Update to Planning Resilient Public Space:
Resilient People, Places and Projects (RP³) Working Group Research Project

RP³ Working Group Background. Town+Gown:NYC (Town+Gown) initiated a collaborative inquiry into planning and designing resilient public spaces to support resilient communities with two events—the first, Resilient Public Spaces and Communities: Data Driven Explorations on October 31, 2018 (RP³.1), and the second, Resilient Public Spaces and Communities.2, on November 18, 2019 (RP³.2)

RP³.1 leveraged a series of design-related events in Town+Gown that focused on the Red Hook neighborhood (see Appendix A) as a jumping-off point to aim at accelerating the action research cycle by piloting Town+Gown's working group format. After Superstorm Sandy, the academic focus on environmental sustainability quickly pivoted to a focus on resiliency, and few other neighborhoods in the City received more intensive academic attention than Brooklyn's Red Hook neighborhood. RP³.1 used Red Hook as the case study area to establish the knowledge base and move it forward by exploring and contextualizing resilience in the built environment generally and public space and communities specifically and then identifying issues for future research within the Town+Gown community.

The RP³.1 participants divided into two sub-groups to discuss (1) what allows public space to function as community resiliency asset in both disaster and everyday life and (2) how to move from qualitative data analysis to quantitative data analysis. Both sub-group discussions raised issues posed by the City's capital budget process. Members of the two sub-groups coalesced into a working group (the RP3 WG). Several discussions with RP3 WG members to develop a research project yielded, in April 2019, the outlines of a research project to identify a public capital project in Red Hook as a case study to explore using the design phase methodology to leverage capital projects by engaging the community during design within the constraints of the city's capital program/process,[1] that Hana Kassem presented at RP³.1, and apply AREA Research's life cycle cost benefit analysis model to the exploration. Efforts to identify an

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[1] Hana Kassem and Richard Roark, "Beyond Resilience," *Urban Omnibus,* September 12, 2018.

appropriate capital project for the initial version of the research project failed primarily due to timing issues with the capital budget and construction processes in conjunction with the focus on the *community*. The capital project process—from capital planning before budget adoption to construction project completion and use—is long and complex. See Appendix B. The "community" involved in earlier stages of a particular project during the capital budget process may become demographically different than the "community" for that project during later stages, suggesting that Kassem's focus on the post-adoption design phase may not be the optimal time for the research project and the research should instead focus on the capital planning phase immediately preceding capital budget adoption.

RP^3.2 focused on the planning phase in contrast to RF^3.1's focus on the design phase. While planners can be architects by training, planning is part of the Geography discipline and is not entirely about architecture. RP^3.2 brought the planning discipline's focus on community explicitly to bear on the complex issues raised at RP^3.1. With both architecture and planning disciplines involved going forward, the discussion at RP^3.2 explicitly discussed ways to move the initial research project forward within the RP3 WG.

Post-RP^3.2 Research Project. The participating City agencies within the RP3 WG and academics from Pratt and AREA Research in the RP3 WG (the Study Group) developed a research project that focused on the capital planning phase of the budget process and optimal ways the "community" can participate in that process. The second iteration of the research project aimed to:

(1) Apply the Neighborhood Activation Study (NAS) methodology,[2] by changing the policy objective from reducing crime to increasing infrastructural and community resiliency, to analyze a case study cluster of routine capital infrastructure projects in the capital planning stage and/or headed for the design phase in a case study neighborhood (initially Red Hook), in a holistic manner to identify ways to rethink them together to increase their infrastructural and community resiliency. Aging infrastructure is an unrecognized resiliency hazard in the literature and in practice. Large resiliency projects, especially those funded by FEMA after disasters, tend to get all the attention due to their funding source that requires them to explicitly address resiliency based on failures during events. State of good repair (SOGR) capital projects in each year's capital budget, however, represent multiple additional opportunities each year to increase/optimize infrastructural and community resiliency. As one example using SOGR capital projects, agencies could rethink how a park project running by or near a sewer project could

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[2] See https://criminaljustice.cityofnewyork.us/reports/neighborhood-activation-study/.

include stormwater holding infrastructure, like Rotterdam and Copenhagen, to hold water during a storm and feed it into the sewer system over time but during dry days would be usable for park purposes (e.g., sitting, skateboarding, etc.). This became known within the Study Team as the "cluster" analysis.

The NAS methodology consists of using a collection of place-based planned investments for new or rehabilitated public buildings and public spaces, including the public right of way, within neighborhoods to identify potential synergies among them where public design can strengthen ongoing community initiatives and agency efforts. The NAS methodology also envisioned engaging and learning from community residents about needs that can be met through these projects' synergies so that intentional design could leverage the individual projects to be more than a sum of their parts. The NAS suggested, as a tool for capital project design to reduce crime, that multiple NYC agencies coordinate their projects among themselves and with the communities during the capital planning process.[3] NYC's existing capital budget process outlined in the City Charter does not require this type of interagency collaboration during the capital planning stage and there is currently no mechanism to permit it, which represents a significant weakness of implementing the NAS methodology in practice.[4] NYC's 10-year capital strategy, which is intended to inform the annual capital planning process, does not include granular project-level detail, which is the reason the cluster analysis exercise would assume agency capital projects mapped for cluster analysis were not yet been adopted in the budget.

(2) Apply the Envision framework, which is a holistic framework for evaluating and rating the community, environmental, and economic benefits of all types and sizes of infrastructure projects and permits owners to evaluate, grade and give recognition to infrastructure projects that use transformational, collaborative approaches to assess the sustainability indicators over the course of the project's life cycle,[5] to determine how ideas emanating from the application of the NAS methodology above could form the basis of Envision credits, especially innovation

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[3] NAS, p. 38. Another tool consisted of leveraging NYC agencies' public space programs through their capital projects. NAS, p. 37.

[4] After the capital planning process, agencies can and do learn more about other agencies' projects in specific neighborhoods in order to rethink their individual projects to further policy objectives, but rethinking projects post-budget adoption would likely require additional funding for project re-designs and extend project schedules, which tends to discourage NAS methodology application for place-based multi-project optimization.

[5] Spiro N. Pollalis, "The Envision® Rating System for Sustainable Infrastructure Projects" presentation at Town+Gown: NYC symposium event, *CD+W.4. Envision and Impact Analyses*, October 23, 2019; not yet posted to website. See Wellbeing QL1.1 Improve Community Quality of Life, Mobility QL2.1 Improve Community Mobility & Access, Community QL2.4 Enhance Public Space & Amenities, Collaboration LD1.2 Foster Collaboration & Teamwork, Planning LD2.2 Plan for Sustainable Communities, Resilience CR2.5 Maximize Resilience.

credits, and possibly further refine the holistic rethinking of the case study project begun under the NAS methodology.

With climate change affecting cites, resilient public spaces become an even more important area of planning for stakeholders in the built environment. The interrelation between sustainability and resiliency is reflected in the Envision framework, and the Envision Rating System provides measurements for quality of life, leadership, resource allocation, the natural world, and climate and resilience, several of which address the importance of creating and maintaining a culture of resilience within communities. In addition to the inanimate components of infrastructure, this framework also prioritizes including communities and leveraging different data collection methods within these projects.

(3) Apply AREA Research's life cycle cost benefit analysis (LCCBA) model to these rethought case study projects from the cluster analysis to analyze the ability to maximize/optimize the level of total return on City capital investment and identify potential capital budget savings opportunities. Steps (1) through (3) became known within the Study Team as the "proof of concept" analysis.

The identification, planning and implementation of public capital projects is a complex process (see Appendix B), and the City's capital process typically assigns execution of stand-alone projects through individual agencies that have sector-specific criteria for project performance and desired outcomes.[6] The standard process for stand-alone projects, however, may tend to limit the parameters that define a project, leading to several siloed projects within a neighborhood, unconnected with each other and providing isolated returns for the public.

The "proof of concept" exercise would investigate the opportunities during the capital planning process before budget adoption to increase returns for the City and the public for the clustered case study projects and broaden meaningful community participation by utilizing (i) a collaborative platform for government agency stakeholders that enables a multi-valent evaluation of these projects, as a case study for future project identification and prioritization, and (ii) process aimed at identifying opportunities to increase broad returns while possibly decreasing capital investments.

From the City's capital budget process perspective, the "proof of concept" exercises is a version of applying the value engineering (VE) methodology to potential capital projects during the

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[6] For some large projects involving multiple city agencies, however, this process typically assigns execution to a lead managing agency that coordinates the project with and on behalf of all the other agencies.

capital planning stage where all options can be on the table for consideration. Since these projects are assumed to be prior to adoption in the exercises, there is the opportunity to refine the estimated project amounts and schedules prior to adoption, assuming we are in a value proposition or a lower overall cost scenario. The "proof of concept" analysis would take place much earlier than when the City typically applies VE during the design phase of each project in a silo, where good ideas that may cost money on an individual project but save money on others have to be rejected because changes during design that add costs and/or delay schedules on siloed projects are difficult to accomplish in the budget. When the City needs viable proposals for the Program to Eliminate the Gap (PEG), if the "proof of concept" analysis demonstrates an ability to increase resiliency while keeping estimated funding constant and/or reducing estimating funding, it would support a long-term capital PEG.

(4) Build on the "proof of concept" analysis results to analyze the institutional community board process to identify opportunities to bring community infrastructural and community resiliency deficit knowledge to bear during the capital planning phase of capital projects. This phase of the research project would apply urban hazard mitigation principles to leverage SOGR capital projects to optimize infrastructural and community resiliency[7] as well as other community-based planning principles such as the theory of a partnered platform.[8] (See Appendix C.)

Initial Proposed Research Project Deliverables and Schedule.

Phase 1. *Identification of Study Projects and Application of NAS Methodology and Envision Framework*. (Study Group only, with reporting out to RP3 WG for comments.) Duration: Summer and Fall 2020

The Study Group agencies will review their agency capital plans and programs and other projects in the City's budget documents to identify case study projects that would be mapped for application of the NAS methodology and Envision framework to the case study projects to identify potential points of convergence to support increased infrastructural and community resiliency and generate synergistic ideas for these case study projects for Phase 2. The results of the collaborative NAS methodology and Envision framework exercises might potentially add to, or delete, projects on the preliminary case study project list.

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[7] David R. Godschalk, "Urban Hazard Mitigation: Creating Resilient Cities," *Natural Hazards Review* (American Society of Civil Engineers, August 2003), pp. 136-140.

[8] Sherry Arnstein, "A Ladder of Citizen Participation," *Journal of American Institute of Planners*, Vol. 35 (1969), Issue 4, pp 216-224.

Update. *The Study Group has been working on Phase 1 since Fall 2020, with four separate exercises, which included a change in case study neighborhoods in early 2021. During the NAS methodology map exercise #4 using the recent DCP map of Commitment Plan projects for the case study Community Districts, the RP3 WG determined there was insufficient density of project data for cluster analysis for the case study Community Districts. The RP3 WG discussion (1) concluded that pre-selecting case study neighborhoods for cluster analysis did not work and that it would be necessary to look at the entire city to identify Community Districts with sufficient project density for cluster analysis, which would require some funded academic assistance and (2) also confirmed the absence of interagency collaboration during capital planning phase. Idea of platform emerged to support interagency collaboration was raised, which platform would also support local knowledge transmission. Please see the chart in Appendix D, which includes some preliminary research findings.*

Phase 2. *Application of AREA Research LCCBA Model to Case Study Projects*. (Study Group only, with reporting out to RP3 WG for comments.) <u>Duration: Winter 2021</u>

Applying the LCCBA model to the synergistically rethought case study projects would determine quantitatively the extent to which it is possible to collective enhance clusters of closely co-located projects within neighborhoods to provide the highest level of return from an infrastructural and community resiliency perspective on the City's investment by focusing on the several aspects of "return". Starting with ideas about what should be done, the model permits agencies to quantitatively analyze and test these projects during the capital planning stage that will increase infrastructural resiliency in projects at the end of the build phase, including post-construction operations and maintenance (see Appendix B). Each capital project has its stand-alone problem to solve (keep the water out, bring people together, etc.) that are generally addressed through a very limited, focused set of project criteria. There are, however, opportunities happening at minimally choreographed milestones along the capital planning-to-budgeting process that can assure that each project is good for the community, within the context of other contemporaneous adjacent projects, because, with the other projects, it can solve multiple problems within a neighborhood.

The current methodology, or model, for project planning, is based on allocation of funds for a project that generally only addresses and solves problems for a particular agency:

> $ for a park, solves one problem – a place for the public to recreate; costs x
> $ for a sewer, solves one problem – flooding; costs y
> $ for a street improvement, solves one problem – capacity realignment; cost z

Applying the LCCBA model to the case study projects permits assessing those standalone projects, with an initial estimated cumulative cost, as solving multiple problems or addressing three challenges, providing an opportunity to capture value across all projects, so that, for example, a single project might be able to simultaneously solve parts of the other projects' problems, collectively increasing the resilience of public spaces and the community they are located.

The more collaborative methodology is structured to combine the projects, such that:

$ for a park, solves one problem; costs x – a,
$ for a sewer, solves one problem; costs y – b,
$ for a street improvement, solves one problem; costs z – c

with a, b and c representing the overlapping that results in capital savings and enhanced project value. The single project, drawn from the initial three separate projects, in conjunction with the other two projects, solves three problems with the same, overlapping funding, resulting in reductions. The connected set of projects—a park/sewer/street project—can address and solver a number of related challenges and problems using the same resources across variable criteria.

Application of this model can show savings and increased benefits (project value) equal to (x + y + z) – (a + b + c), but application depends on knowing all issues going into the effort and taking steps to ensure a merging of the efforts. Application of the model can take place at the very initial planning process and can run through to project implementation and post-completion maintenance.

Phase 3. *Community Board Planning and Design Opportunities.* (Study Group only, with reporting out to RP3 WG for comments.) Duration: First half of Summer 2021

Focusing on the Charter-mandated institutional role of Community Boards in the case study neighborhood, the Study Group will identify institutional process points in the capital planning-to-design-to-construction-to-maintenance process and develop a hypothetical plan where a Community Board can transmit community knowledge relevant to the case study projects in a meaningful way to City agencies to support the case study projects' overall effectiveness in increasing infrastructural and community resilience. During Phase 3, the Study Group will also identify smaller community groups that collaborate with CB6 and other elected officials and

develop a similar hypothetical plan. (See Appendix C for issues related to resiliency and community.)

Phase 4. *Methodology for Smaller Community Group Involvement.* (Study Group, with reporting out to RP3 WG for comments.)   Duration: Second half of Summer 2021

Following the methodology in Phase 3 above, the Study Group will identify methods for the smaller community groups to work within the Community Board process and the larger city capital process to identify a hypothetical plan for ways these groups can transmit community knowledge as discussed above.

Phase 5. *Full Project Study Group Report to RP3 WG.* Based on comments from the Working Group on interim reports, Town+Gown will work with the Study Group to document the entire research projects, which will include a series of recommendations for the city-wide process to be applied on other sets of projects in other neighborhoods. Duration: Fall 2021

Sustainable Communities: Making the Invisible Visible
Town NYC DEP and NYC DDC
Gown Pratt/Graduate Center
Researcher(s) Students in Sustainable Communities, Fall 2013

4D BIM Explorations in Design and Construction Management
Town NYC DDC
Gown Pratt/Architecture
Researcher(s) Students in ARCH 521B/CM 423P, Spring 2014

Mapping Red Hook/Red Hook HUB: A Creative Placemaking Project
Town Amplifier/MGMT*
Gown Pratt/Communications Design
Researcher(s) Students in Design Advocacy: Creative Placemaking, Spring 2014
See: http://redhookhub.org/about/

And a related relevant project
Putting Dollars to Work at the Community Board Level
Town Community Board 14, Brooklyn
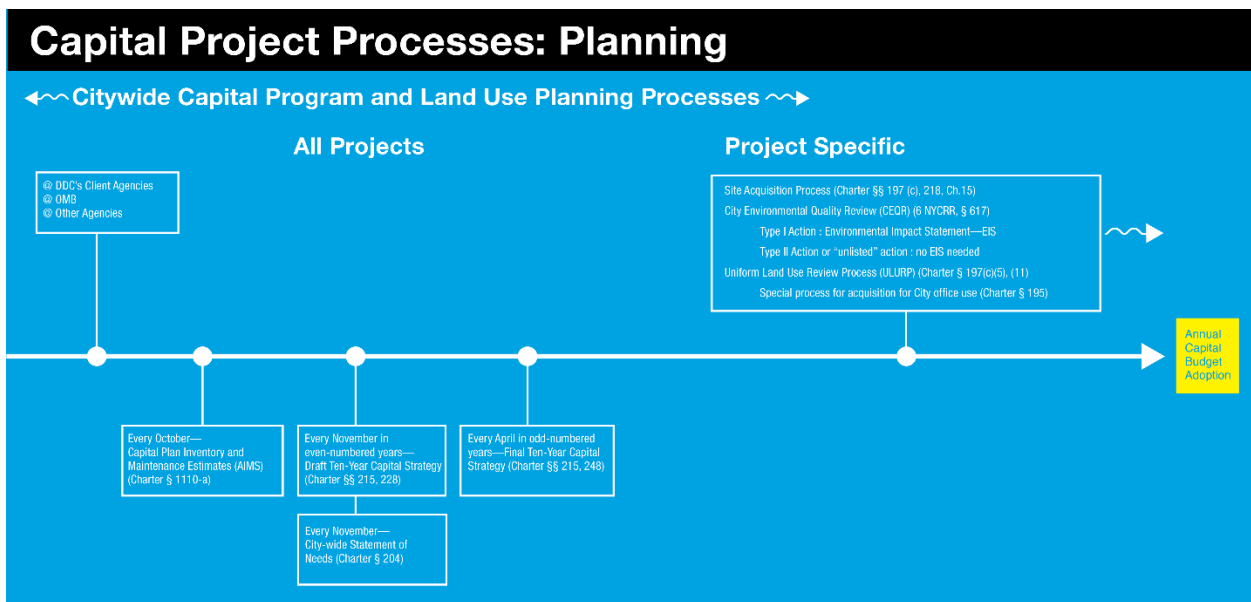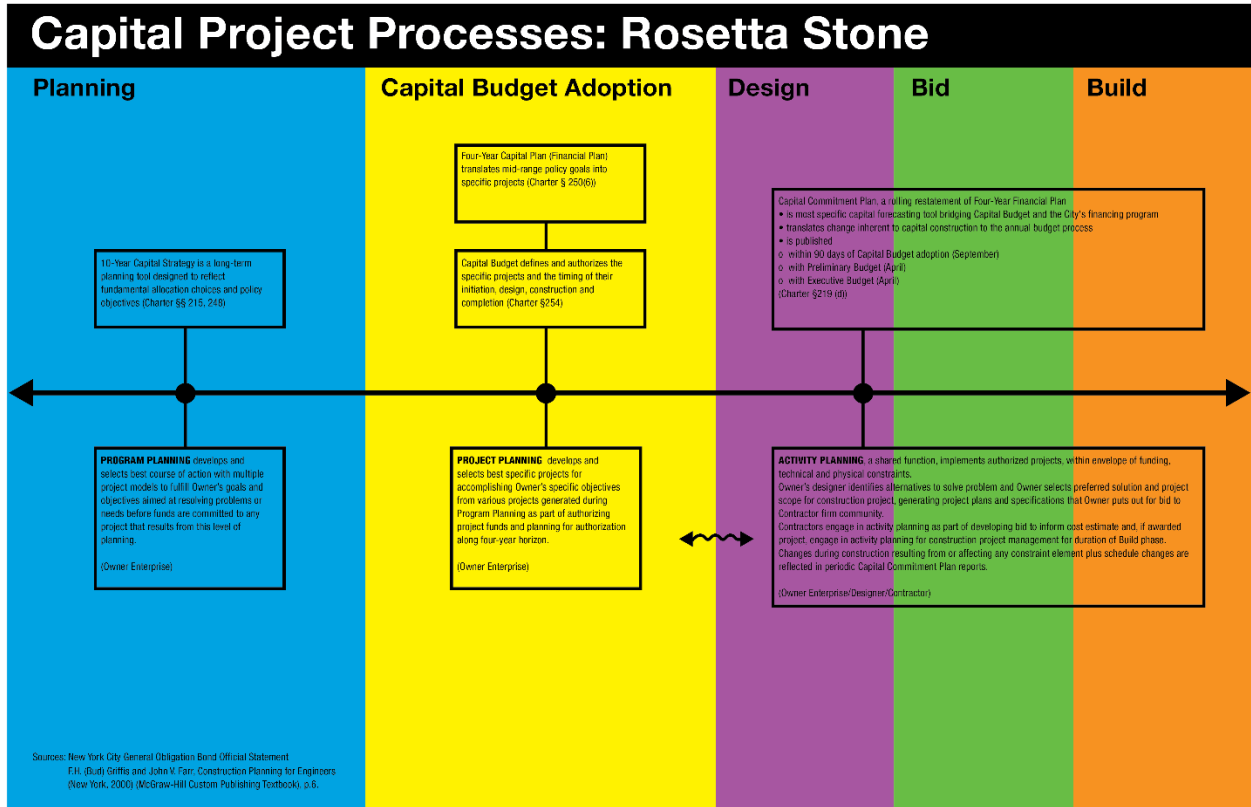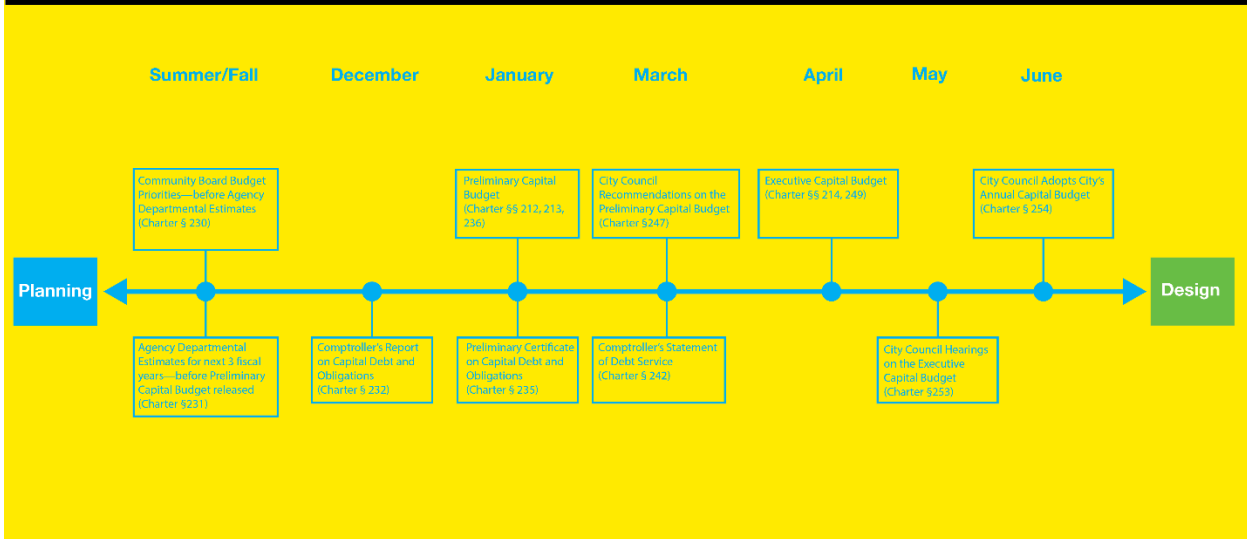**Gown** New School/Milano and New School/Parsons
Researcher(s) Milano: Daniela Alulema, Eleni Bourinaris, Michael Campbell and Nicole Payne
Parsons: Salome Asega, Roy Bedingfield, Tajii Kuroda and Regina Maria La Puno, Spring 2014

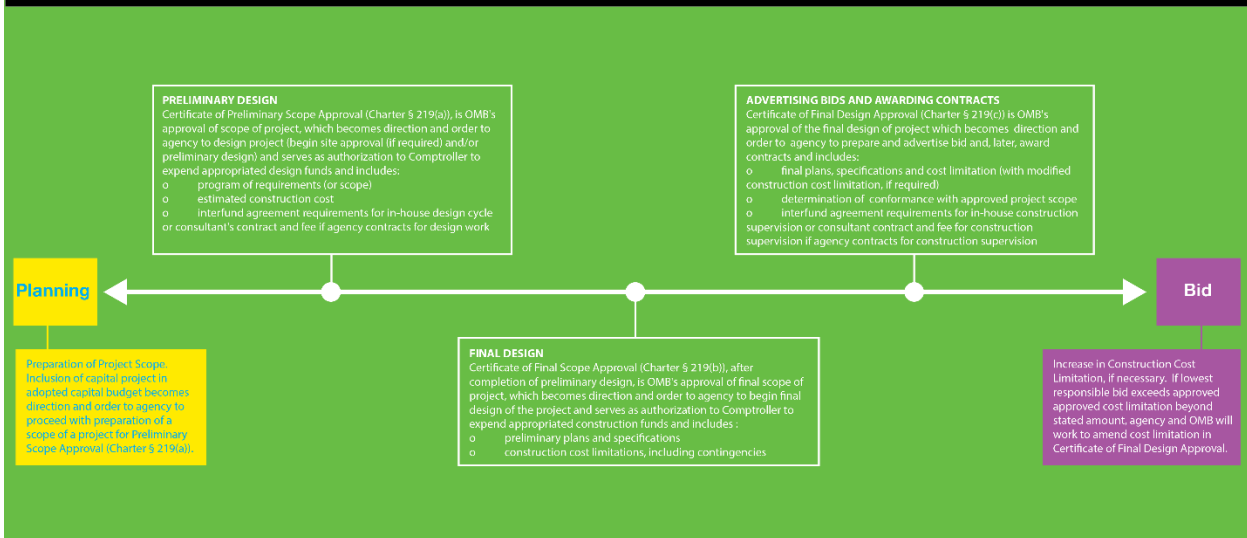All these projects are abstracted in *Building Ideas*, Vol. 5, at
https://www1.nyc.gov/assets/ddc/downloads/town-and-gown/building-ideas-5.pdf.

Capital Project Processes: Rosetta Stone

Planning	Capital Budget Adoption	Design	Bid	Build

Four-Year Capital Plan (Financial Plan) translates mid-range policy goals into specific projects (Charter § 250(6))

Capital Commitment Plan, a rolling restatement of Four-Year Financial Plan
• is most specific capital forecasting tool bridging Capital Budget and the City's financing program
• translates change inherent to capital construction to the annual budget process
• is published
  o within 90 days of Capital Budget adoption (September)
  o with Preliminary Budget (April)
  o with Executive Budget (April)
(Charter §219 (d))

10-Year Capital Strategy is a long-term planning tool designed to reflect fundamental allocation choices and policy objectives (Charter §§ 215, 248)

Capital Budget defines and authorizes the specific projects and the timing of their initiation, design, construction and completion (Charter §254)

PROGRAM PLANNING develops and selects best course of action with multiple project models to fulfill Owner's goals and objectives aimed at resolving problems or needs before funds are committed to any project that results from this level of planning.

(Owner Enterprise)

PROJECT PLANNING develops and selects best specific projects for accomplishing Owner's specific objectives from various projects generated during Program Planning as part of authorizing project funds and planning for authorization along four-year horizon.

(Owner Enterprise)

ACTIVITY PLANNING, a shared function, implements authorized projects, within envelope of funding, technical and physical constraints.
Owner's designer identifies alternatives to solve problem and Owner selects preferred solution and project scope for construction project, generating project plans and specifications that Owner puts out for bid to Contractor firm community.
Contractors engage in activity planning as part of developing bid to inform cost estimate and, if awarded project, engage in activity planning for construction project management for duration of Build phase.
Changes during construction resulting from or affecting any constraint element plus schedule changes are reflected in periodic Capital Commitment Plan reports.

(Owner Enterprise/Designer/Contractor)

Sources: New York City General Obligation Bond Official Statement
F.H. (Bud) Griffis and John V. Farr, Construction Planning for Engineers
(New York, 2000) (McGraw-Hill Custom Publishing Textbook), p.6.

Capital Project Processes: Planning

⟵∿ Citywide Capital Program and Land Use Planning Processes ∿⟶

All Projects	Project Specific

@ DDC's Client Agencies
@ OMB
@ Other Agencies

Site Acquisition Process (Charter §§ 197 (c), 218, Ch.15)
City Environmental Quality Review (CEQR) (6 NYCRR, § 617)
　　　Type I Action : Environmental Impact Statement—EIS
　　　Type II Action or "unlisted" action : no EIS needed
Uniform Land Use Review Process (ULURP) (Charter § 197(c)(5), (11)
　　　Special process for acquisition for City office use (Charter § 195)

Every October—
Capital Plan Inventory and Maintenance Estimates (AIMS) (Charter § 1110-a)

Every November in even-numbered years—Draft Ten-Year Capital Strategy (Charter §§ 215, 228)

Every April in odd-numbered years—Final Ten-Year Capital Strategy (Charter §§ 215, 248)

Every November—City-wide Statement of Needs (Charter § 204)

Annual Capital Budget Adoption

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Capital Project Processes: Capital Budget

Summer/Fall **December** **January** **March** **April** **May** **June**

Planning

Design

Community Board Budget Priorities—before Agency Departmental Estimates (Charter § 230)

Preliminary Capital Budget (Charter §§ 212, 213, 236)

City Council Recommendations on the Preliminary Capital Budget (Charter §247)

Executive Capital Budget (Charter §§ 214, 249)

City Council Adopts City's Annual Capital Budget (Charter § 254)

Agency Departmental Estimates for next 3 fiscal years—before Preliminary Capital Budget released (Charter §231)

Comptroller's Report on Capital Debt and Obligations (Charter § 232)

Preliminary Certificate on Capital Debt and Obligations (Charter § 235)

Comptroller's Statement of Debt Service (Charter § 242)

City Council Hearings on the Executive Capital Budget (Charter §253)

Capital Project Processes: Design

PRELIMINARY DESIGN
Certificate of Preliminary Scope Approval (Charter § 219(a)), is OMB's approval of scope of project, which becomes direction and order to agency to design project (begin site approval (if required) and/or preliminary design) and serves as authorization to Comptroller to expend appropriated design funds and includes:
o   program of requirements (or scope)
o   estimated construction cost
o   interfund agreement requirements for in-house design cycle or consultant's contract and fee if agency contracts for design work

ADVERTISING BIDS AND AWARDING CONTRACTS
Certificate of Final Design Approval (Charter § 219(c)) is OMB's approval of the final design of project which becomes direction and order to agency to prepare and advertise bid and, later, award contracts and includes:
o   final plans, specifications and cost limitation (with modified construction cost limitation, if required)
o   determination of conformance with approved project scope
o   interfund agreement requirements for in-house construction supervision or consultant contract and fee for construction supervision if agency contracts for construction supervision

Planning

Bid

FINAL DESIGN
Certificate of Final Scope Approval (Charter § 219(b)), after completion of preliminary design, is OMB's approval of final scope of project, which becomes direction and order to agency to begin final design of the project and serves as authorization to Comptroller to expend appropriated construction funds and includes :
o   preliminary plans and specifications
o   construction cost limitations, including contingencies

Preparation of Project Scope. Inclusion of capital project in adopted capital budget becomes direction and order to agency to proceed with preparation of a scope of a project for Preliminary Scope Approval (Charter § 219(a)).

Increase in Construction Cost Limitation, if necessary. If lowest responsible bid exceeds approved approved cost limitation beyond stated amount, agency and OMB will work to amend cost limitation in Certificate of Final Design Approval.

11

Capital Project Processes: Build Phase Components

Build

Use

Pre-Construction
• Notice to Proceed
• Pre-Construction Meeting

Substantial Completion

Final Completion

Construction "Parade of Trades"

Project Close-Out

Post-Construction
• Operations
• Maintainance

Urban Hazard Mitigation for Infrastructural and Community Resiliency. Cities are "complex and interdependent [systems], extremely vulnerable to threats from both natural hazards and terrorism."[9] The paradox of cities is that what makes them "desirable—their architectural structures, population concentrations, places of assembly, and interconnected infrastructure systems—also puts them at high risk to floods, earthquakes, hurricanes, and terrorist attacks."[10]

A resilient city is one that is "capable of withstanding severe shock without immediate chaos or permanent harm" and, using plans "[d]esigned in advance to anticipate, weather, and recover from the impacts of natural or terrorist hazards [that are based] on principles derived from past experience with disasters in urban areas, [it] might bend from hazard forces, [but] not break."[11] A resilient city is "[c]omposed of networked social communities and lifeline systems [that enable it to] become stronger by adapting and learning from disasters."[12] This vision of resiliency relies on a "sustainable network of physical systems and human communities, with the "constructed and natural environmental components of the city" making up the physical systems, and "the formal and informal, stable and ad hoc human associations that operate in an urban area" making up the human communities.[13]

Cities engaging in advance planning and action to reduce these risks engage in a form of urban hazard mitigation practice. Distinguished from "the more immediate and reactive activities taken during disaster preparedness, response, and recovery, [h]azard mitigation is action taken to reduce or eliminate long-term risk to people and property from hazards and their effects [and] is the phase of emergency management dedicated to breaking the cycle of damage, reconstruction, and repeated damage from disasters [, consisting of] measures ranging from structural engineering and building code standards to land use planning and property."[14] Post 9/11 technical approaches to strengthening defenses against terrorism threats include "a broad program to technical approaches to mitigate the vulnerability of key infrastructures ... and the contribution of science and technology to counter terrorist threats to particular functional systems."[15]

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[9] Godschalk, *op. cit.*, p. 136.
[10] *Idem*
[11] *Ibid.,* pp. 136-137.
[12] *Ibid.,* p. 137.
[13] *Idem*.
[14] *Ibid.,* p. 136, citing to FEMA.
[15] *Idem*

Public spaces and communities share reciprocal, symbiotic relationships. Communities can also become resilient with their use of public spaces, which continue to exist and function with the communities' use. These spaces' levels of accessibility, openness, visibility, revelation, and support for community practices define their resiliency. An open, accessible space builds community and builds support for community practices, which in turn allows for community members to become visible within the space. Visibility breeds revelation and a sharing of ideas, which leads to diversity, accommodation, and tolerance.[16]

Standard hazard mitigation practices, however, do not typically focus on or identify "the unique needs and characteristics under stress, as opposed to more generic hazard situations," while an urban hazard mitigation plan and decision support system have the overriding goal of developing a resilient city and enables a city" to be resilient to natural hazards while ensuring that development efforts do not increase the vulnerability to these hazards"[17]

A city's physical systems "act as the body of the city, its bones, arteries , and muscles [and] must be able to survive and function under extreme stress."[18] An urban hazard mitigation plan and decision support system must focus not only to the natural and man-made hazards and threats discussed above, but also the city's "own multiple vulnerabilities" that include the "points of urban vulnerability [posed by its] infrastructure systems and buildings to telecommunications, transport, and energy and resource supply lines."[19]   Its "[u]rban risk reduction mechanisms include police and fire forces, planning and building inspection departments, health services, families, schools, and the media."[20]

Together with a city's governmental structure and those of the state and federal government, a city's communities "act as the brain of the city, directing its activities, responding to its needs, and learning from its experience."[21]   For a city to be resilient or *resistant* and reduce vulnerability to disasters, its physical systems not only need to be resilient, but its communities also need to resilient.[22] A city's urban hazard mitigation plan and decision support system must incorporate all traditional hazard mitigation planning protocols and practices for its physical

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[16] Anthony Maniscalco "Occupy Mall Street? How the Court Conditioned Public Space Where People Go" (2014). *CUNY Academic Works.* https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1069&context=gc_etds accessed on 11/08/19 @ 4:31 p.m.

[17] Godschalk, *op. cit*., p. 136.

[18] *Ibid.,* p. 137.

[19] *Idem*

[20] *Idem*

[21] *Idem*

[22] *Idem*

aspects and must also teach "the city's social communities and institutions to reduce hazard risks and respond effectively to disasters because they will be the ones most responsible for building ultimate urban resilience."[23]

Resilient cities are dichotomous—strong and flexible, redundant and efficient, diverse and interdependent, autonomous and collaborative, and adaptive.[24] Resiliency contributes to a city's "the ability to accommodate [incompletely predictable] change gracefully and without catastrophic failure" and helps its "people and property [to] fare better [in a disaster]."[25] Disaster resilience principles, with a wealth of data from the long-standing use of these principles, can serve as a bridge between natural and man-made disasters in an urban hazard mitigation plan. Resilience principles should apply to all urban systems—physical, social, economic and environmental—and success in resilient responses reflect the following characteristics: redundancy, diversity, efficiency, autonomous-ness, strength, interdependency, adaptability and collaborative.[26] An effective urban hazard mitigation plan is based on "strong central governance, as well as vital private sector and non-governmental institutions" within a city and "networks of leadership and initiatives [with] goals and objectives [that can be adapted] in light of new information and learning."[27] Best hazard mitigation practices also include developing community mitigation capacity and mitigating for social and institutional resilience.[28]

The community component of city-wide urban hazard mitigation consists of a distributed hazard mitigation capacity across neighborhoods, which includes "hazard awareness information, funding, and training to new and existing neighborhood and community organizations to enable them to develop capable leaders and carry out hazard mitigation as one element of their program activities [, which] include environmental conservation, economic development, community facilities and historic preservation."[29] Further, a city must develop a broad hazard mitigation commitment within communities by establishing a "hard mitigation ethic [, moving] hazard issues onto the public agenda, keeping issues before the community and holding leaders accountable for hazard mitigation actions."[30]

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[23] *Idem*
[24] *Ibid.,* pp. 137, 139.
[25] *Ibid.,* p. 138.
[26] *Ibid.,* p. 139.
[27] *Ibid.,* p. 139.
[28] *Ibid.,* pp. 139-140.
[29] *Ibid.,* p. 140.
[30] *Ibid.,* p. 140.

Operating through networked communications also requires adopting recognized equity standards, assisting vulnerable neighborhoods by specifically providing resources and assistance to them, and mitigating business interruption impacts by preparing "businesses and financial institutions to cope with disasters [and establishing] procedures for providing loans and deferring obligations following a disaster, as well as programs to assist workers during periods of business closure due to disasters."[31] As important as the "engineering-oriented, technocratic fix perspective" is, such an approach is only as effective as the weakest link in a community, which include "the poorest and most vulnerable communities within a city"[32] so that is it necessary for a decision support system to assess the fragility of organizational capacity within low income census tracts and monitor vulnerability reduction within those census tracts..[33] It is possible to measure community capacity using 'fragility curves' developed by social scientists to measure organizations under stress.[34] To "build the capacity of the multiple involved communities to anticipate and respond to disasters ... advances in information processing and dissemination will facilitate collective learning and self-organization."[35] "[L]inking information technology to organizational learning [can] create a sociotechnical system able to solve shared risk problems."[36]

Issues of Community.   Throughout discussions about resiliency, the "community" is a key consideration with respect to resilient infrastructure and communities. The question of how to *create* resilient infrastructure and communities raises the *a priori* question of "*Who* can create?"[37] Viewing sustainability as a multi-disciplinary issue reorients policy and administration goals to consider the social context.[38] Urban community planners can offer a great insight into engaging the community because an important part of this profession involves communicating with this conceptual entity and considering how to determine who constitutes it. But at some point, focusing on "official" community roles, defined by local law, in city-wide processes can unlock actionable potential for municipal innovation with respect to communities[39] because meaningful change requires identifying exactly where and how

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[31] *Ibid.,* p. 140.

[32] *Ibid*., p. 140.

[33] *Ibid.,* p. 140.

[34] *Ibid.,* p. 137.

[35] *Ibid.,* p. 140.

[36] *Ibid.,* p. 140.

[37] See *Redesigning Neighborhood Change*, May 13, 2014, at https://www1.nyc.gov/assets/ddc/downloads/town-and-gown/05.13.14_precis_neighbor.pdf.

[38] Pollalis, op. cit., Envision Framework.

[39] Stephen Hammer, "Capacity to Act: The Critical Determinant of Local Energy Planning and Program Implementation," Working Paper, Columbia University Center for Energy, Marine Transportation and Public Policy. Presented at the World Bank's 5th Urban Research Symposium (Cities and Climate Change), Marseilles, France, June 28-30, 2009.

ineffective interfaces in the prescribed processes can be redesigned within the existing legal framework.

Capital budgeting[40] is a significant local governmental function that must at some point, of necessity, be performed at the city-wide executive and legislative branches of local government. But NYC is physically large, consisting of perhaps as many as 336 distinct neighborhoods that are smaller geographical areas corresponding to lived reality.[41] In NYC, the functions and relationships of neighborhood activities are defined by the City Charter, which creates 59 community districts and invests their boards with power to act in the areas of the budget land use and the budget as well as with respect to certain service agencies.[42] "[T]he average community district, however, has a population of over 100,000, which makes it comparable in size to Elizabeth, New Jersey, and Albany, New York."[43] The City's capital budget process is technically complex, involving a high degree of politics, many stakeholders and reams of equally complex public data that are often difficult to understand and use. Moreover, the City Charter provisions for the budget process are mostly very old. See abstract of Town+Gown Pratt/Brooklyn Law School project on pp. 34-35 of Building Ideas, Vols 8+9 (at https://www1.nyc.gov/assets/ddc/downloads/town-and-gown/Building_Ideas_Vols_8_9.pdf) that "aged" NYC's budget law provisions. The age of the laws, however, is not necessarily the source of the problem but rather the practical interfaces among participants working within the existing legal framework.

NYC's 59 community districts operation through community boards are the smallest level of government with City Charter-defined roles in citywide capital planning process when, in theory, community members can officially influence city-wide capital planning and budgeting. One goal of the 1989 Charter Revision Commission was to increase "... the participation of ... the people in the things that affect their lives", seeking to enhance the ability of community boards to participate in citywide processes.[44] The tension between two approaches to planning—the professional and centralized approach and the community-based planning

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[40] Land use planning is the other significant local function, which is not part of this research project.
[41] *See* New York City Department of City Planning website (http://www.nyc.gov/html/dcp/html/neighbor/neigh.shtml); Anthony D. King, "Boundaries, Networks, and Cities: Playing and Replaying Diasporas and Histories", from Alev Çinar and Thomas Bender, editors, *Urban Imaginaries: Locating the Modern City* (Minneapolis: University of Minnesota Press, 2007), p. 2.
[42] See https://communityprofiles.planning.nyc.gov/.
[43] Municipal Art Society Planning Center on behalf of the Community-Based Planning Task Force, *Livable Neighborhoods for a Livable City*, 2005, p. 11. (http://mas.org/presscenter/publications/).
[44] In 1989, it was specifically the land use planning function.

approach that is still evolving, however, impacts achievement of this goal.[45] That goal embedded into the City's governance structure, in part, reflects the urban planning field's adoption of Jane Jacobs's belief that land use planners, versed in techniques, theories and services, need to know "the terms of the precise and unique places in a city with which they are dealing" by turning to "the people of the place" who "understand thoroughly" the specific place.[46] The term "locality coordination" describes a vertical communications mechanism that captures place-based expertise for "locality knowledge in planning, whether the planning is creative, coordinating or predictive."[47]

Since the 1989 Charter Revision Commission changes, "horizontal networks of public, private, and non-profit organizations as a phenomenon of governance, as opposed to hierarchical organizational decision making," appear to have evolved into "a new type of local governance regime [and] a form of "muddling through" at major American cities and may already have produced an "evolution of a new type of local governance regime,"[48] resulting in the growth of smaller community-based organizations increasingly interacting in the policymaking process on environmental issues.[49]   But while Jacobs may have elevated the neighborhood to the subject and object of urban planning and the City Charter vests the community boards with locality coordinating powers in capital budgeting, the history of the City's community boards reflects impediments that have made it challenging for them and for smaller community based organizations working with them or independently to feel they can play an effective role in capital planning and design at the neighborhood level.

The community boards perform this "locality coordination" function in the citywide capital planning process,[50] by collecting all types of complaints, observations and suggestions from community members in public hearings and transmitting that knowledge, often prioritized based on their professional staff's local knowledge. Each year during the capital planning stage, community boards submit their local capital needs that reflect, to some extent, real time capital

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[45] Frederick A. O. Schwarz, Jr., and Eric Lane, "The Policy and Politics of Charter Making: The Story of New York City's 1989 Charter, *New York Law School Law Review*, Volume XLII, Numbers 3 and 4, 1998, pp. 751-752, 866, 868.

[46] Jane Jacobs, *The Death and Life of Great American Cities* (New York: Random House, 1993), p. 533.

[47] *Ibid.*, pp. 543-545.

[48] Kent E. Portney and Jeffrey M. Berry, *Urban Advocacy Groups, City Governance, and the Pursuit of Sustainability in American Cities*, paper prepared for delivery at the 2010 Meetings of the American Political Science Association, Washington, D.C., Panel 39-3 Urban Sustainability in a Changing Climate, September 5, 2010, p. 11.

[49] *Ibid.,* abstract page. See also Robert F. Pecorella. *Community Power in a Postreform City: Politics in New York City* (New York: M. E. Sharpe, Inc, 1994), pp. 138-150.

[50] NYC Charter, Chapters 8-10.

asset assessments reflecting infrastructural and community resiliency deficiencies.[51] The community boards and other community organizations working within and outside the official community board process are widely known to feel frustrated in their attempts to inform and influence city-wide capital investment decision making. The central budget office's treatment of these community board submissions during the capital planning stage suggests systemic timing lags in community-based knowledge transfer of local infrastructural and community resiliency deficiencies during this stage process. While NYC agencies and central budget office must act for the City as a whole and balance multiple needs in excess of resources, resolving identified systemic impediments at the community board level due to poorly designed interfaces within NYC's capital planning process would optimize the impact of public capital investments to enhance peoples' access to essential public resources and services where these capital investments would significantly improve neighborhood quality of life and community resilience to disruptions caused by a shock or disaster.

Community boards originally functioned as a decentralized version of 311 that imparted local knowledge and navigated the bureaucracy at operating agencies and the central budget and planning offices on behalf of community members. Many of the promises from 311 systems, such as agency and citywide data-driven analytics to inform operations, planning and budgeting, have been realized, but agency reliance on 311 data for capital planning purposes has drawbacks. Not only does the 311 system tend to bypass community boards' local knowledge but also known biases in 311 use, along with 311 data primacy at agencies for capital planning purposes, can translate into biased outcomes in agency decisions, leaving some vulnerable and underserved neighborhoods with underestimated and unaddressed needs, including infrastructural and community resiliency needs.[52] A Town+Gown research project for Brooklyn Community Board 14 with multi-disciplinary Parsons student teams, which is abstracted on pp. 16-19 of Building Ideas, Vol. 5 (at https://www1.nyc.gov/assets/ddc/downloads/town-and-gown/building-ideas-5.pdf), focused on the community district budget function in a 311 environment. Addressing the existing poorly defined interfaces, without changes in law but with tools to support the locality coordination function during the capital planning stage, would permit development of a methodology within the institutional community board function for optimal transmission of important community knowledge, expressed less as complaints and more as infrastructural and

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[51] See Community Boards Register by Borough (https://www1.nyc.gov/assets/omb/downloads/pdf/cbrboro6-21.pdf).

[52] Constantine Kontokosta and Boyeong Hong, "Bias in Smart City Governance: How Socio-Spatial Disparities in 311 Complaint Behavior Impact the Fairness of Data Driven Decisions," *Sustainable Cities and Society*, Volume 64 (2021).

community resiliency deficits, to City agencies to support capital project effectiveness in increasing infrastructural and community resilience on an equitable basis by correcting for 311 reporting biases. The environmental sustainability agenda and related resiliency imperative, explicitly expanded to include economic justice and social measures, may ultimately help support community boards and community-based organizations succeed in the "politics of place."[53]

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[53] Portney and Berry, *op. cit.,* pp. 6-8.

Summary of Collaborative Research Conducted within RP³ WG to Date

Event	Participants
10/31/18 , *Resilient Public Spaces and Communities: Data Driven Explorations*	NYC agencies, academics, practicing architects and community groups
11/18/19 *Resilient Public Spaces and Communities.2*	NYC agencies, academics, practicing urban planners and community groups
07/23/20 Research Project Draft release	RP3 WG (NYC capital agencies and researchers)
09/23/20 Research Project Kick Off Meeting	RP3 WG (NYC capital agencies and researchers)
09/18/20 Capital Project identification exercise for mapping from publicly available budget documents	RP3 WG (researchers)
Request to NYC capital agencies for Red Hook projects to map	
11/17/20 NAS methodology map exercise #1 for Red Hook; RP3 WG determined Red Hook not appropriate case study neighborhood	RP3 WG (NYC capital agencies and researchers)
NYC DDC to identify neighborhoods with all 3 aspects of resiliency deficiencies (urban heat island, inland flooding and coastal flooding)	
01/12/21 Meeting to discuss and select new case study neighborhoods—South Bronx and Greenpoint Community Districts were selected	RP3 WG (NYC capital agencies and researchers)
Request to NYC capital agencies for two case study neighborhood projects to map	
05/20/21 NAS methodology map exercise #2; RP3 WG determined insufficient project data for cluster analysis of case study Community Districts	RP3 WG (NYC capital agencies and researchers)
Request to DCP for additional case study neighborhood projects to map	
07/15/21 NAS methodology map exercise #3; RP3 WG determined insufficient project data for cluster analysis of case study Community Districts	RP3 WG (NYC capital agencies and researchers)

Waiting for DCP to release new Commitment Plan Map; T+G analysis of case study neighborhood Community Boards Registers by Borough revealed temporal gap in local knowledge transmission during capital planning process	
01/28/22 NAS methodology map exercise #4 using the recent DCP map of Commitment Plan projects for the case study Community Districts ; RP3 WG determined insufficient project data for cluster analysis of case study Community Districts; WG discussion (1) concluded that pre-selecting case study neighborhoods for cluster analysis did not work and that it would be necessary to look at the entire city to identify Community Districts with sufficient project density for cluster analysis, which would require some funded academic assistance and (2) also confirmed the absence of interagency collaboration during capital planning phase. Idea of platform emerged to support interagency collaboration was raised, which platform would also support local knowledge transmission.	RP3 WG (NYC capital agencies and researchers)