BUILDING IDEAS

TOWN+GOWN

2010-2011 Research Agenda

Table of Contents

MANAGEMENT WITH URBAN PLANNING TWIST

ECONOMICS

LAW

TECHNOLOGY

DESIGN

PREFACE

TOWN+GOWN PROGRAM

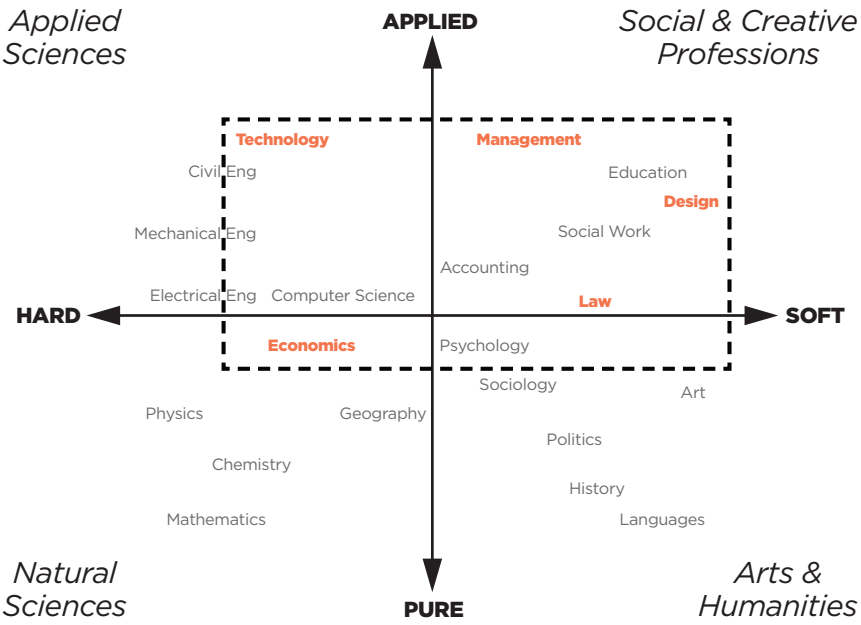
In response to recent calls, from groups as diverse as the construction industry and the preservation community, to increase research activities in the Built Environment, the Town+Gown program embarked on a pragmatic and integrated approach, known as "systematic action research", to increase applied research focusing on the particular physical setting of the City's built environment.

Town+Gown matches academics and practitioners to collaborate on Built Environment research projects, the results of which will generate discussion and follow-up research, aimed at making appropriate changes in practices and policies. These research projects come from the 2010-2011 Research Agenda, which is modeled on the University Capstone program of the Congressional Research Service. Twelve research projects from the 2009-2010 Research Agenda were completed at the end of academic year 2009-2010.

In addition to facilitating partnerships between academics and practitioners, Town+Gown creates space for conversation among Built Environment practitioners and academics about work that has been done and work that should be done and links practitioners and academics by disseminating relevant research and analysis, from various sources, so that we can collectively use research results to inform policy and practice.

FORMAT OF THE RESEARCH AGENDA

This 2010-2011 Research Agenda is organized around five basic disciplines—MANAGEMENT (with a subheading entitled MANAGEMENT WITH AN URBAN PLANNING TWIST), ECONOMICS, LAW, TECHNOLOGY and DESIGN—comprising the recognized multi-disciplinary, if not yet inter-disciplinary, field of the Built Environment.



As shown in the chart above, these core disciplines are themselves located on a matrix, with the horizontal axis representing "a continuum from 'hard' (paradigmatic) to 'soft' (non-paradigmatic)" disciplines, and the vertical axis representing a continuum from the applied disciplines to the pure disciplines.[2] The City's physical built environment can serve as an ideal laboratory for those working in these disciplines. This taxonomy shows where overlaps between professional graduate program disciplines and the Built Environment disciplines occur.

While there is a brief introduction to the issues under each discipline heading, a companion background document, entitled Orientation to Policy in the Built Environment, accompanies this 2010-2011 Research Agenda to explain, primarily to schools and students considering the questions, some of the more technical issues related to the Built Environment. We have placed questions under one of five core discipline headings, though many of these questions are multi-disciplinary. We urge you to read all the way through the document in your search for questions.

Our experience with the questions last year demonstrates a level of flexibility within many of the questions that enables us to work with the schools to refine the questions as discrete projects that are appropriate for school programs and student skills. To facilitate the interactive process to refine questions in this 2010-2011 Research Agenda, all questions contain a list of POSSIBLE TYPES OF PROJECTS to help identify the possible types of research that the questions will permit.

INTERESTED IN A QUESTION?

If you or your program is interested in working on one or more questions, please e-mail (matthewte@ddc.nyc.gov) or call (718-391-2884) Terri Matthews, Senior Policy Advisor at the New York City Department of Design and Construction, who will put you in touch with the appropriate staff from the client agency/agencies.

MANAGEMENT

For the research questions under MANAGEMENT, the City acts primarily in the role of an owner. A critical objective for an owner is to align its interests in budget, schedule, safety and quality with those of its agents in construction who often have superior knowledge that increases during the pendency of a particular project. Since project needs, materials, building methods and information technology continually change "on the ground", construction market participants adapt to such changes by using an evolving menu of service delivery methodologies as well as various management theories, techniques and tools, not dissimilar to those found in other industries or sectors. Finally, since some of the research projects below involve the City's capital program and budget, separate analytical issues related to the City's budget will be present in these questions. For more detailed background information related to MANAGEMENT issues, please see Orientation to Policy in the Built Environment.

How Can the Risk Management Model from the Healthcare Industry Improve Construction Practices?

BACKGROUND:

Risk management—the systematic process of identifying, evaluating and addressing potential and actual risk in a process or operation—was introduced to the hospital setting almost 30 years ago, primarily in response to a crisis in medical malpractice. While a desire to protect an institution against, or mitigate the impact of, malpractice litigation often underpins risk management practices, there is a correlative desire to improve patient and worker safety as an end in itself. In the hospital risk management field, regardless of any litigation outcome, a "sentinel" or critical event creates opportunities for a "root cause" analysis of the causes and factors, generating potential operational changes in the organization to avoid or minimize known risk and improve operations and safety for its own sake.

QUESTION(S):

What lessons can a public owner, such as the City, learn from the healthcare risk management model?

What are best practices in risk management? What changes would be necessary for City agencies to implement such practices?

What does analysis of the City's historical claims and litigation data suggest about long-term trends in construction-related risk? What types of things tend to go wrong on City construction projects?

Based on the analyses above, what constitutes successful outcomes in construction and what seem to be preconditions for success?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

Foundational Research: Conceptual Modeling

Data Collection: Designing and Fielding a Survey

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Statistical/Econometric Modeling

CLIENT AGENCY/AGENCIES:

HHC, Parks, DDC

Why Does It Cost So Much to Build in New York—Public Projects?

BACKGROUND:

New York City construction costs have historically been the highest among all U.S. cities. Public construction cost increases are driven by a combination of market conditions and construction-related practices. It has been suggested that there is a premium for public construction projects as well. Public works programs must continue despite market changes, whether positive or negative. Those components of cost increases related to policies and practices that are not mandated by law present opportunities for public owners to contain or reduce costs. Understanding what actions public owners can take to contain or reduce costs would be critical to manage project budgets. Understanding the drivers of costs can help owners develop effective strategies to deal with turning points in the market when it changes from a buyer's market to a seller's market and then back again.

QUESTION(S):

After a literature survey on the drivers of construction costs, with a focus on public construction programs, the team would perform analyses of available cost data to test hypotheses about the effects of public construction practices on construction costs. Additional questions to be analyzed:

To the extent drivers of increased costs are within the City's control (e.g., discretionary City processes and practices), how should the City reform processes and practices and/or develop strategies to minimize cost increases over time?

For those drivers outside the City's control, how could the City develop risk management practices and feedback loops to eliminate or mitigate the impact of cost increases?

With a better understanding of the cost drivers, how could the City construct a City-specific model of cost increases for capital budget planning processes to complement the appropriate general cost inflator for the capital plan/10-year capital strategy periods? Would insight from our actual costs enable City estimators to modify cost manual data to achieve better estimates?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Statistical/Econometric Modeling

CLIENT AGENCY/AGENCIES:

DEP, Parks, OMB, Mayor's Office of Contract Services, DDC

How to Balance Cost and Quality More Effectively?

BACKGROUND:

The cost of a built thing is the cost of a particular combination of function, durability and aesthetics. Several possible combinations exist along a continuum of prices. The interplay between the owner's prioritization of the project's functions and the costs of such functions creates the value exercise, which is ultimately bounded by what the owner wants and is able and/or willing to pay. Value, the ratio of function to cost, can be increased by either improving the function or reducing the cost or a combination of both. This exercise is part of the industrial production management discipline known as Value Engineering (VE), a systematic method to improve the "value" of goods and services by a rigorous examination of function.

The City instituted its VE process in 1983, subjecting certain capital projects to the traditional "pause and look" VE process during the later part of the design process to provide an opportunity for all stakeholders to get a "reality check" on a project's functionality, cost and schedule. The impact of a VE review on project schedule varies and can be problematic for the schedules of certain projects. Further, some feel that the designer, if properly performing, engages in VE-like analysis from the beginning of the design process, possibly rendering the VE process somewhat redundant. Moreover, many design professionals believe that not all the variables in the value equation are truly operable—or more specifically, that only cost reduction is operable at the expense of function and design priorities.

There are many design management methodologies used in construction, some of which come from the industrial design field and others which come straight from the construction field. They include Functional Analysis Conceptual Design (a variant of VE), Target Cost Modeling, Target Value Design, Total Quality Management, Multi-disciplinary Design Optimization, Lean Manufacturing and, from the U.K., Design Quality Indicators. The newest entrants consist of a technological tool—Building Information Modeling—and a service delivery methodology—Integrated Project Delivery. The trend among all of these is the earliest and continuous application of the management techniques with as many stakeholders as possible.

QUESTION(S):

What would a literature survey on design management methodologies and tools suggest for public owners like the City?

What would case studies of various public owner VE programs suggest for the City, were it to attempt to resolve tensions from the application of VE, an industrial design technique, to construction projects? What are best practices?

What would a cost-benefit analysis of the City's VE program suggest for the City?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Statistical/Econometric Modeling

CLIENT AGENCY/AGENCIES:

DDC, OMB

How Can Public Owners Better Match Risk Shifting/Mitigation Strategies to Risk?

BACKGROUND:

The financial planning for, and the design and construction of, long-lived physical assets—vertical structures or horizontal infrastructures or combinations of both—involve sets of relationships in a shifting environment of unequal information and imperfect understanding. Public owners, like all owners, bear the ultimate responsibility for a capital project—from program definition to payment—and are concerned with budget, schedule, safety and quality, in a milieu that is the poster child for asymmetric information. Thus, a critical objective for an owner is to increase the chances of aligning its interests in budget, schedule, safety and quality with those of its agents in construction, the designer and the contractor, who often have superior knowledge about the owner's project. Risk management methodologies, most often used by private sector enterprises to assess and manage risks across entire corporate operations, can be useful tools to help public owners identify opportunities to make their capital programs more efficient, beginning in the capital planning process, including the project development process, and ending with the project commissioning process.

QUESTION(S):

What would a survey of risk management practices, in general and specifically in construction planning and execution, at large owner organizations, either public or private, reveal for public owners such as the City?

What strategies can public owners use to better manage risk in construction, from planning to project operation and maintenance?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Data Collection: Designing and Fielding a Survey

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

How Do Public Agency Construction Practices Vary and What Is the Relation of Variance to Cost and Schedule?

BACKGROUND:

While the 1979 Model Procurement Code influenced the City's procurement provisions in the Charter, State public construction law prevents the City from utilizing some of the more flexible procurement tools included in the Charter. The City's construction-related procurement rules further integrated the Charter with State law. As a result, some project management methods commonly used by private owners, as well as public owners governed by different laws and regulations, such as the Design-Build and Construction-Management-at Risk service delivery methodologies, are not widely used by City agencies.

However, other construction contracting practice variations that fall squarely within the parameters of State law and City regulations may also have significant impacts on City agencies' performance in project execution. These include variations in the roles played by construction managers and resident engineers, as well as variations in the use of pre-qualification, a tool that is now more widely available as a result of a recent change to State law. While several steps in the process are prescribed Citywide by the regulations, internal operational approaches to execution can differ among agencies.

All of these practices, especially those used by public owners in other jurisdictions, may give the City insight into feasible ways to streamline the contracting process, while promoting the Model Procurement Code's—and the City's—procurement values. While these additional methods may require changes to State law, the City has been hampered in its efforts to pursue greater flexibility in State law by the absence of reliable data concerning the savings and other benefits potentially to be derived from their use.

QUESTION(S):

What are the variances in practice among City agencies that procure large-scale construction services?

What would a comparative analysis of operational practices in the contracting process reveal?

Working from the comparative analysis of City agency practice, what is the relation of agency practice to project performance—schedule and budget?

What would a survey of practices by other public owners that have adopted 1979 Model Procurement Code provisions reveal as possible options for the City to consider, either within its current legal framework or in the context of legislative reform?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Designing and Fielding a Survey

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

CLIENT AGENCY/AGENCIES:

DCAS, DSNY, Parks, EDC, Mayor's Office of Contract Services, DDC

How to Ensure Financial and Environmental Sustainability of Public Art?

BACKGROUND:

The City Charter has, since 1982, required that a one percent allocation of capital funds for new construction and renovation of City-owned buildings with public access, be used for the commissioning of permanent works of art. Such art work projects are subject to environmental and financial sustainability challenges.

QUESTION(S):

What would a literature survey on the response of public art programs, across the country and outside the U.S., to concerns with environmental and financial sustainability suggest for public owners like the City?

What are best practices among large public art programs, both across the country and outside the U.S.? Since legal and policy-based restrictions on the use of capital and concession-derived funds vary across jurisdictions, a separate analysis of such restrictions would be helpful.

What kinds of statutory changes—at both State and local levels—would be required for the City to implement these identified best practices?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling

CLIENT AGENCY/AGENCIES:

DCA, DDC

How to Manage the Impact of Politics of the Capital Budget on Project Costs and Execution?

BACKGROUND:

Since there are many components of cost increases for public projects, one issue in evaluating cost increases is deciding when, during the capital-planning-to-project-execution continuum, it is appropriate to establish the baseline measure of cost estimates upon which to evaluate the increase in costs. Unlike the private sector, in which decisions about whether and how to do a project are completely private, in the public sector, the planning and execution of public projects take place in a public and politicized process of the capital budget.

The City's capital budget process anticipates a post-adoption process of increasing understanding of the project, which often increases the project estimates figures, yet the public often views these increases as evidence of public sector incompetence. But a process that permits more projects into the capital budget due to unrealistic initial cost estimates results in slowing them all down, on the margin, as funds to make up the difference need to be found, usually from other projects, resulting in the delay or elimination of projects which may by then have a public constituency. Further, agreements with the surrounding community about related amenities can exacerbate the upward slope of project costs. Moreover, some academics have suggested the politics of capital planning extend to the purposeful underestimation of costs and overestimation of benefits in order to obtain political buy-in from the taxpayer public.

Since it is not possible or desirable to eliminate the politics of capital planning and budgeting, developing a better understanding of the impact of politics on the costs of the public capital program, however, might enable public owners to craft capital plans and budgets that better reflect their impacts sooner in the process.

QUESTION(S):

What would a literature survey about the impacts of the politics of capital planning and budgeting processes on the costs of public projects suggest for public owners like the City?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling

CLIENT AGENCY/AGENCIES:

DEP, OMB, DDC, EDC

How to Increase Project Planning and Scheduling Certainty?

BACKGROUND:

Understanding the overall timing of a project – how long it will take a public agency to move from "idea" to "building" to "completion" – and what factors influence decision-making as well as actual project execution would help the City better estimate a project's schedule and better plan its capital program. Elected officials frequently make commitments to constituent groups to deliver certain projects – for example, libraries, firehouses, improved streetscapes, parks. Yet the insufficient level of understanding of project scope and client needs when the project first surfaces in public, often before or at budget adoption, results in unrealistic estimates of cost and schedule and corresponding unrealistic expectations which construction agencies are thus often in the position of not meeting. The complexity increases when projects involve more than one City agency or participation by other levels of government or private sector organizations.

A seminal study observed that, among the many factors that cause change in project schedule and costs, changes in the macro-environment of a project is a key determinant. The macro-environment for a project generally includes the political, economic and cultural environment, within which applicable laws and regulations, labor practices, and prices operate to impact schedule and costs. The study also noted that regulatory requirements imposed by government have a significant impact. For private projects, the "government" is always an external factor, but for public projects, the "government" is not always external and is, to some extent, controllable.

QUESTION(S):

What does a map of **all** City processes related to capital planning and project execution look like and what are the time periods associated with the various processes?

What would a literature survey on the nature of factors that cause schedule volatility in both public and private sectors suggest for public owners like the City?

What are best practices among public owners and large institutional private owners to manage schedule volatility?

Using data from the City's capital program:

- what would a case study of a particular project type in the City capital program suggest as possible causes of schedule and budget volatility?
- how might the City design a quantitative model to evaluate the impact of internal and external environment changes on project schedule?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

Foundational Research: Conceptual Modeling

Data Collection: Designing and Fielding a Survey

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

Quantitative Analysis: Statistical/Econometric Modeling

CLIENT AGENCY/AGENCIES:

Mayor's Office of Capital Project Development, DDC

How Do Other Cities Do It—Pro-active Infrastructure Maintenance?

BACKGROUND:

The task of maintaining public infrastructure is technically difficult and subject to competing forces including the political benefits that accrue to visible new and expansion projects. On the technical side, however, some jurisdictions are using protocols to inspect and evaluate existing infrastructure on a regular inspection cycle, using software to evaluate/compare previous inspection results and to estimate when repairs will be needed to prevent failures. The City is interested in learning more about what has been effective elsewhere.

QUESTION(S):

What would a literature survey of infrastructure assessment techniques suggest to public owners such as the City?

How do other agencies and local governments in the State and across the country evaluate infrastructure asset condition and what protocols do they follow?

How effective have these protocols been; specifically, how well have they projected rates of deterioration?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

What Tools Have Been the Most Successful in Enabling Agencies to Better Manage Scope Changes as Large-Scale Capital Projects Evolve?

BACKGROUND:

Change is an inevitable part of capital construction projects. Changes to such projects have cost implications, rarely resulting in lower costs. Thus, it is imperative for the owner to understand and manage change at all times during construction. The City's capital budget process explicitly expects and is set up to accommodate change from project inception (at budget adoption) through the bidding process and beyond. The Charter includes a capital project "road map" with stages that each capital project must follow. This process expressly assumes that projects change over time, and it is in the interest of project budget and schedule to anticipate and manage such change.

Some construction agencies have developed effective change management techniques. For example, DOT uses contract provisions such as the contractor-initiated value engineering change (CIVEC) process, incentive and disincentive specifications and various fixed price lump sum specifications (acceleration, incidental repairs and bridge flag repairs). DEP uses contract provisions called cost reduction incentives (CRIPs). Price indexing for certain component materials and contingency work allowances are also used by various agencies.

QUESTION(S):

What is the menu of techniques in use across City agencies and what is the impact on cost and schedule, as these innovative provisions are used in large-scale projects?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Designing and Fielding a Survey

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

CLIENT AGENCY/AGENCIES:

Mayor's Office of Contract Services, EDC, DDC

Future Workforce Needs and Development—Sources for Future Construction Professionals and Skilled Workers?

BACKGROUND:

There are concerns about the adequacy of the supply for all construction professions. For example, the City, one of the largest consumers of engineering services, has depended on professionals from other countries for some of its supply of civil engineers. This source is subject to demand from these other countries, which have increased opportunities as a result of their own development, as well as from adjacent areas where development has also increased. The U.S. is no longer the most attractive buyer of engineering services. What can the City do to look ahead and work with the local professional institutions to make sure that there is adequate construction management staff available over the long term? How might the City examine its professional staffing requirements over the next several decades and plan the steps necessary to insure the maintenance of capital management excellence?

QUESTION(S):

What would a literature survey on the demand for and supply of construction professionals suggest for public owners like the City?

What do other agencies and local governments in the State and across the country do to attract and retain construction professionals in public sector work? What are best practices?

What would a series of interviews at professional schools suggest for public owners?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Designing and Fielding a Survey

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC, Mayor's Office of Contract Services

How to Bridge Organizational Divides to Create Culture of Innovation within Built Environment Agencies?

BACKGROUND:

It has become axiomatic that there is insufficient research in the Built Environment field. Problems in "informational transfer" abound in this area, further complicating the ability to do effective research. Divides exist between academia and practitioners and within practitioner organizations. Focusing on the large public owners/practitioners, one can see the divides that typically occur within large public bureaucracies, with vertical, hierarchical structures of command and control, applied to the built environment milieu. In addition, divides between the "permanent government" and elected administrative apparatus over the long term can operate to dim institutional memory. The inability of knowledgeable agency staff to translate institutional memory effectively up the agency hierarchy and to elected officials every time an issue arises may be, in part, due to the complexity, the obscurity and technical nature of some issues, surrounded by a conventional wisdom that is as fragmented as the state of formal analysis in this area. This is compounded by the possibility that there may be an ineffective bridge between upper policy management and lower data management.

QUESTION(S):

What are non-technological obstacles that prevent effective information transfers up and down the hierarchy that can then serve as a source of strategies to increase information transfers and make institutional memory more resilient?

What techniques are available to large government systems to bridge divides and move toward "smart" or "more informed" development and execution of capital programs?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling

Data Collection: Designing and Fielding a Survey

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

How to Evaluate Contractor Capacity to Undertake Public Projects?

BACKGROUND:

Despite the presence of large construction firms, the predominant business model for construction firms is the small business. There are two views on the prevalence of small businesses in construction. On the one hand, it may be socially beneficial to have small businesses, often emerging businesses, participate in the industry, growing over time. On the other hand, it may be viewed as an economically inefficient mode of industry organization. The organizational and capacity issues facing emerging and growing contracting firms are not unlike those facing emerging and growing not-for-profit service organizations. From the public owner's perspective, however, there are practical issues inherent in assessing the capacity of small businesses to work on large and/or complex projects. Further, under State law governing public construction procurement, while there are limits on how a public owner can disqualify a potential winning bidder, there is an ability to pre-qualify bidders.

QUESTION(S):

In view of current methodologies to analyze the capacity of organizations, the composition of the local construction market and the needs of projects in the City's capital program, how might City agencies design tools to the assess the capacity, including financial capacity, of vendors to perform on various public projects?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling

Data Collection: Designing and Fielding a Survey

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC, Mayor's Office of Contract Services

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

BACKGROUND:

Some design management techniques and project management tools emerged from the industrial design field and were applied to construction, while others emerged from the construction field itself. Despite their different origins, successful techniques share a basic precept that the earliest practicable and continuous application of these techniques, including all relevant participants and stakeholders in the process, works best for the project at hand. The newest entrants to the firmament consist of a technological tool—Building Information Modeling or BIM—and an innovative service delivery methodology—Integrated Project Delivery or IPD.

BIM originated from parametric solid modeling (PSM) software used in the automotive and aerospace industries, and as these software platforms evolved and became less expensive, they migrated into the field of physical structures. BIM can hold large amounts of data—spatial, schedule and cost—permitting users to explore various building designs at the earliest possible stage as well as the inter-relationships among design, constructability, schedule and price. Public owners have been using BIM, though their ability to fully exploit its benefits is limited when a public owner can only use the design-bid-build methodology which imposes a temporal divide between the designer and contractor.

IPD is an innovative relational contractual arrangement in which the owner, designer and contractor, manage project risk by contractually sharing, as early as possible in the life of a project, responsibility, risk and reward. Public owners constrained by public bidding requirements that preclude vendor selection based on value as well as contract negotiation, cannot use this innovative methodology.

QUESTION(S):

What would a survey of large public owners use of BIM and/or IPD reveal of public owner adoption of BIM/IPD?

What is the relation of BIM and IPD use in the public sector to existing tools and techniques currently in widespread use? In other words, how have public owners constrained by law picked up features of either BIM or IPD? What has been the relation of BIM to IPD and vice versa on public projects?

What has been the experience of owners—private owners and especially large public owners—that have embraced either or both BIM and IPD?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Public Owners Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Designing and Fielding a Survey

Quantitative Analysis: Data Analysis

CLIENT AGENCY/AGENCIES:

DDC

What Can Public Construction Cost Data Tell Us?

BACKGROUND:

Various studies analyzing public construction cost data have suggested that various aspects of public construction reality may be at odds with the intent of the many laws mandating the public construction process. For example, there are studies analyzing the relation of prices bid to predatory bidding as well as to the magnitude of change orders. There are studies analyzing the relation of original cost estimates to final costs, implicating elements of the politics of public construction. There are studies analyzing the relation of initial project and/or life cycle costs with service delivery methodologies. There are also studies analyzing the costs associated with negotiated construction methodologies and with auction-based construction methodologies, suggesting aspects of appropriate construction contract design to align principal and agent interests in a situation of incomplete information, the definition of a construction project.

Quantitative analyses would be critical to definitively assess the degree to which the mandated public construction process imposes avoidable costs on public owners that management practices alone cannot resolve. To tackle such a daunting task, however, requires some important foundational research.

QUESTION(S):

What would a survey and cataloguing of construction cost quantitative analyses suggest for a public owner about to embark on analyses of its own cost data?

What would a survey and cataloguing of public and private construction cost data suggest?

Based upon the surveys above, what would the most effective strategy be for a public owner to pursue to systematically analyze its cost data to illuminate the nature of its practices, policies and mandated processes?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

Data Collection: Building the Dataset

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

How Can a Public Owner Apply Continuous Improvement Methodologies to Standardization Practice in Construction?

BACKGROUND:

Public owners, such as the City, have turned to design and materials standards and, in particular, standard specifications contained in bid documents to attempt to manage costs and quality. There is the risk, however, in the bureaucratic environment of large public owners, that standards, once issued, may not change quickly enough to take advantage of innovative design and construction techniques and new materials. The bureaucratic tendency is compounded in an industry that has historically been slow to adopt innovative methods and materials. Failure to update standards increases the risk that static standards may, at some point, fail to contain costs and/or maintain a certain quality.

QUESTION(S):

What would a literature survey on the use of design and construction standards in both public and private sectors suggest for public owners like the City?

What are best practices among public owners and large institutional private owners in adopting and updating standards? To what extent do these best practices address the ability of a large public owner to change standards to reflect innovations in practices and materials?

To what extent would standard specification practices from the industrial design world be applicable to construction in general and public construction in particular?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

Mayor's Office of Contract Services, DDC

How Can Public Owners Embrace Life Cycle Costing?

BACKGROUND:

To the untrained observer, it would seem that the public sector has historically turned a blind eye to life cycle costs. Outmoded conceptions of the construction product, participants and process inform current public construction law, creating disconnects in the practices of public owners. These outmoded statutory schemes are often not often within the control of some public owners. For example, outmoded statutory schemes that control local government activities are often creations of higher state law, leaving some public owners unable to change practice. Other processes and practices are within the public owner's discretion, but politics intervene and discourage policy and practice improvements.

The rational public owner, and equally the rational taxpayer, should want the public owner, or government, to provide school buildings, road and bridges, drinking water and waste water treatment facilities and their related services over many years, necessarily implying that operation and maintenance costs after initial construction costs must be paid. Yet many factors conspire against the explicit and early assumption and planning for such life cycle costs as part of the initial public investment decision processes. First, State procurement law requires a focus on initial costs only. Even the most sophisticated long-term financial planning systems only project out for five fiscal years, too short a period to effectively link the projected operation and maintenance costs to the expense budgets outside the plan period. The politics of capital projects may further conspire to overestimate benefits and underestimate the costs, whether initial or life cycle, of proposed projects. Finally, for existing infrastructure, the estimates of state of good repair activities, done correctly, may overwhelm capital budget resources, crowding out the politically popular new and expansion projects. What's a public owner to do?

QUESTION(S):

What elements of the public-private partnership methodology can be applied to the traditional processes of planning, financing and construction of public capital projects and how?

How can public owners effectively balance state of good repair capital needs with needs for new and expansion projects?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

How Can the City Apply Life Cycle Costing to its Street and Public Space Programs?

BACKGROUND:

The City is at the forefront of the nationwide shift to a more effective and holistic approach to funding, building, maintaining and managing streets. At the root of this transition is the recognition that every street serves a number of functions beyond the movement of vehicles. The reliability of any project assessment depends on the use of criteria that accurately reflect a street's particular functions while drawing on reliable cost and durability data for materials under consideration. At the same time, in the design and construction of its streets and public spaces, the City seeks to use materials that are high-quality, durable, and cost-effective.

Various capital planning and budget mechanisms are in place to ensure that street and public space projects make the most effective use of taxpayer funds. For their criteria to remain effective, it is essential that they be continually refined to reflect current City priorities and the most up-to-date information on material technology and characteristics. In particular, the criteria should reflect the full lifecycle costs and benefits associated with various treatments. Granite curbs, for example, are more costly up front than the concrete alternative, but they are far more durable over time. The decision of which is best for a particular site should be informed by empirical research on the various costs – initial installation, maintenance and replacement – that can be amortized over time. Without considering the full lifecycle costs of a material, it is not possible to have a full understanding of which materials are best-performing and most cost-effective in the long term.

QUESTION(S):

What would an evaluation, focusing on full lifecycle cost, of the primary categories of street materials that DOT uses suggest for the purposes of proposing improvements to the City's specific screening criteria so that those criteria incorporate full lifecycle costs and accurately reflect the latest research and technology?

What is the latest research on the costs and benefits of materials for a range of applications in streets and public spaces? What do other public owners and, in particular, transportation agencies do? It is intended that these synthesized results would be used to inform proposed strategic improvements to the City's existing mechanisms to review and approve street materials and designs to enhance DOT's ability to plan high-quality street and public space improvements that are cost-effective and can be proven as such.

The final product of the project would include the following:

A review of relevant literature and past research;

Table(s) that summarize any findings on the costs (both up-front and over the life of the treatment) and longevity of various materials;

Recommendations and conclusions on the implications for the City, including discussion of potential gaps in the body of research.

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DOT, DDC

MANAGEMENT WITH URBAN PLANNING TWIST

In the questions that follow under this sub-heading, MANAGEMENT WITH URBAN PLANNING TWIST, some management issues are made more powerful when the owner is a governmental entity with formal municipal planning powers. The use of this sub-heading is an attempt to conform to the identified core disciplines of the Built Environment, described above, for research questions with an urban planning twist.

How Can Urban Planning Strategies Help Manage the Inevitable Mismatch between Static Capital Assets and Demographic Trends?

BACKGROUND:

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. Public owners may find it difficult to change policies or practices quickly, especially in view of the practice of over-building public assets to assure they last "forever" in the face of historical insufficient maintenance activities after construction 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 a 2009-2010 Town + Gown urban planning workshop, which recommended, among other proposals, developing plans for multiple compatible uses within underutilized 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. Difficulties in coordinating such efforts and allocating expenses for separate agencies providing services have impeded implementation. Since then, however, the sustainability agenda has placed a focus re-adaptive reuse of existing buildings, and trends in work standards have evolved to include job sharing, telecommuting and flexible co-location of staffs from various offices across an organization.

QUESTION(S):

Building upon the work of the 2009-2010 Town+Gown urban planning workshop, how might the City implement some of the workshop's recommendations, especially the recommendation to develop plans for multiple compatible uses within underutilized structures in order to optimize utilization the City's capital assets?

How might the City improve on the long-term accuracy of demographic forecasting models underpinning the capital planning for all City agencies? What precautionary strategies could the City use to mitigate the inadequacies of demographic forecasting instead of playing catch-up when the mismatch between assets and demographics becomes obvious? Further, what planning techniques are available to the City to actively influence demographics instead of reacting to them?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

Mayor's Office of Operations, DDC

How to Develop an Evaluation Tool for Environmental Assessment and Impact Surveys?

BACKGROUND:

The City Environmental Quality Review (CEQR) law mandates environmental review for projects in New York City that require governmental discretionary action. CEQR originated as part of a set of laws across the country, enacted almost 40 years ago, when environmental science was itself relatively new. The intent of these laws was to force government to take a "hard look" at the environmental consequences of its actions. Yet these laws have come, over time, to function as a public disclosure law because they include no enforcement mechanism to ensure proposed mitigations were actually implemented. These laws, and the risk of related litigation, tend to negatively impact the project development schedule. Further, the timing of discretionary actions that trigger environmental review requires estimating possible environmental impacts at the earliest phases of a project, before project scope, design and budget are fully complete, all of which estimates determine the nature of proposed mitigation actions in the event an environmental impact is found.

Sufficient time has passed to enable the City to evaluate the effectiveness of CEQR's tools—the Environmental Assessment Statement (EAS) and the Environmental Information Statement (EIS). Like the 2009-2010 Town+Gown project to develop an evaluation tool for zoning actions, this project would develop an evaluation tool for the EAS and the EIS. Like zoning resolutions, the EAS and the EIS contain an evaluation of the estimated effects of a proposed project.

QUESTION(S):

What would a literature survey about evaluation tools for land use activities, such as environmental review, suggest for the City? What evaluation tools outside the land use area could be modified for use in environmental review activities?

What are best practices in environmental review and evaluation of such reviews across the country that would be suitable for large dense urban area such as the City?

Based on the above work, how might the City design an evaluation model for the EAS and EIS?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

What Is the Impact of Less-Than-Perfect Levels of State-of-Good-Repair Investments—or Is Almost "Just-in-Time" Repair Good Enough for Infrastructure Systems?

BACKGROUND:

The City experiences impediments in planning for, and achieving, state of good repair investments. At the same time, the mismatch between long-lived capital assets and changes in the demand for the related services that inspired the project in the first place might argue against rigid application of planning, budgeting and execution rules that do not reflect such dynamics. Continuing evolving technology may also argue against rigid application of such rules, since replacing near or at the time of actual failure permits the replacement to take advantage of the latest technology. Further, there have been recent advances in applicable quantitative techniques such as hedonic place-in-place regression techniques for types of capital investment as well as engineering analytical techniques based on the epidemiological statistical modeling.

QUESTION(S):

What would a literature survey of capital asset condition assessment theory and practice and a complementary literature survey on recent innovative technology in asset evaluation techniques suggest to public owners such as the City?

How do federal, states and other local governments across the country evaluate asset condition and what systems do they follow to plan for, budget and execute such state-of-good-repair work? What are best practices?

Based on the literature review and survey of best practices, what elements should be in a public owner's state-of-good-repair standard that applies to and/or governs capital project planning, budgeting and execution?

Based on the literature survey, how might the City design a quantitative methodology to evaluate the impact of less-than-perfect levels of investment in state-of-good-repair activities?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC, OMB

How Do Other Cities Do It—Design Oversight of Public Realm?

BACKGROUND:

Established in 1898 as the Art Commission, New York City's design review agency was renamed the Design Commission in July 2008 to better reflect its mission. The Design Commission reviews permanent works of art, architecture and landscape architecture proposed on or over City-owned property. Projects include construction, renovation or restoration of buildings, such as museums and libraries; creation or rehabilitation of parks and playgrounds; installation of lighting and other streetscape elements; and design, installation and conservation of artwork. As the City's mature built urban environment moves forward into this 21st century, issues related to the aesthetics of the public realm are bound to come up, making this an optimum time to begin some threshold analyses.

QUESTION(S):

What are the aesthetic issues for mature built urban environments?

What are the various interests involved in and affected by aesthetics of the public realm?

What do other mature urban environments do to raise and manage aesthetic issues?

How might the City shape and oversee these issues?

Based upon a model of the costs and benefits of the current scheme, what would the costs and benefits of possible alternative models be?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

CLIENT AGENCY/AGENCIES:

Design Commission, DDC

How Do Other Cities Do It—Systematic Planning for Services and Related Capital Assets?

BACKGROUND:

The planning of public facilities and infrastructure related to service delivery is often done by agencies in isolation from each other, making it difficult for system-wide planning to make optimal use of capital facilities. Theories on program performance and/or fiscal benefits from service delivery centralization or decentralization vary over time and with facts. But integrated systematic planning that focuses on both the service and the facility where it is delivered across the entire enterprise could yield improvements in service performance, optimization of related facilities and avoided costs.

Structures and infrastructure are no longer static items with fixed life spans. For large institutional systems, such as hospital systems and universities, the rapid change in technology has forced them to view their capital inventory more flexibly as combinations of systems with respective different useful lives that can be manipulated to meet anticipated and unanticipated needs. In addition, the current environmental sustainability agenda has increased interest in designing for sustainability over time as well as in adaptive reuse of existing assets. Further, recent trends in work standards, such as job sharing, telecommuting and flexible co-location of staffs from various offices across an organization also create tools for institutions to consider when dealing with future system needs.

QUESTION(S):

What would a literature survey suggest to public owners such as the City about the possibilities of integrated systematic capital planning?

What program performance and capital planning issues are raised by the concept of integrated systematic planning?

What are the various interests involved in and affected by such a methodology?

What types of integrated planning practices do other cities use to optimize their use of capital facilities? What are best practices?

Based upon a model of the costs and benefits of the current methodology, what would the costs and benefits of possible alternative models be?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

CLIENT AGENCY/AGENCIES:

OMB, DDC

How to Expand the Use of Cross-System Environmental Protection Methodologies?

BACKGROUND:

A pressing long-term issue facing the City's built environment is how to address climate change issues cost-effectively. As the natural environment consists of various inter-related systems, the City's built environment mirrors such inter-related systems, so that cross-system efficiencies may be possible. The most recent example of cross-systems thinking has been on storm-water issues. A related issue is determining the scale at which, or a combination of scales at which, a particular problem can most effectively and efficiently be addressed.

QUESTION(S):

Using the storm-water issue as the take off point, how should the City analyze other cross-system environmental protection options for future implementation?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

How to Promote More Sustainable Neighborhoods—Economically, Socially and Environmentally?

BACKGROUND:

The sustainability agenda has exposed the interdependence of all aspects of life, from the economy to the environment and the social network. Environmental sustainability requires accounting for the economy's negative externalities upon the environment, but once negative externalities to the environment are identified, it becomes difficult to ignore related social negative externalities. The full cost accounting methodology provides a means to identify and assess the inter-related economic, social and environmental externalities from a proposed economic activity. Planning for development in an urban environment is a governmental activity and the resulting development is an economic activity that both impacts the social network—or neighborhood—and the environment.

QUESTION(S):

How might the urban planning function take advantage of the full accounting methodology to study the impacts of a proposed action on the neighborhood, and the wider jurisdiction, taking into account the economy, the social network and the environment?

How might the urban planning function use full accounting in an evaluation tool to measure the effects of a planning action within a neighborhood and within the jurisdiction as a whole?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Designing and Fielding a Survey

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DCP, DDC

ECONOMICS

For the questions under ECONOMICS, the City acts in the role of either economic policy maker or regulator. The City builds and funds, through its capital program, a significant portion of New York City's public realm. The public works or capital programs of all levels of government are, in essence, work orders for facilities relating to "social" or "public" goods and to "mixed goods" that correct for negative and positive externalities, and while engaging in such activities, the City acts in its role of economic policy maker. In its role of regulator, the City directs and regulates private capital participation in the public realm (e.g., utilities—telecommunication, electricity, gas) and regulates the safety of the construction process and the products of construction of both public and private owners. Moreover, the practices of large public owners within a regional construction market have impacts on such market. For more detailed background information related ECONOMICS issues, please see Orientation to Policy in the Built Environment.

Future Workforce Needs and Development—What Are the Conditions for Construction Business Formation and Success?

BACKGROUND:

The fragmented construction industry contains many sub-markets within a local area and a wide spectrum of organizational forms. To some degree, the size and complexity of prevalent construction project types can define the nature of the local market. The local market for Manhattan, dominated by high-rise offices and housing structures, is quite different from the local market for Brooklyn, dominated by low-rise multi-family housing. Further, the industry is also a haven for small businesses. Despite some consolidation in the industry, after the several top national firms, the size and revenues of the remaining construction companies drop off sharply.

One assumption behind the public construction solicitation methodology is that an open competitive process will assure a competitive market in an economic sense. Unexamined public construction laws, however, may create regulatory complexities that operate as inadvertent barriers to effective competition. Standard public construction contracts reflecting the statutory scheme may not permit variation in approaches to reflect different local construction markets, and may also operate as inadvertent barriers.

Research and analysis are necessary to understand the local construction marketplace(s) better in order to develop appropriate strategies to fill market gaps, to help support business capacity development, especially for small businesses, and to increase/preserve competition by reducing unnecessary barriers.

QUESTION(S):

What would a literature survey on the origins and life cycle of construction contractors and subcontractors, the sources and training of entrepreneurs, the internal and external barriers they face, and the components of success suggest for public owners like the City?

What would case studies of several small construction businesses across the City suggest for the City?

What do other agencies and local governments in the State and across the country do to increase small construction business capacity? What are best practices?

What would analysis of defaulted contractors and contractors in trouble during construction reveal about small business capacity issues and issues businesses face as they try to move from one level to the next?

After the qualitative work above, designing and conducting a survey for small businesses in a particular market may become feasible.

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Designing and Fielding a Survey

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

SBS, DDC, Mayor's Office of Contract Services

How Do Service Delivery Methodologies Increase Alignment between Principal and Agent?

BACKGROUND:

Modern methodologies permitting public owners to match project needs with the services of construction professionals include design-build, design-build-operate-maintain, and design-build-finace-operate-maintain, and require "best value" selection criteria currently not permitted to many public owners. New York State law prohibits public owners from using the modern successors to traditional design-bid-build that private owners have used for many years.

The various service delivery models allocate and manage risk among the owner, the architect and the contractor in different ways. The appropriateness of a particular service delivery model depends on the complexity of the project and the internal capacities of the parties. There is no one perfect service delivery model—the benefits and disadvantages of the models vary with the particulars of the project and the parties.

QUESTION(S):

What would a literature search on the relation between service delivery methodology and project schedule, budget, safety and quality suggest for public owners?

To the extent a literature review uncovers quantitative analyses of actual construction projects, how might the City design a quantitative analysis to evaluate the City's design-bid-build projects against other public owner projects using other methodologies?

For those jurisdictions, unlike New York, that allow public owners to use modern service delivery methodologies such as design-build-operate-maintain, what are the quantitative and qualitative differences between publicly owned and operated construction projects and publicly owned but privately operated construction projects?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

Quantitative Analysis: Statistical/Econometric Modeling

CLIENT AGENCY/AGENCIES:

DDC, Mayor's Office of Contract Services

What Are the Impacts of Road Infrastructure Reconstruction?

BACKGROUND:

The City's diverse capital program rehabilitates, maintains, and expands the public infrastructure of a large and complex built urban center. Routine street reconstruction combining planned water and sewer reconstruction with planned upgrades of City streets, performed by DDC in conjunction with DOT and DEP, is an essential part of keeping the City's infrastructure in a state of good repair and likely has an impact on the economic vitality of business districts and property values of residential districts. The recent federal stimulus bill underscores the important relation of capital infrastructure projects to the economy. It is possible to evaluate various dimensions of the costs and benefits (internal and, to the extent possible, external as well) of capital street reconstructions over time, against a set of control data such as crash data, retail sales, property values or sales prices (as described in greater detail below), crime, environmental impacts and perception of residents/business owners/shoppers.

QUESTION(S):

What would a literature survey of the impacts of roadway construction on various indicators suggest to public owners such as the City?

What would be the appropriate strategies to pursue/methodologies to use in analyzing the impacts of roadway reconstruction on the surrounding neighborhood?

Based on the results of the literature survey and using statistical techniques, including hedonic place-in-place regression, for other types of capital investment, what are the impacts of the City's roadway reconstruction projects on the surrounding neighborhoods?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Statistical/Econometric Modeling

CLIENT AGENCY/AGENCIES:

DDC, DOT

What Economic Factors Influence Costs and Project Efficiency on Roadway Projects?

BACKGROUND:

Owners, especially public owners, use in-house personnel and contracted consultants on projects in different ways and proportions in order to manage the schedule during the year. While consultants are initially more expensive than in-house personnel, agencies can remove consultants from projects as necessary, providing overall program management flexibility.

The Comptroller's Office under two different Comptrollers (Goldin and Hevesi) conducted analyses of roadway resurfacing, comparing in-house and contracted cost performance. More recently, the American Council of Engineering Consultants commissioned a study comparing in-house and contracted cost performance on State roadwork. These studies come to surprisingly different conclusions, raising the possibility that broader economic conditions may be influencing the cost analysis.

QUESTION(S):

What are the various economic conditions that have a significant effect on the cost performance of in-house staff and consultants on roadway projects?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Designing and Fielding a Survey

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

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

BACKGROUND:

Year after year, in rising or falling markets, whatever the building type, construction costs in New York City top the listing of costs among major American cities. Unexamined state and local government laws and regulations may create regulatory complexities that operate as inadvertent barriers to effective competition in an already fragmented construction market. Risk shifting provisions in the private construction statutory schemes that do not permit changes in approaches to reflect different project types and project needs, much less the different local construction markets, may also operate as inadvertent barriers.

QUESTION(S):

What would a literature survey on the drivers of construction costs, with a focus on private construction, reveal to government as regulator?

To the extent drivers of increased costs are within the regulator's control, what changes to regulations would minimize cost increases or reduce costs over time? What countervailing public policy concerns would be affected by proposed cost reforms?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

What Are the Economic Consequences of Being a "Public Works"?

BACKGROUND:

In New York, the application of various public construction processes turns on whether a project is a "public works", which is defined by case law and not by statute. For local governments, the case law is derived not from one statute, but rather from two—the Labor Law and the General Municipal Law—and the case law is not necessarily identical. For the state government and applicable agencies, the two laws consist of the Labor Law and the State Finance Law.

QUESTION(S):

What are the economic consequences that flow from being deemed a "public works"?

What are the differences and different economic consequences between the mandated public construction process and private construction processes?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

How to Increase Construction Research and Development?

BACKGROUND:

The City has a dual role with respect to Built Environment research and development. As an owner, the City has an interest in the application of innovative technology on its projects, and, as an economic policy maker, the City has access to strategies to increase research and development generally within the local construction market. But the construction industry has historically been a conservative one, often referred to as "the industry that time forgot", partly as a result of the nature of construction projects, the industry's fragmentation and atypical pricing mechanics.

But despite insufficient levels of government-sponsored innovation, there have been successes in the past, at all levels of government, in sponsoring and using research and development for innovative technology. And, the Obama Administration has recently taken an active interest, at the federal level, in creating programs to increase levels of public and private innovation to enable the U.S. to remain competitive in the global economy.

QUESTION(S):

What would a literature survey of public sponsorship of innovation suggest for public owners such as the City?

Based on examples of successful public sponsorship of research and development in general and/or use of innovative technology in construction, what strategies could the City use to increase the application of innovative technology in its capital program?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

How to Expand Analysis of Asset Appreciation Attributable to Historic District Status?

BACKGROUND:

Anecdotal observations suggest that landmark activities, which contribute to the creation and maintenance a unique sense of place, neighborhood and density, also likely contribute to the appreciation of property values. While certain prospective property owners may purposely avoid purchasing property within a historic district, there often exists an abundance of potential purchasers who willingly pay a premium for properties that boast historic architectural features, and to which a rich historic narrative can be affixed. Moreover, for these property owners, the landmark regulator's oversight and regulatory monitoring provide a measure of certainty that the intrinsic character of the immediate neighborhood will remain intact, further preserving the values of individual properties.

To date, only one analysis, conducted by the City's Independent Budget Office, has attempted to evaluate the impacts of landmark status on a neighborhood. This analysis was limited by the nature of the question asked—whether there was any evidence that historic districting in New York City had constrained the appreciation in residential property values—the focus on six community districts in Brooklyn and the particular statistical techniques used. The conclusions were consistent with anecdotal observations. The prices of houses in historic districts were higher than those of similar houses outside historic districts and overall price appreciation from period studied was greater for houses inside historical districts than outside.

Preserving the City's history by preserving its buildings is a value embedded into the creation of Landmarks Preservation Commission. As the Commission enters its fifth decade, expanding upon the initial analysis to measure more widely the impact of landmark activities would be useful to inform future conversations about landmark activities.

QUESTION(S):

To what extent and in what manner is it possible to expand upon the initial analysis and conduct studies adding other types of properties and/or other areas and using other statistical techniques such as paired-sale appreciation analysis?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

Foundational Research: Conceptual Modeling

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Statistical/Econometric Modeling

CLIENT AGENCY/AGENCIES:

Landmarks Preservation Commission

How to Estimate LEED Payback for New Construction?

BACKGROUND:

One research question from the 2009-2010 Research Agenda generated a project with the New York City Office of Environmental Coordination to explore whether the City could analyze the long-term savings associated with green building practice if the investment decision methodology took into account a longer-term horizon than current practice. The project, entitled "Long Term Capital Investment and Green Construction in New York City", conducted extensive research into existing cost/savings analyses focusing on long-term sustainability and then applied them to Local Law 86, the City's effort to bring all government buildings in line with LEED standards, generating an estimate of aggregate savings from productivity, health and waste reduction. Building on the foundation of this research, the next step is to develop a model to estimate the payback to the City for each of the points in LEED 2009 for new construction.

QUESTION(S):

How could the City develop a cost/savings estimate model for new construction complying with LEED 2009 standards?

How could the City test such model on a case-study project?

POSSIBLE TYPES OF PROJECTS:

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Statistical/Econometric Modeling

CLIENT AGENCY/AGENCIES:

Mayor's Office of Environmental Coordination, DDC

How Can the City Create Its Own Model of the Local Construction Market?

BACKGROUND:

Attempts at predicting economic behavior in construction is a dicey affair in general and nowhere is it dicier than in New York City. Year after year, in every report of construction costs in major American cities, New York City tops them all. Yet, commercial report services for components of construction costs, which are disaggregated by region and are used by a diverse group, including economists and estimators on jobs to be bid, always make a disclaimer for the New York City region. Since the commercial regional reports are estimates themselves from aggregated data, they are not terribly reliable within the City market. They are top down, not bottom up, estimates. The national economic accounts, although recently updated to reflect changes in various industries, still do not account for the construction industry as one would want. It is aggregated in ways that are inappropriate for the fragmented industry that is construction. Further, since the demand for construction is a derived demand from the overall business cycle, upturns and downturns in construction lag behind overall economic trends, and construction industry cycles may be more volatile than the general business cycle.

The idiosyncratic nature of the New York City market argues for New York City-centric accounting of economic behavior. That would be a tall order, requiring the application of resources heretofore not devoted to one metropolitan area, notwithstanding its importance to the national economy, and is likely never to happen. One practical need for such an individual approach, however, would be the need for a public owner, such as New York City, whose capital program and practices affect the local construction market and its prices, to be able to predict changes in the construction market so that it can plan and budget more effectively. The City, as a public owner, has years of its own cost data that could be analyzed to determine the relation of project costs to variables, possibly enabling the City to construct a model of the city's construction economy to predict changes in construction activity and cost, much in the way it has constructed a model of the city economy to estimate future revenues for the budget. Further, such an analysis could identify components of construction that function as market indicators within the New York City area so that we might create a market basket of cost indicators to follow going forward to help our capital planning and budgeting efforts.

QUESTION(S):

How might the City, as a foundational research matter, approach the feasibility of creating its own model of the local construction market and a market basket for costs for the purposes of more effective capital planning and budgeting?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Designing and Fielding a Survey

Data Collection: Building the Dataset

Quantitative Analysis: Meta Analysis

Quantitative Analysis: Statistical/Econometric Modeling

CLIENT AGENCY/AGENCIES:

DDC

How to Measure the Effects of Various "Green" Initiatives—Cost/Benefit Analysis of Building Sustainability Implementation?

BACKGROUND:

The implementation of sustainability measures in residential and office buildings is becoming more ubiquitous whether because of requirements to be phased in by law or a desire by building owners and developers to improve the operating efficiency of their buildings. The main reasons that are often given for the benefits of sustainability implementation can be compartmentalized into three fundamental categories: 1) Energy Efficiency: sustainability measures will decrease the operating cost of a building while simultaneously increasing the lifespan of operating systems and allow buildings to operate more efficiently than similar-sized conventional buildings; 2) Building Value: whether residential or commercial, recent history has shown that developers/building management can charge more per square foot for buildings that are LEED or have certain sustainability measures implemented; in addition the tenant/resident perception is that because the building is 'green' it is elite; 3) Environmentally Friendly: sustainability measures are designed to decrease the carbon footprint of a building thus lessening both the urban heat-island effect as well as the impact on global warming.

QUESTION(S):

What are the economic and other tangible benefits of implementing sustainability measures in both new and existing buildings in New York City balanced with the cost of the implementation? In addition, how are the effects of sustainability measured to provide a clear indication of the benefits? Provide an assessment of the sustainability practices in various jurisdictions outside New York City and the U.S., focusing specifically on:

- cost of implementation in both new and existing buildings in terms of financial outlay as well as level of effort
- tracking and accountability measures taken by these jurisdictions to ensure the implementation is providing the intended and desired economic benefits
- any required performance measurements used in these programs

Based on the survey of practices and requirements elsewhere, what practices should the City consider to better ensure that sustainability has an economic as well as environmental impact?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Designing and Fielding a Survey

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Statistical/Econometric Modeling

CLIENT AGENCY/AGENCIES:

DOB

How to Design Incentives for Sustainability Implementation?

BACKGROUND:

The City of New York, along with a multitude of other cities across the nation and world over the last 5-10 years, have been looking to implement sustainability measures in buildings and homes as a way to increase energy efficiency, decrease their carbon footprint, and in a broader way improve the quality of life of their citizenry. Some of the sustainability measures include the installation of white or green roofs, micro-turbines, solar panels, LED lighting, and gray-water systems, among a number of other available building technologies. Since there are relatively few laws on the books requiring sustainability implementation and a necessary phased-in approach in the laws that do exist, municipal governments and local jurisdictions have begun to incentivize these sustainability measures in an effort to increase their implementation in buildings where they might have a greater impact as well as across of a broader section of the building stock.

QUESTION(S):

What incentives have been utilized in other jurisdictions to spur the implementation of sustainability practices and how do they compare in terms of both cost and benefit with the programs in New York City? In addition, provide an assessment of which incentives over the last two to three years have proven to be the most popular and the most effective within specific cities and comparatively, specifically focusing on:

- the efficacy of fee-bates and an analysis of where and for what types of measures they are most commonly used
- a comparison of incentive-based and code-based sustainability implementation with regard to the rate of implementation
- the effects of incentives on municipal revenue and whether or not the incentive program has had any detrimental side effects

Based on the survey of practices and requirements elsewhere and mindful of the Department of Buildings revenue structure, in which fees account for a large portion of revenue, should the City consider incentivizing sustainability measures with a fee-bate program?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Designing and Fielding a Survey

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DOB

What Are Best Practices for Public-Private Partnerships to Promote "Green" Projects for Water and Wastewater Utilities?

BACKGROUND:

The scope of the contemporary sustainability agenda has extended to all aspects of the Built Environment, including water and wastewater infrastructure projects, the need for which emerged during the initial wave of environmental or "green" laws. The Department of Environmental Protection, manages the City's water supply, which provides more than one billion gallons of quality drinking water daily and serves more than half the population of New York State, and manages 14 in-City wastewater treatment plants, as well as eight treatment plants upstate. This complex water and wastewater system is structured as a utility, with user rates supporting capital projects and operation and maintenance activities.

The utility finance model, even for a public owner, shares much the private sector finance model. For sometime now, however, a more explicit public-private partnership finance vehicle has been applied to many public infrastructure settings, raising the question of how the public private partnership finance model might apply to the City's water and wastewater setting, in particular, focusing on "green" projects, which use innovative technology.

QUESTION(S):

For the various "green" investments related to energy supply side operations, energy demand side operations and storm-water management operations to be identified subsequently with DEP, what public-private partnership practices/vehicles have been used by public utilities for investment in such technology as well as other types of projects?

Among the practices/vehicles identified, how could they work in the DEP setting—for both capital project development and life cycle operation and management—and what would the trade-offs from an application be?

What are the opportunities and impediments for DEP to use such practices/vehicles?

What are the best practices for public water and wastewater utility investment in "green" projects?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DEP

How to Develop a Model of the Tourism Industry for More Sensitive Fiscal Impact Analysis?

BACKGROUND:

Governments often levy tourism taxes to finance specific tourism-related facilities, such as convention centers and related hotels as well as sports stadia, and the related infrastructure that they, as public owners, seek to build. Governments also levy tourism-related taxes for other budgetary purposes, such as filling gaps created by other budget conditions (recession, economic restructuring, etc.). As a result, there is a natural tension between the public need for revenue to be raised from tourism, the local industry's view of their bottom line and the level of tourism experienced within a jurisdiction.

The model of the local tourism industry is not a simple one due to the nature of the tourism trade itself. Tourism facilities will price their goods and services to reflect demand, and taxes are often expressed as a percentage of price. But, the costs of goods and service here also have an impact on the plans of potential visitors, who are consumers living in other places with their own economic forces and able to travel to a variety of destinations. When new tourism-related taxes are proposed, fiscal impact assessments based on a model that is not sensitive to pricing freedom and external systemic effects of the tax itself may either overstate or understate related revenues, fees and impacts on the industry and, if enacted, may have unintended negative consequences—negative to the industry and to the budget.

As the global economy continues apace, it is important to develop a more robust model of the tourism—economy that permits more sensitive fiscal analysis of proposed actions that affect the local tourism industry.

QUESTION(S):

What would a review of local and comparative experiences with funding through tourism taxes reveal about the model of the tourism economy?

How might the City develop a tourism industry model and fiscal assessment tool that account for the full impact of a tax increase including reduced travel demand and/or resulting local lower prices in response to lower demand?

How might a fiscal assessment tool that would also apply to taxes and fees for the financing of tourism—related facilities provide a comprehensive analysis of the intended benefits and unintended consequences of various tourism and hospitality tax policies?

Based on a survey of various tourism taxes and fees elsewhere, what tax and fee structure effectively delivers, on the whole, its intended benefits? Which dedicated tax and fee structures have been effective for financing tourism-related facilities and infrastructure?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Designing and Fielding a Survey

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

Quantitative Analysis: Statistical/Econometric Modeling

CLIENT AGENCY/AGENCIES:

OMB, NYC + Co.

LAW

The City, as a law maker, acts in the role of a regulator and policy maker, and those related research questions are found above under ECONOMICS. For questions under LAW, however, the City acts as an owner, primarily through the contractual relationship between it and its designers and contractors, which is the product of industry standard practice, governing law and past experience. For more detailed background information related to LAW issues, please see Orientation to Policy in the Built Environment.

What Types of Construction Contract Provisions Would Increase Alignment between Principal and Agent?

BACKGROUND:

The various service delivery models allocate and manage risk among the owner, the architect and the contractor in different ways. The appropriateness of a particular service delivery model depends on the complexity of the project and the internal capacities of the parties. There is no one perfect service delivery model, and the benefits and disadvantages of the models vary with the particulars of the project and the parties. Certain service delivery models facilitate better alignment of the design phase with consideration of constructability issues. And certain service delivery models may facilitate better alignment of the owner's interests in budget, schedule, safety and quality with the interests of its agents—the architect and the contractor—in construction, especially critical in the construction milieu which is the picture of asymmetric information.

QUESTION(S):

Building upon the work of a related 2009-2010 Town + Gown comparative contract analysis project, what types of construction contract provisions would increase the alignment of principal and agent on particular types of projects?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling

Data Collection: Designing and Fielding a Survey

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC, Mayor's Office of Contract Services

What Are the Statutory Consequences of Being a "Public Works"?

BACKGROUND:

In New York, the application of various public construction processes turns on whether a project is a "public works", which is defined by case law and not by statute. For local governments, the case law is derived not from one statute, but rather from two—the Labor Law and the General Municipal Law—and the case law is not necessarily identical. For the state government and applicable agencies, the two laws consist of the Labor Law and the State Finance Law.

In order to evaluate the economic consequences that flow from being deemed a "public works" in order to delineate the differences between the mandated public construction processes and the private construction processes, it is necessary to understand what makes a project a "public works" and what statutory consequences flow from them.

QUESTION(S):

What are the criteria for being a "public works" project at both local and state government levels?

What are the statutory consequences of being a "public works"?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

What is the Relation between Land Use Law Techniques and Urban Design and Function?

BACKGROUND:

The urban design of cities represents a complex interaction between laws regulating land use, including zoning, institutional arrangements, politics, economics, technology, and social conditions. In existence for little more than a century, these land use laws, especially zoning, are instruments of public planning and policy and directly impact the visual fabric and functioning of the City's built environment. As legal instruments imposing limits on the use of private property, they tend to be expressed in prescriptive form—setting forth permissible uses as well as site coverage, setback and height limits.

As the municipal zoning instrument enters its second century of use, at a time of increasing conceptual complexity resulting from the sustainability agenda, an understanding of the relationship between land use regulations, including zoning, and both urban design and function seems in order.

QUESTION(S):

What can a survey of methodologies used by other jurisdictions in their land use regulations, including zoning, tell us about the relation of modern zoning tools and desired effects "on the ground", specifically the design and function of urban areas?

Using New York City as a case study, what can the evolution of tools used in the City's various land use laws, including the zoning code, tell us about the relation of tools used by the City and the City's distinctive visual fabric and the history of its infrastructure development?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

What Is the Current Pattern of Construction Participant Licensure and What is the Relation to History of Construction?

BACKGROUND:

The construction project is the poster child for information asymmetry—a complex process where the archetypal actors—owner, designer and contractor—attempt to cooperate while attempting manage risk, often by shifting risk away from themselves. Of the three archetypal actors, two—the designer and the contractor—are regulated with respect to the services they provide to the project. The designers—architect and engineer—are licensed individually as professionals. Among organizations functioning as the contractor, some may be licensed, holding a variety of licenses, and some may not. And many of the individual trade people working as or for the contractor may be are licensed individually. The state and local levels of government have various roles in the licensing scheme, as well. Further, the mixed pattern of licensing of construction participants working together on a project has its roots in the master builder model from before the period of industrialization, as well as the medieval guild model from even further back in time.

The most recent service delivery innovation, Integrated Project Delivery, requires the archetypal actors to manage risk on construction by contractually sharing, early in the life of a project, responsibility, risk and reward. Further, there has been greater interest in refining licensure regulations for safety purposes. Success in either endeavor requires understanding the differences among the licensing schemes, their historical antecedents and their economic implications. A white paper on the state of licensing in New York State, containing a focus on the construction process and participants in the City, is in order.

QUESTION(S):

What are the licensing statutory schemes in New York for all participants in the construction process?

What is the taxonomy of licenses at the State level and those at the local level and what is level of reciprocity among the local jurisdictions?

What is the taxonomy of licenses linked to project permits?

Who issues and evaluates licensing exams and what are the qualifications for examiners?

What are the conditions and processes for revocation of licenses and who controls the process and how?

What public policy and economic issues are raised by such statutory schemes?

What are the historical antecedents to such regulatory schemes?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

How to Assure a "Green" Future—Green Building Regulations and Enforcement?

BACKGROUND:

Green building practices are becoming ever more prominent globally as building developers, owners, and occupants become more aware of their benefits. In order to advance the interest in achieving greater sustainability, many jurisdictions are beginning to allow or require certain green building practices. The Mayor's PlaNYC has outlined several initiatives that will result in new requirements for buildings in the City. The Buildings Department is interested in the results of a wide survey of green building practices elsewhere that surveys the spectrum from planning to regulation to enforcement.

QUESTION(S):

What have been the green building requirements and practices in various jurisdictions outside New York City and the U.S., focusing specifically on:

- specific building requirements and how they were developed
- enforcement of the requirements and operational measures taken by these jurisdictions to ensure the requirements are being followed and associated challenges, and
- any related performance measurements used in these programs?

Based on the survey of practices elsewhere, what practices should the City consider as it pursues implementing new regulations as part of PlaNYC?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Designing and Fielding a Survey

Data Collection: Building the Dataset

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DOB

TECHNOLOGY

The City has an interest in technology solutions as an owner, and the research questions listed below under TECHNOLOGY are related to government in its role as owner on particular projects. Yet government can exercise a powerful role in advancing technology innovation, as economic policy maker, by subsidizing the research and development necessary for innovation in construction technology. Research questions related to this role will be found under ECONOMICS. For more detailed background information related to TECHNOLOGY issues, please see Orientation to Policy in the Built Environment.

How Might Roadway Technology Mitigate Negative Impacts of Road Infrastructure Reconstruction?

BACKGROUND:

The City's diverse capital program rehabilitates, maintains, and expands the public infrastructure of a large and complex built urban center. DDC's Infrastructure Division is dedicated to roadway reconstruction, combining planned water and sewer reconstruction with planned upgrades of City streets. Routine street reconstruction is an essential part of keeping the City's infrastructure in a state of good repair and likely has an impact on the economic vitality of business districts and property values of residential districts. The recent federal stimulus bill underscores the important relation of capital infrastructure projects to the economy. There may be, however, some negative local economic consequences during construction that emerging technology might help mitigate.

QUESTION(S):

What would a literature survey of the impacts of roadway construction on business activity during construction and a complementary literature survey on recent innovative technology in roadway design and construction practices suggest to public owners such as the City?

What do other agencies and local governments in the State and across the country do to mitigate disruption during roadway construction? What are best practices and technologies?

What planning techniques are available to mitigate negative impacts of roadway construction?

Based on the results of the literature survey above, how might the City design a quantitative analysis to evaluate the impacts on local businesses of roadway reconstruction during project duration?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

What is the Impact of Innovative Technology on Project Performance and Budget?

BACKGROUND:

The City has a dual role with respect to Built Environment research and development. As an owner, the City has an interest in the application of innovative technology on its projects, and, as an economic policy-maker, the City has access to strategies to increase research and development generally within the local construction market. The City has, in the past, adopted innovative technology in roadway construction but it has not gone back to evaluate the increased efficiency and/or effective of such technology.

QUESTION(S):

What has been the impact on the efficiency and effectiveness of the water/sewer systems from the City's adoption of pipe lining technology for projects beginning in the 1970s?

What lessons can the City learn from this earlier adoption of new technology?

POSSIBLE TYPES OF PROJECTS:

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Data Collection: Building the Dataset

Quantitative Analysis: Data Analysis

CLIENT AGENCY/AGENCIES:

DDC

How to Implement Innovative Information Technology Products in Construction Programs?

BACKGROUND:

The City has a dual role with respect to Built Environment research and development. As an owner, the City has an interest in the application of innovative technology on its projects, and, as an economic policy maker, the City has access to strategies to increase research and development generally within the local construction market.

DDC has begun to require contractors to manually document the "as built" condition of completed projects, noting changes to the original project plans that occurred during construction as a result of unknown conditions below the surface, and DDC is considering the use of information technology in connection with this requirement. Yet, computer technology creates management challenges on the job and technical challenges posed by different data systems within at the reporting contractor and at the agency. Further, the reality of rapid change in the industry makes early adoption of technology perhaps seem unwise.

QUESTION(S):

What would a literature survey on management issues related to the adoption of innovative computer/information technology, with some emphasis on management of construction projects, suggest to a public owner such as the City?

What strategies might the City use to efficiently and effectively implement the adoption of innovative computer/information technology in its roadway construction program?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

What Modern Mapping Technology Exists for Efficient and Effective Planning?

BACKGROUND:

The City has approximately 5,800 miles of streets, sidewalks, and highways, 789 bridge structures and six tunnels, managed by New York City Department of Transportation (DOT). The City's street system is a vast network of streets, avenues, and boulevards. In view of the institutional process of street mapping described below, it is always challenging to determine the various characteristics of the status of City streets, such as whether they are mapped or unmapped, whether they are improved or unimproved and who owns them. Streets could be a mapped street, an unmapped street in all five City boroughs, a private street or sometimes a record street.

The City's streets, arterials and some highways are generally mapped in the Final City Map and the ownership of these streets is shown in the Damage and Acquisition Maps (a.k.a. Title Maps), which are maintained by the Topographical Bureaus in each Borough President's office. During the last significant restructuring of City government in 1989, many legislative-type functions exercised by the office of the Borough President were modified to become advisory and mediating or, as Jane Jacobs described, locality coordination functions. One non-legislative function that remained within each Borough President office is the topographical function, which has its origins from the period, before the 1936 and 1961 Charter revisions, when Borough Presidents played a more active role in building regulation and implementation of capital projects. Before the City became a fully built city, local expertise was critical, especially in the absence of today's geographic information system (GIS) technology.

Difficulties DOT encounters in determining street status, coupled with advances in GIS technology, suggest the time has come to reconcile a localized function with current technology that permits centralized computer-based mapping, a possible outcome that could also improve public safety which requires a way to relate vanity addresses to actual locations. With a GIS-based street map, DOT could improve its planning activities, working with other agencies to better utilize mapped and City-owned streets that have not been improved for traffic purposes to, for example, create plazas, improve as a street, establish park-and-ride programs, use for parking purposes or lease to private entities.

QUESTION(S):

What would a literature survey on topographical functions and techniques in dense urban environments and on current geographic information system (GIS) technology suggest for public owners like the City?

What have other large dense urban cities across the country done since the advent of GIS technology to improve the topographical functions in such cities? What are best practices?

Document a case study of a borough office topographical practice to support possible future plans resulting from the above analyses.

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DOT

How Can the City Use Technology to Enhance Road Congestion Management?

BACKGROUND:

Among the many roles of the Department of Environmental Protection is the responsibility to carry out the federal Clean Air Act rules and regulations. As tightening air quality standards loom in the future, technology can play a role in enhancing road congestion management as a method of complying with stricter standards.

QUESTION(S):

What lessons can be learned from other jurisdictions, in the U.S. and elsewhere, about:

effective new technologies in managing road congestion

opportunities and impediments in the City for the use of such technologies

the cost/benefits of various successful programs

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DEP

DESIGN

Public capital programs generate public architecture that become part of the visible Built Environment. Mayor Bloomberg, in his inaugural address at the Art Commission's 2002 annual design award ceremony, quoted I.N. Phelps Stokes, who presided over the Art Commission under Mayor LaGuardia:

> The production of beauty, especially by simple and inexpensive means is a very subtle problem and can be solved successfully only by a combination of ability, experience and care.

This expression of the challenges inherent in municipal architecture—or the City's capital program—provides an architectural context for the questions below.

The City, under DESIGN, primarily acts as an owner and a purchaser of design—architectural and engineering—services. Research questions related to the City's role of regulator of the visible public realm will be found under MANAGEMENT WITH AN URBAN POLICY TWIST. For more detailed background information related to DESIGN issues, please see Orientation to Policy in the Built Environment.

How to Incorporate "Long Life, Loose Fit, Low Technology" Design Principles for City Buildings?

BACKGROUND:

Across the spectrum of public uses, there is always the potential for a mismatch over time between long-lived fixed capital assets (and their original design goals) and the changes in the demographics of 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 for long-lived assets. Public owners find it harder than private owners to change policies or practices quickly. It becomes especially difficult for a public owner like the City with a practice of over-building public assets to last "forever" in the face of historical insufficient maintenance activities after construction 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 with certain uses perceived to be negative. Under such circumstances, currently underutilized public assets of many kinds might be considered as resources for future planned and/or unanticipated demand. In view of the limits of demographic forecasting, government needs other tools to help it manage periods when dynamic reality differs significantly with long-lived assets.

This topic has been the subject of a 2009-2010 Town + Gown urban planning workshop, which recommended, among other proposals, developing a strategy for flexible design of public buildings going forward. 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. Difficulties in coordinating such efforts and allocating expenses for separate agencies providing services have impeded implementation. Since then, however, the sustainability agenda has placed a focus on "long life, loose fit, low technology" design and trends in work standards have evolved to include job sharing, telecommuting and flexible co-location of staffs from various offices across an organization.

QUESTION(S):

Building upon the work of the 2009-2010 Town+Gown urban planning workshop, how might the City implement the recommendation to design structures flexibly to permit multiple uses over time and at the same time in order to optimize utilization the City's capital assets?

Taking the implementation strategy to a more specific level, what specific public building typology would lend itself best to a "long life, loose fit, low technology" approach that could become the subject of a design competition?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling/Cost Benefit Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DDC

What Are the Impacts of Workplace Design on Workplace Performance?

BACKGROUND:

The design and construction of workspace, where many spend most of their lives, impact us as individuals and as a society. All levels of government have been transforming their work environments to maximize the value of public office space as the result of earlier government re-engineering and downsizing efforts, the advent of telecommuting and family-friendly work environment initiatives, rapid changes in technology and the need for improved customer services, as well as budget efficiencies. The performance measurement focus in the prior decade also created an impetus toward reforming office space planning as the connection between worker performance and the workspace became increasingly clear. At the federal level, linking the planned downsizing of offices with trends in alternative workplace design permitted a reduction in office space costs in ways that minimized the negative impact on agency performance of missions and tasks articulated during strategic planning processes.

Since then, the sustainability agenda has placed a focus on the impact of the environment—external and internal—on human health. Research conducted in the U.K. and U.S. has demonstrated that the most successful labor markets are reinforced by workplaces that are physically and conceptually supportive of their objectives, values and people. These studies have demonstrated that workplace projects can positively influence organizational performance and employee effectiveness, by increasing productivity, employee satisfaction and attractiveness to potential candidates and reducing absenteeism, employee turnover and use of health insurance benefits. A 2009-2010 Town + Gown project focused on developing methodologies to quantify the benefits of the City's Local Law 86, including the benefits resulting from increased productivity and improved health of those working in green buildings.

The City does not currently evaluate the contribution of workplace design to agencies' performance or the fiscal savings that derive from improvements in the workplace. Investigating the incremental increases in agency performance and fiscal savings as the result of such design interventions would enable the City to evaluate future relocation strategies, consolidation efforts, planning initiatives, technological improvements, changes in management policies, and environmental designs.

QUESTION(S):

What would a literature survey of the relation of workplace design and performance in both public and private sectors suggest for a public employer and public owner such as the City?

Based upon the review of the literature, and using the City's performance-based data, how could a quantitative evaluation model be designed to test the relation between recent renovation or expansion projects involving interior workplace improvements and related agency performance as well as savings to the expense budget?

How might such a model evaluate impacts on agency performance?

CLIENT AGENCY/AGENCIES:

DSNY, DDC

How to Diversify the Architectural Vernacular of Affordable Housing?

BACKGROUND:

Through public and private partnerships, there has been creation and preservation over 100,000 units of affordable housing in the City over the last 8 years. There have been recent examples of affordable housing where the architectural quality is just as good, if not better, than the quality of nearby market rate projects, yet the housing/construction typology does tend toward the identifiable affordable housing typologies.

The production of affordable housing occurs within a matrix of interrelated constraints, including economic, physical, regulatory and political constraints. The City's policy goals include providing the maximum number of affordable units to meet the Mayor's housing objective and adding to the affordable housing supply within currently projected financial resources. Yet it is also desirable to explore whether and how it is possible, within such constraints, to diversify the architectural vernacular of affordable housing in the City to include designs and materials that integrate well within the City's various neighborhoods, for example, row houses, stacked duplexes, stick-built structures and towers other than the more standard double-loaded slab.

QUESTION(S):

What factors surrounding the production of affordable housing, including the cost of building, result in the look of affordable housing?

What tools are available to encourage more variation in design? In construction? Within current cost and zoning constraints?

Within the constraint of providing maximum number of affordable units to meet the Mayor's housing goal and adding to the affordable housing supply within currently projected financial resources, how can the City's public and private partnerships achieve greater variation in housing/construction typology?

How does affordable housing design in New York compare to that of other large cities such as Chicago, Seattle and San Francisco? What do other cities do to encourage variation in design of affordable housing? What are their related cost and zoning constraints?

Affordable housing is a public good, yet its integration within a neighborhood is also critical—what are the elements that make affordable housing successful?

POSSIBLE TYPES OF PROJECTS:

Identifying What Is Known: Literature Surveys and/or Interviews with Knowledgeable Practitioners

How Other Cities Do It: Comparative Analysis

Foundational Research: Conceptual Modeling

Data Collection: Designing and Fielding a Survey

Quantitative Analysis: Data Analysis

Quantitative Analysis: Meta Analysis

CLIENT AGENCY/AGENCIES:

DCP, HPD, DDC

ENDNOTES

1. 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.

2. Ibid., pp. 3-4.