

# SAFR CONNECTICUT CONNECTIONS

U.S. Department of Housing & Urban Development's  
NATIONAL DISASTER RESILIENCE COMPETITION

**THE STATE OF CONNECTICUT  
PHASE II DRAFT APPLICATION FOR PUBLIC COMMENT**

October 9, 2015



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**EXHIBIT A**  
**EXECUTIVE SUMMARY**

**The State of Connecticut has formed State Agencies Fostering Resilience (SAFR)** to develop a long-term resilience plan for the State of Connecticut to address combat the challenges of climate change and build a sustainable economic future for the State. SAFR has been formed as a State level policy-making body to craft policies to promote resilience equitably across its impacted region and the entire State, and to develop and implement a phased approach that integrates a science-based forward looking risk analysis to develop resilience plans in response to hurricane Sandy, the qualifying disaster for this application, and other recent major shocks, including Hurricane Irene. SAFR has been formed to assist impacted communities to formulate resilience plans and implement resilience projects. SAFR has conducted an extensive planning effort to progress resilience projects in the eleven target municipalities in the two counties, New Haven and Fairfield Counties, most impacted by Hurricane Sandy and will look to progress plans in each of these impacted communities during the initial roll out of the program. This initial regional program will be launched by pilot projects in the two municipalities who illustrated the greatest need and most advanced approach to creating resilient futures. These pilot communities will launch a statewide program for resilience that will be addressed through the modification of existing programs within the State and new programs designed to combat the effects of climate change, in order to institutionalize the ability to both plan for and implement disaster resilience strategies in the State of Connecticut.

In New Haven and Fairfield Counties, the most impacted and distressed counties in the State due to Hurricane Sandy, 2,853 single-family homes in Fairfield County and 1,165 in New Haven County were damaged during Sandy. Unmet recovery needs total more than \$158 million from housing (\$135,789,167) and infrastructure (\$22,360,508), including eight (8) public housing properties totaling 815 units in the 100-year floodplain. Additional unmet need would reach into the hundreds of millions of dollars. Coastal communities total 60% of the state's population. More than 32,000 homes lie in the

100-year floodplain. Connecticut has the second highest exposure of vulnerable coastal assets on the eastern seaboard, with more than \$542 billion at risk to coastal storms.

The Applicant, the State of Connecticut's Department of Housing (DOH), is a member of SAFR and is taking the lead role to address these risks and integrate the HUD NDRC proposal into its resilience plans. As described in more detail in Exhibit C.b.1., Management Structure, SAFR is represented by nine state agencies (SAFR members) and is supported by 19 additional partners including the regional Councils of Government (COGs), Connecticut Conference of Municipalities, the Connecticut Institute for Resilience & Climate Adaptation (CIRCA) at University of Connecticut, Yale, Partnership for Strong Communities, Housing Development Fund, Connecticut Green Bank, the state's largest utility companies, several environmental organizations, The Red Cross, CT Rises, and the Tremaine Foundation. All SAFR Members and Partners have incorporated climate change resilience into their core mission or programs.

**This proposal outlines a long-term vision for establishing resilient communities.** The main tenets of the program include:

- *Focusing community development around transit (resilient TOD),*
- *Creating corridors resilient to climate change (resilient corridors),*
- *Creating opportunities for affordable housing, and preserving and enhancing the quality of life of existing affordable communities*
- *Developing energy, economic and social resilience,*
- *Increasing transit connectivity,*
- *Adapting structures and critical infrastructure in the flood zone to withstand occasional flooding, and*

- *Protecting communities through healthy buffering ecosystems, where critical services, infrastructure and transport hubs are located on safer, higher ground, and where strong connections exist between the two.*

**Increasing investment in identified TOD resilience zones provides an opportunity to increase economic resilience** by strongly tying back to the regional transportation network and regional economic opportunities. Connecticut is investing heavily in its transportation system, bringing the system to a state of good repair, increasing service along existing lines, building new stations to attract new mass transit ridership and building new transit corridors to bring mass transit to previously automobile dependent communities. This strong shift in emphasis is in recognition that Connecticut's economy is curtailed by sprawl and congestion and that a future where mass transit can encourage more energy efficient and sustainable development will enhance future growth and preserve a strong economic future. Tying TOD development strategies into the resilience framework will focus on building communities that are resilient to climate change and communities that are focused on sustainable solutions. In addition to providing long-term resilience, they provide myriad co-benefits that strengthen communities and economic opportunities in the short term and between storms. *Resilient corridors* connect communities and regions and create opportunities for ecological and economic investment that will help communities, especially the coastal and riverine communities of the State vulnerable to flooding,

As part of the development process for the resilience vision and for this proposal, the team undertook a robust process of public outreach and engagement. This process built upon the lessons learned in Rebuild by Design and numerous community resiliency processes. The initial outreach included over 50 consultations, 3 public hearings and open houses, a project website, site visits, and social media campaigns. This enriched the Phase 1 discovery process, informed the resiliency strategy,

and resulted in numerous partnerships. Phase 2 expanded the outreach to include a municipal workshop in the municipalities of Fairfield and New Haven counties to inform municipalities and regional COGs on the SAFR mission and collectively approach resilience strategies and share ideas and to select initial NDRC pilot communities. Upon selection after Phase 1, direct community outreach in the form of public pop-up information presentations were conducted to both inform and receive comment in both pilot communities. The effort culminated in two public hearings to solicit general comment.

The concept of this proposal is closely aligned with state strategic programs and spending priorities, including the Governor's \$ 10 Billion LetsGOCT! "best-in-class transportation system" program. The partner agencies of SAFR have pledged to coordinate projects in their capital budget with the NDRC proposal, including programmatic changes and specific capital project authorizations. The state has already committed \$ 475,000 along with approximately three hundred thousand in staff time to the CDBG-NDR application, identified direct and supporting commitment leverage in excess of \$400 million in the next two years to launch a resilience program that will transform how the State of Connecticut focuses its capital priorities in the future.

**Connecticut has demonstrated its long-term commitment to building back better through the Connecticut Climate Preparedness Plan**, which advanced legally-mandated efforts to prepare for climate change. The State has reduced coastal vulnerabilities through the passage of two new laws, the dedication of new resources to the Microgrids program, and the creation of a multi-disciplinary institution that enhances technical capacity for resilience and adaptation planning, the Connecticut Institute for Resilience and Climate Adaptation as well as Shore Up Connecticut, a low-interest loan program for flood mitigation. The State has developed three additional programs totaling \$88 million to protect to combat the effects of climate change, the \$20 million Long Island Sound Stewardship and Resiliency Program for protection of coastal marshes and natural buffer areas and the \$20 million

Grants-in-Aid Green Infrastructure Program to encourage low impact design of green municipal infrastructure and an additional \$8 million for open space land acquisition for conservation and recreation.

The funding of this NDRC grant for the DOH will play a vital role in fostering Connecticut's long-term vision and continuing efforts to build resiliency into its infrastructure and its economic vitality.



**EXHIBIT B**  
**THRESHOLD REQUIREMENTS**

This application is compliant with all the threshold requirements specified in the NDRC process.

**General Section.** The State of Connecticut is in compliance with the requirements of the General Section. **Eligible applicant.** The Applicant is the State of Connecticut. **Eligible county.** The eligible counties in the State of Connecticut are Fairfield (County/in PMSA 1160,1930,5760,8040) and New Haven (County/in PMSA 1160,5480,8880). New Haven and Fairfield counties were both impacted by Disaster Number 4087, incident type: Hurricane, incident title: Hurricane Sandy, incident begin date: 2012-10-27, and incident end date: 2012-11-08.

**Most impacted and distressed target area.** The target areas identified as most impacted and distressed as a result of Hurricane Sandy (DR-4087) are Fairfield and New Haven counties. These counties were previously determined by HUD to be most impacted.

**Unmet recovery needs threshold.** The State of Connecticut has Unmet Recovery Needs (URN) (needs that have not been addressed by federal, state, or other sources) in the most impacted and distressed target areas of Fairfield and New Haven counties. Connecticut has more than \$158 million in unmet need in housing and infrastructure.

**Owner occupied housing.** DOH is administering an Owner-Occupied Rehabilitation and Rebuilding program targeted to assist 1-4 unit owner-occupied properties, addressing rehabilitation and mitigation/elevation needs. Tranche 1 (T1) CDBG-DR funding addressed unmet rehabilitation needs, alone or in conjunction with mitigation/elevation needs. Tranche 2 (T2) CDBG-DR funds addressed mitigation/elevation needs of 1-4 unit owner-occupied properties damaged by Hurricane Sandy whose rehabilitation was addressed through insurance proceeds, FEMA assistance and/or SBA assistance. We anticipate awarding and expending all of the available Tranche 1 and Tranche 2 funds allocated for these activities (\$44.2M). The Tranche 3 (T3) plan proposes distributing \$6,886,050 to owner-occupied housing and the remaining \$4,572,950 to multi-family housing, infrastructure, administration and

planning, and \$10M to *Resilient Bridgeport* RBD. DOH does not anticipate the number of houses damaged by the disaster to go below 20, even after T3 funds are allocated.

**Owner Occupied housing Data Source Analysis:** In the Dropbox folder **Spreadsheet 1** is a detailed breakdown by county of the homeowners currently being assisted or intended to be assisted with an estimated cost of activity, including CDBG-DR, insurance, FEMA and SBA. **Spreadsheet 2** is a detailed breakdown of homeowners who have applied for assistance, but for whom funds are not currently available. In order to accomplish this analysis, we made the following assumptions: (1) There is remaining Unmet Need existing among homeowners in both New Haven and Fairfield Counties consisting of those on our current application list; (2) Mitigation/elevation needs exist in both counties consisting of those on our current application list; (3) Cost estimates for Unmet Need in **Spreadsheet 2** were determined using the average cost of assisted or to-be-assisted homeowners in the respective counties from **Spreadsheet 1**. The Summary Table of Unmet Need – Owner Occupied below shows the number of current applicants seeking assistance with remaining unmet rehabilitation or with unmet mitigation/elevation needs, which cannot be addressed with other sources through CDBG-DR, insurance, FEMA, SBA. Table Legend: Avg. Asst = Average Assistance from other sources (Insurance, FEMA, SBA); Total Asst. = Total Assistance from other sources; and URN = Unmet Recovery Need (URN calculated as Total Need minus Total Asst.).

<b>The Summary Table of Unmet Need – Owner Occupied Housing</b>						
County	# Houses	Ave. Cost	Total Need	Avg. Asst.	Total Asst.	URN
Fairfield	99	\$181,579	\$17,976,315	\$67,186	\$6,651,414	\$11,324,923
New Haven	74	\$175,325	\$12,974,098	\$52,139	\$3,858,286	\$9,115,794
Total reported unmet need after Tranche 3 CDBG-DR allocation = <b>\$13,554,621</b>						

**Multi-family housing.** DOH is administering a Multi-family Rehabilitation/Rebuilding and Mitigation program (T1 p. 53), targeted at low and moderate-income (LMI) multifamily properties with unmet need, and emphasizes state or federal public housing. DOH anticipated using leverage (state taxable and tax exempt bond financing, federal Low Income Housing Tax Credits (LIHTC) (both 4% and 9% credits), as well as conventional financing for housing) and thus allocated \$26,000,000 in CDBG-DR funding to address these needs. To date, DOH has targeted the majority of the \$26,000,000 available on three separate public housing replacement activities (T3, p.9).

The Summary Table of Unmet Need – multifamily shows remaining unmet need for rehabilitation or replacement of these units (T3, p.9). T3 proposes to distribute \$3,000,000 to multi-family (T3, p.19). Not all of the funds identified in the “Estimated Assistance Other Sources” column have received commitments, therefore unmet need may be greater than estimated. Table Legend: (T.D.C. = Total Development Cost; CDBG-DR = CDBG-DR Assistance; E.A.O. = Estimated Assistance Other Sources (DOH/LIHTC/Other); URN = Unmet Recovery Need, URN calculated from T.D.C minus CDBG-DR minus E.A.O.).

<b>Summary Table of Unmet Need – Multi-family Housing</b>					
County	# Units	T.D.C.	CDBG-DR	E.A.O.	URN
Fairfield	911	\$315,463,287	\$23,230,000	\$191,998,787	\$100,234,500
New Haven	140	\$43,000,000	\$0	\$18,000,000	\$25,000,000
<b>Total URN –Multifamily after Tranche 3 CDBG-DR allocation = \$122,234,500</b>					

**Summary of unmet housing need.** There is unmet housing need in the MID counties, Fairfield and New Haven, in excess of **\$135,789,167** after proposed T3 (Figures 1-3).

**Infrastructure.** In the most impacted target areas there is damage to permanent public infrastructure from the qualifying disaster, Hurricane Sandy, which has not been repaired. The following is the

remaining infrastructure repair needs in the target area sent to DOH. The location of damage by county and municipality and a damage summary for each project is as follows: (Dropbox file names: *Town Name\_Descriptor*) Fairfield County: *Fairfield\_Pump Station* – over two feet of Sandy flood waters stayed behind after storm, flooding one square mile of land and homes; *Greenwich\_Point Park* – wave and wind damage to park structures and erosion of natural features, living shoreline for damage prevention proposed; *Westport\_Bridge* – Sandy waves dislodged bridge to island, which was repaired, but not resilient to future storms. *Bridgeport\_Marina Village* – storm surge flooding damaged housing, proposal to repair incorporates resilience. New Haven County: *Beacon Falls\_WWTP* – stormwater flooding at wastewater treatment plant along river; *Meriden\_Harbor Brook* – stormwater flooding along river; *Milford\_Point Beach* – coastal storm surge flooding damage of low-lying areas; *Milford\_Wepawaug* – flooding along Wepawaug river, dredging mitigation proposed; *Oxford\_Firehouse* – firehouse flooded during Sandy; *West Haven\_Tide Gate & Footbridge* – tide gates and footbridge damaged from Sandy storm surge flooding; *West Haven\_Culvert* – culvert vulnerable to extensive flood damage from Sandy and future storms; *Ansonia-Derby\_Water Tank* – project to prevent loss of water pressure. The Data Sources has the sources and uses for each project listed. The table below shows the total cost of repairs, other sources of funding (ACE/FEMA/municipal) and the funding required to complete repairs.

<b>Summary Table of Unmet Need – Infrastructure</b>			
County	Cost of Repairs	Other Funding Sources	Funding Needed
Fairfield	\$15,301,536	\$4,761,250	\$10,540,286
New Haven	\$17,322,742	\$4,352,520	\$12,970,222
Total reported Unmet Infrastructure Need after Tranche 3 CDBG-DR Allocation = <b>\$22,510,508</b>			

There are inadequate funds to complete the repairs because CDBG-DR funds have been exhausted. Following Sandy there were 40 infrastructure projects requiring \$157.4 million in funding. Of the CDBG-DR funds awarded only \$6.2 (T1) and \$30 (T2) million have been dedicated to addressing these needs. While T3 proposes dedicating an additional \$1 million to infrastructure, there will remain an unmet need in excess of \$22 million.

**Summary of unmet infrastructure need.** Based on the projects listed in the data source and summarized above, there is an unmet infrastructure need of **\$22,510,508** after proposed T3.

**Statement on eligible activity, resilience incorporated, national objective, overall benefit and establish tie-back.** Funds will be used solely for necessary expenses related to disaster relief, long-term recovery, restoration of infrastructure and housing, and economic revitalization in the most impacted and distressed areas for which the President declared a major disaster in the aftermath of an event occurring in 2011, 2012, or 2013, pursuant to the Stafford Act. The expectation is to improve the resilience of the most impacted and distressed target area(s) to current and future threat(s) and hazard(s), including effects of climate change.

Connecticut has demonstrated taking at least one permanent action to increase resilience in the target area, region or state. With respect to activities expected to be assisted with CDBG–NDR funds, the Application has been developed so as to give the maximum feasible priority to activities that will benefit low and moderate-income (LMI) families. The aggregate use of CDBG–NDR funds shall principally benefit LMI families in a manner that ensures that at least 50 percent of the grant amount is expended for activities that benefit such persons.

**Benefit Cost Analysis.** A comprehensive Benefit Cost Analysis of the proposed projects were prepared by the State of Connecticut and its partners and is included in Attachment F – Benefit Cost Analysis.

**EXHIBIT C**  
**FACTOR 1. PHASE 2 CAPACITY**

## **Exhibit C.a. Experience of the Applicant**

The State of Connecticut is the Applicant and therefore all state agencies are considered the Applicant. Governor Malloy designated the Department of Housing as the principal state agency for allocation and administration of this funding. The DOH will coordinate with the other state agencies and Partners to implement the activities proposed in this application. Under P.L. 113-2, the CT DOH \$159,279,000 CDBG-DR funds.

The State of Connecticut DOH is the lead agency making all final allocations of funding; however, the DOH will coordinate and plan all projects with the state agencies, specifically those of the interagency advisory committee State Agencies Fostering Resilience (SAFR). SAFR members include lead staff from agencies that have supported and committed resources to this application and building overall resilience in the state. SAFR is comprised of the following state agencies:

- CT Department of Housing (DOH)
- CT Office of Policy and Management (OPM)
- CT Department of Energy and Environmental Protection (DEEP)
- CT Office of the Governor (OTG)
- CT Department of Transportation (CTDOT)
- CT Department of Economic and Community Development (DECD)
- CT Department of Emergency Services and Public Protection/Division of Emergency Management and Homeland Security (DESPP/DEMHS)
- CT Department of Public Health (DPH)
- CT Insurance Department (CID)
- CT Department of Administrative Services
- University of Connecticut (UConn)



SAFR also includes the Executive Director of the Yale, Urban Ecology and Design Lab and the Connecticut Conference of Municipalities. DOH will work across disciplines to achieve project goals, and ensure excellent design quality by collaborating with SAFR and the Partner members of the SAFR Advisory Committee that includes the regional Councils of Governments, non-profits working in environment, emergency response, and community development, and the private utility industry.

### **Exhibit C.a.1. General Administrative Capacity**

The State of Connecticut and its Partners have extensive knowledge and expertise with federal grants and the capacity to manage any awarded NDRC projects. The following examples outline the general administrative capacity of the State of Connecticut to manage, if awarded, the proposed projects.

The CT DOH and its partners have extensive knowledge and expertise with federal grants and the capacity to manage any awarded NDRC projects. The following examples outline the general administrative capacity of the State of Connecticut to manage, if awarded, the proposed projects.

#### Project Management, Procurement, Contract and Financial Management

The State of Connecticut complies with Federal procurement regulations and its own procurement policies and procedures. The lead agency, the CT DOH maintains a dedicated Sandy recovery staff team that has successfully administered, managed, distributed - with sound financial and procurement processes - two rounds of CDBG-DR funding since the Qualifying Disaster (Sandy). The DOH has prepared and executed a CDBG-DR Action Plan and two substantial amendments to meet the housing needs of communities most impacted by the storm. These needs included the costs of repairs, reconstruction and new construction, which were not covered by insurance, FEMA, or other sources of funding as well as infrastructure repairs, mitigation projects, and planning activities. Through this

process DOH vetted contractors, issued invitations to bid, issued contracts, oversaw contract execution, and coordinated with other agencies to obtain the proper permits.

#### Accountability, Quality Control/Quality Assurance, Monitoring, Internal Audit

The Department of Housing oversees accountability, quality control, monitoring and internal auditing.

#### Rapid Program Design, Launch and Evaluation

DOH manages and funds Shore Up CT, a low-interest mitigation financing program. DOH's ability to initiate the Sandy program and programs like Shore Up CT show its internal control capacity and ability to quickly launch and implement major projects successfully. In addition to DOH, SAFR agencies such as CTDOT, DECD, DEEP, OPM and UConn have extensive knowledge and experience in quickly launching a project and establishing and maintaining project performance and overall management.

#### **Exhibit C.a.2. Technical Capacity**

DOH and the SAFR representatives have extensive experience working on multi-agency projects and through public private partnerships including work specific to Sandy recovery. The State of Connecticut and partners have experience with interdisciplinary work in multiple areas including designing, planning and implementing large, complex and comprehensive projects; benefit-cost and data analysis; public works; affordable housing; environmental quality; community engagement; design and engineering; and economic revitalization.

We have secured Partners to join the SAFR Advisory Committee, with a wide array of diverse and overlapping capacities and expertise. This redundancy provides security, as well as great team depth and strength should Partner commitments change. All Partners are committed to this application and have incorporated one or more aspects of resilience to the impacts of severe weather, sea level rise

and climate change into their core mission or programs. Moreover, the lead agency, the DOH, has run a CDBG-DR program for the past three years, and will continue to do so if funds are awarded. Many of the state agencies have existing contracts with firms that could provide additional technical (i.e. engineering and other professional services) expertise. For example, CTDOT has a pre-approved list of 135 engineering, design and planning consultants.

Additional state agency capacity includes the University of Connecticut Connecticut Institute for Resilience and Climate Adaptation (CIRCA). CIRCA's technical capacity for science-based analysis includes impacts of climate change, sea level rise, ocean dynamics, future precipitation and hydrology models, weather prediction, environmental law, economics and policy analysis. CIRCA develops and deploys natural science, engineering, legal, financial, and policy best practices for climate resilience as well as undertaking and overseeing pilot projects designed to improve resilience and sustainability of the natural and built environment along Connecticut's coast and inland waterways.

- DECD has an Office of Brownfield Remediation and Development and Office of Capital Projects with staff comprised of planners, engineers, environmental analysts and real estate development professionals who have significant experience in brownfield remediation and redevelopment, project and construction management, and infrastructure and real estate development. DECD successfully managed and administered the \$2 million HUD Sustainable Communities Challenge Grant that supported TOD planning and development in the cities of New Haven and Meriden.
- DEEP's technical capacity includes the administration of CT's Clean Water Fund, developing and implementing energy, brownfields, land use, coordinating climate and resilience policy (through CIRCA), and running the Floodplain Management.
- CTDOT has tremendous experience handling Federal projects. Within CT DOT, the Bureau of Planning is responsible for coordinating major transportation and Transit Oriented Development

(TOD) initiatives. The organization also has an active Transportation Asset Management program with the capacity to inventory, inspect, monitor and prioritize facilities for maintenance and capital project programs. CTDOT routinely practices scenario planning including no-build alternatives and other advanced management techniques to constrain its ongoing work program to available revenue. CTDOT has an Office of Rights of Way Property Management Division which is responsible for managing the real property acquired for proposed construction projects. Upon completion of construction, this office handles the sale and lease of properties that are in excess of Transportation needs. CTDOT, in coordination with multiple agencies is shaping TOD policy for the State of Connecticut. DOT chairs an interagency technical and policy group that includes OPM, OTG, DOT, DECD and DEEP to coordinate the planning and implementation of TOD around the expanding mass transportation infrastructure of the State. This policy advisory committee serves as a pre-cursor to the SAFR structure and has been successful in coordinating policy, mission and action around TOD.

### **Exhibit C.a.3. Community Engagement and Inclusiveness**

DOH has a commitment to resident and community engagement with established programs detailed in an Action Plan and two substantial amendments for the CDBG-DR program. The State of Connecticut engaged CIRCA, an institute dedicated to research and outreach for communities impacted by climate change, to support DOH and identify the communities most vulnerable to future hazards. CIRCA's Director of Community Engagement is a designated member of SAFR. Her role as the liaison between Connecticut's municipalities and the research faculty at UConn, ensures that CIRCA's research directly responds to the adaptation needs of those towns. For example, she engages with community members through regular meetings with municipal task forces and committees on climate change and is an active speaker at statewide conferences including the Connecticut Association of

Flood Managers and the Connecticut Association of Conservation and Inland Wetlands Commissions. All state agency partners, CCM and the regional councils of government, have extensive experience with community engagement and planning. Partners have extensive engagement experience through multiple projects including Rebuild by Design, local and international landscape architecture projects, rebuilding in New Orleans, national resilience charrettes and leading a Community Development Corporation that rehabilitated over 1,500 buildings.

An example of effective community engagement and outreach is Rebuild by Design in Bridgeport, where many of our partners worked to engage the community through a variety of methods including the All Scales Workshop where leaders from more than 40 organizations, including many based in the impacted community, worked alongside a cadre of professionals developing proposals for resilient community development. This engagement model served as a precedent for future engagement. DPH is exploring the potential to integrate a rapid Health Impact Assessment (HIA) into the community engagement process for future resilience planning outreach.

DOH supports a number of initiatives to build community leadership, such as the CT Housing Coalition's Connecticut Emerging Leaders Network and the Affordable Housing Academy. As an example, the Yale UEDLAB has worked for over four years with residents from Bridgeport's vulnerable South End neighborhood to build, maintain and adapt a community-driven flood management and green infrastructure project in the floodplain. UConn CLEAR's Climate Adaptation Academy is educating officials about adaptation measures.

Additional partners, such as Partnership for Strong Communities, has an extensive record of bringing together diverse constituencies to find solutions reaching beyond the specific interests of housing advocates, developers and human service providers typically involved in housing policy. The

councils of government, which provide regional planning support, have extensive experience with community development through participatory activities.

### **Exhibit C.b.1. Management Structure**

The State of Connecticut DOH is the lead agency making all final allocations of funding under for DOH; however, SAFR, under direction of OPM, will lead the NDRC application, design and implementation of the proposed projects. DOH will continue to serve as the recipient of HUD funding and will manage the disbursement of funds for the NDRC Grant. OPM will serve as the policy manager for the SAFR team, coordinating the SAFR member agencies in the implementation of pilot projects, review of policy initiatives, and coordination across agency structure of programs to support resilience. Each of the agencies of SAFR will serve a role in policy-making decisions as experience and concentration dictates. Where programs managed by specific agencies have the opportunity to be coordinated to focus on the SAFR resilience mission, OPM will lead the effort to coordinate those agencies to set policy and modify State programs accordingly. For example, DEEP has a green streets program and CTDOT has a complete streets program, through the NDRC grant application program, both agencies have recognized a synergy in collaborating on new design standards for resiliency in the construction and reconstruction of roadways which could be piloted through the NDRC application. SAFR is coordinating the dialogue between DEEP and CTDOT to structure those agencies to proceed towards a shared mission to develop a cross-agency set of resilient roadway design guidelines that would provide State-level guidance for road construction on State arterials that could guide local roadway construction decisions. The implementation of specific construction projects will be handled on a project-by-project basis, dependent upon the project type and characteristics and the local entity or entities involved. DEEP and CTDOT will take a leadership role in structuring the management approach to the implementation of pilot projects as both agencies are experienced and structured to

administer and manage large-scale capital infrastructure projects. As these projects are complex and will require the coordination of multiple agencies during design, permitting, construction and post-construction management, SAFR will develop implementation teams for each major project that will include representation for each agency in the capacity that that agency will be involved in the project, to ensure a seamless implementation of project.

The following staff and team members are integral to the design and implementation of the proposed New Haven and Bridgeport projects:

**Michael Santoro**, a Community Development Specialist in the Office of Policy, Research and Housing Support of the Connecticut Department of Department of Housing will be responsible for management of all final allocations of funding of the under the DOH. Mr. Santoro has managed millions of dollars of state and federal resources during his tenure and he oversees all financial management and accounting functions for the agency, including drawing and allocating funds from HUD.

**April Capone**, Manager of Intergovernmental Affairs in the Intergovernmental Policy Division, with the Connecticut Office of Policy and Management, will serve as the SAFR Chair and Project Director, where she will be responsible for management and administration oversight of the projects. Ms. Capone has 15 years of experience managing a variety of state and federal program resources and will provide executive oversight and represent SAFR in disaster resiliency discussions.

**Binu Chandy**, Civil Engineer and Project Manager in the Office of Capital Projects with the Connecticut Department of Economic and Community Development has 15 years work experience in environmental planning, public policy and project management of federal and state-funded projects.

**City of New Haven.** The City of New Haven has a long record of successfully implementing a variety of projects similar in scale, scope and complexity to those proposed in this application.

**City of Bridgeport.** The City of Bridgeport has a long record of successfully implementing a variety of projects similar in scale, scope and complexity to those proposed in this application.

**State Agencies Fostering Resilience.** Formed during Phase 1, Governor Dannel P. Malloy has since signed a letter formalizing SAFR as a statewide organization responsible for the resilience and sustainability of vulnerable communities along Connecticut's coast and inland waterways. Chaired by the Office of Policy and Management (OPM), SAFR will be responsible for the creation of a Statewide Resilience Roadmap based on the best available climate impact research and data. With members from nine State agencies, SAFR ensures resiliency is incorporated into the planning processes of its member agencies. Ongoing collaboration among SAFR members will seek to reduce the loss of life and property, ecological and economic damage, social disruption and enhance the resilience of associated critical infrastructure systems. SAFR provides opportunities for a unified statewide response and technical assistance on resilience issues. The SAFR mission is to increase the resilience and sustainability of vulnerable communities along Connecticut's coast and inland waterways and studying and reshaping human settlements through research and design, with the goal of advancing urban sustainability.

**CT Department of Housing (DOH)** strengthens and revitalizes communities by promoting affordable housing opportunities and has significant experience working on civil rights and fair housing issues. DOH seeks to eliminate homelessness and to catalyze the creation and preservation of quality, affordable housing to meet the needs of all individuals and families. Major initiatives include the Governor's \$300 million, 10-year capital investment in State-sponsored Housing Portfolio and the Sandy CDBG-DR program, which includes data analysis of racial or economic disparities in its Action Plan.

**CT Office of Policy and Management (OPM)** is chair of SAFR. OPM functions as the



Governor's staff agency and plays a central role in state government, providing the information and analysis used to formulate public policy and assisting state agencies and municipalities in implementing policy decisions on the Governor's behalf. OPM is the coordinator of interagency problem-solving efforts, including Transit-Oriented Development (TOD), and is the liaison between municipal and state government.

OPM is organized among eight offices and divisions: Administration; Budget and Financial Management; Criminal Justice Policy and Planning Division; Finance; Intergovernmental Policy; Labor Relations; Policy Development and Planning Division; Transportation Policy and Planning; and Secretary. OPM has 125 permanent staff on board. OPM manages an annual budget of \$361 million (FY 2015) while overseeing the State of Connecticut budget.

**CT Department of Energy and Environmental Protection (DEEP)**'s mission is to conserve, improve, and protect natural resources and the environment as well as to ensure availability of affordable, clean and reliable energy. DEEP brings its experience co-leading CIRCA, implementing the Coastal Zone Management program, which includes permitting structures for shoreline adaptation, administering CT's Clean Water Fund, developing energy, climate and resilience policy, and running the Floodplain Management and the NFIP.

DEEP is organized into three main branches and the Office of the Commissioner: Energy Branch; Environmental Quality Branch; Environmental Conservation Branch; Office of the Commissioner. DEEP has 670 permanent staff on board. DEEP oversees an annual budget of \$99.5 million (FY 2015).

**Office of the Governor (OTG)** ensures coordination between concepts proposed in the application and gubernatorial priorities, including a focus on State-sponsored housing revitalization and a "best-in-class transportation system". The OTG has 28 permanent staff on board and no current

vacant positions. The OTG oversees an annual budget of \$2.8 million (FY 2015).

**CT Department of Transportation (DOT)** strives to provide a safe and efficient intermodal transportation network that improves the quality of life and promotes economic vitality. DOT's \$1.7 billion annual budget (2015) supports many highway, bridge, rail, bus, water, bicycle, and pedestrian capital assets and operations, including many of which are adjacent to waterways and vulnerable to flooding. DOT brings a wealth of experience on TOD; "Complete Streets" designs; Public-Private Partnerships, Design-Build projects; alternative design concepts; procurement processes; and transportation asset management.

CTDOT has five Bureaus and the Office of the Commissioner: Bureau of Engineering and Construction; Bureau of Finance and Administration; Bureau of Highway Operations; Bureau of Policy and Planning; Bureau of Public Transportation, and the Office of the Commissioner. CTDOT has 3188 permanent staff on board. CTDOT oversees an annual budget of \$594 million (FY 2015).

**CT Department of Economic and Community Development (DECD)** advises SAFR on comprehensive approaches to economic development and revitalization that incorporate community development, transportation, and productive redevelopment of brownfield properties by promoting smart growth principles and strengthening public-private partnerships.

DECD has seven offices and the Office of the Commissioner: Office of Business Development; Office of Financial Review; Office of Brownfield Remediation and Redevelopment; Office of Capital Projects; Office of Finance and Administration; Office of Tourism; and Office of the Arts and Historic Preservation. . DECD has 105 permanent staff on board. DECD oversees an annual budget of approximately \$44 million (FY 2015) alongside multiple bond funded initiatives.

**CT Department of Emergency Services and Public Protection (DESPP)** advises SAFR on emergency management and homeland security programs. The Agency is organized into six divisions: Emergency Management and Homeland Security (DEMHS), Connecticut State Police, Scientific Services, Police Officers Standards and Training Council, Commission on Fire Prevention and Control/CT Fire Academy, and Statewide Emergency Telecommunications. DESPP/DEMHS works closely with local, state, federal, tribal, and private sector partners in providing a coordinated, integrated program for statewide emergency management and homeland security. DESPP/DEMHS directs and coordinates all available resources to protect the life and property of the residents of CT in the event of a disaster or crisis, whether natural or manmade, through a collaborative program of prevention, planning, preparedness, responses, recovery, mitigation, and public education. DESPP/DEMHS is the lead State Agency for the Federal Emergency Management Agency (FEMA) grant assistance and mitigation planning programs. DESPP/DEMHS has 1733 permanent staff on board and no current vacant positions. DESPP/DEMHS oversees an annual budget of \$171.6 million (FY 2015).

**Department of Public Health's (DPH)** vision is for healthy people in healthy Connecticut communities and is charged with protecting and improving the health and safety of the people of Connecticut. The DPH advocates health impact assessments (HIA) be conducted where possible to ensure conditions in which people can be healthy.

CT DPH has 481 permanent staff on board and **xx** current vacant positions. CTDOT oversees an annual budget of \$112.5 million (FY 2015).

**Connecticut Insurance Department (CID)** provides assistance and information to the public and to policy makers and regulates the insurance industry. Connecticut is one of only a few states to request voluntary climate change disclosure surveys from insurance companies. CID advises SAFR on

impacts of mitigation strategies and policies on insurance in the state and provided key contacts with stakeholders from the insurance and reinsurance industries.

CID has 159 permanent staff on board and **no** current vacant positions. CID oversees an annual budget of \$28.5 million (FY 2015).

**University of Connecticut. Connecticut Institute for Resilience and Climate Adaptation** (CIRCA) fosters resilience of vulnerable communities along the state's coast and rivers to the impacts of climate change through transferable and replicable adaptation solutions. CIRCA's technical capacity for science-based analysis includes: impacts of climate change, sea level rise, ocean dynamics, future precipitation and hydrology models, weather prediction, environmental law, economics and policy analysis. CIRCA's faculty contribute to the National Climate Assessment, and they advise state, national and international bodies on climate change.

**Yale Urban Ecology and Design Laboratory** (UEDLAB) provides landscape architecture expertise. The UEDLAB was a member of the *Resilient Bridgeport* Rebuild by Design team and has contributed to green infrastructure and coastal planning projects in Connecticut.

**CT Conference of Municipalities** (CCM) is the state's association of towns and cities, one of the organizations that represents the interests of towns and cities in Connecticut. CCM brings community engagement and regional policy and planning experience to assist SAFR.

**SAFR Advisory Committee Members:**

**UConn Sea Grant** is the state's component of the NOAA national Sea Grant network and has expertise in research and outreach including the Climate Adaptation Academy workshops and the NOAA Sea Grant Coastal Storm Awareness Program.

**UConn Center for Land Use Education and Research** (CLEAR) provides information and assistance to land use decision makers to balance growth and natural resource protection.

**Yale Urban Ecology and Design Laboratory (UEDLAB)** provides landscape architecture expertise. The UEDLAB was a member of the *Resilient Bridgeport* Rebuild by Design team and has contributed to green infrastructure and coastal planning projects in Connecticut.

**Regional Councils of Government (COGs)** serve the vital role of regional planning, as Connecticut does not have county governments. The South Central Regional COG (SCRCOG), Western Connecticut COG (WCCOG), and Greater Bridgeport Regional Council (GBRC), facilitate regional initiatives and represent all municipalities in our MID-URN counties.

**Partnership for Strong Communities** is a statewide housing policy organization that works to prevent and end homelessness, create affordable and mixed-income housing (including in communities that have little or none) and foster community development solutions.

**Housing Development Fund, Inc. (HDF)** is a nonprofit organization dedicated to financing the development of affordable housing and will work with SAFR to apply lessons learned from existing lending programs including Shore Up CT, the state's resiliency loan fund. HDF in partnership with Yale is conducting an analysis of housing needs in 80 low-income census tracts, which will assist in the analysis of unmet needs in the target area.

**Emily Hall Tremaine Foundation** has been a key funder of state-level climate and energy initiatives in Connecticut, including the State's Climate Action Plan, and is looking to fund resiliency innovations at the community scale. In addition, the foundation will utilize its national funder affinity group involvement to raise the visibility of Connecticut's efforts.

**Long Term Recovery Committee for the State of Connecticut** will help coordinate through its participation in a number of joint working groups related to coastal resilience.

**Connecticut Chapter of the American Red Cross** and **CT Rises** have been extensively involved in Sandy recovery efforts in Connecticut and will provide vital insight into unmet need not

identified through government channels.

**EPA Long Island Sound Study, Save the Sound, and Audubon Connecticut** will provide guidance on coastal adaptation measures, wildlife protection, and conservation opportunities.

**Connecticut Green Bank**, the nation's first state green bank, leverages public and private capital to drive investment and scale-up of clean energy and energy efficiency in Connecticut. Their staff will provide important expertise on potential financing mechanisms for projects.

**East Coast Greenway Alliance** is developing a public trails network in the target counties as part of a 2,900-mile system of paths, to connect communities from Maine to Florida.

**UIL Holdings** and **Eversource Energy** serve most electric and natural gas customers in the state and will work closely with SAFR to coordinate electric and gas infrastructure modifications to support the designed project and further enhance critical infrastructure resiliency.

## **Exhibit C.b.2. References**

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**EXHIBIT D**

**FACTOR 2. PHASE 2 NEED/EXTENT OF THE PROBLEM**



## **Exhibit D.a. Unmet Recovery Need & Target Geography**

Connecticut's unique topography defined by north-south ridgelines shaped the development of the east-west rail and road transportation corridors that traverse the state's coastal communities. These systems connect diverse communities, provide linkages to critical infrastructure services, and connect to key assets, forming a network across the state that serves as the backbone of the local, state, and north-east regional economy. In October 2012, Hurricane Sandy hit the coastline of Connecticut, revealing the community, environmental, and economic impacts when this network is interrupted.

Building off of the NDRC Phase 1 application, the State of Connecticut proposes a long term state-wide Connecticut vision to address recovery needs from Sandy (and other shocks and stresses) and create physical and economic resilience in the face of future vulnerabilities. This vision consists of a regional resilience approach for New Haven and Fairfield Counties, which are designated by HUD as Most Impacted and Distressed. The vision will be launched by two (2) pilot projects to address the specific target areas of Union Station/Long Wharf in New Haven and South End East in Bridgeport.

### **Future vulnerability**

Connecticut has the second highest exposure of vulnerable coastal assets on the East Coast. (Only Florida has a greater exposure.) Following Sandy, roughly 7,270 property owners in the state applied for FEMA assistance, including 6,000 along the shoreline. With over 60% of the state's population living in coastal communities and over \$542 billion in assets (64% of properties) at risk, the State of Connecticut remains vulnerable to future storm events, an exposure that will be exacerbated by climate change. In Connecticut, the historic rate of sea level rise is .10 inches per year (at the Bridgeport datum), which is slightly higher than the average rate of sea level rise due to post-glacial regional subsidence however projection indicate an increasing rate of rise. With over 32,000 homes in the 100-year floodplain, coastal and riverine communities remain vulnerable to a changing shoreline and increased flooding due to more frequent and intense storm events.

The State of Connecticut recognizes that actual rise in sea level will involve variable risk. Through the SAFR construct, CIRCA is charged with taking NOAA scenario guidance and equating it to CT specific factors

to develop localized sea level rise projections. For the purpose of this application, the State of Connecticut used the FEMA 100-year storm event plus an estimated 2050 sea level rise (SLR) of 1 foot for design standards. The proposal, however, is designed with a vision towards the future, often incorporating a layered approach employing measures that can be further extended or built upon in the future to protect against potential increases in sea level rise.

### **Target Geographies**

New Haven and Fairfield Counties, designated by HUD as most impacted and distressed, incurred concentrated damages to housing, economic centers, key infrastructure, and social cohesion from Hurricane Sandy. Following Sandy, the State of Connecticut administered over \$159 million of Tranche 1, 2, and 3 CDBG-DR funds to address housing, infrastructure, administration, and planning needs. As identified in Phase 1, unmet recovery needs in these counties total more than \$158 million from housing (\$135,789,167) and infrastructure (\$22,360,508).

Moving into Phase II, the State of Connecticut undertook a vulnerability assessment of the municipalities located within New Haven and Fairfield counties to help guide project selection for Phase 2. (see exhibit \*.\*). Through this public process, the State of Connecticut selected two target areas; the Union Station/Long Wharf area in New Haven and South End East in Bridgeport to serve as pilot project areas under Phase 2.

#### **Union Station/Long Wharf, New Haven Target Area:**

The Long Wharf target area encompasses the Long Wharf and Hill to Downtown communities. Long Wharf is a mixed use area, home to over 120 commercial buildings, key infrastructure including I-95 and the New Haven Union Station Rail yard, and state facilities including CT DOT maintenance facilities and the Regional Water Authority building. The area contains key regional infrastructure built up around New Haven's Union Station and Railyard. The target area includes the following census tracts 1401, 1402, 1403, 1404, 1422, 3614.01.

During Hurricane Sandy, this community experienced extensive flooding from the Harbor with surge ranging from 1 to 7 feet high and as far inland as Church Street. The combination of a high storm surge coupled with a high-tide condition caused coastal waters to infiltrate a combined sewer overflow (CSO) that outfalls into

New Haven Harbor during storm events. Collecting water from a 600-acre upland watershed, the backflow over capacitated the J3 bypass located at West Water and Union Streets. The resulting backup flooded the Hill to Downtown community and converged with surge to exacerbate flooding within Long Wharf.

The storm water flooding in the Hill to Downtown area inundated local streets including Route 34, Union Avenue, Church Street and other local streets in the community. Residents at the New Haven Public Meeting expressed the resulting difficulty and limitations to egress and evacuation in the area. Over 500 units of low income and elderly housing were damaged, including the Church Street South HUD Housing Complex. Upland areas within the water shed also experienced flooding, resulting in damages to key community assets including the City's Central Business District, New Haven's Historic Green, the City Municipal Complex, Yale University Campus South, and Yale Medical Center.

In Long Wharf, surge inundated from the Harbor, passing through I-95 underpasses at Long Wharf Drive and Canal Dock Road to converge with stormwater backup and flood the low-lying area, extending onto the New Haven Rail Yard. Surge levels reached as high as 7 feet, leaving the area inaccessible and causing damage to properties. Following Sandy, 17 properties in the area were classified as affected under FEMA Individual Assistance Inspection Damage.

Similarly the rail yards at Union Station were inundated with up to 7 feet of surge. Service was preemptively halted prior to the onset of Sandy and cars were safely stored upland, limiting the damages incurred. Inundation did lead to damages to the station's low-lying power infrastructure, partially addressed by a \$8,978,750 FTA grant administered by the Connecticut DOT for New Haven Rail Yard Power Upgrades.

#### **Unmet Recovery Need & Future Resilience at Union Station / Long Wharf, New Haven:**

A protected New Haven Union Station and Rail yard is vital to the future resilience of Long Wharf community. The busiest rail line in America, the New Haven Rail Line connects commuters along the Northeast

Corridor stretching from Boston to Washington D.C. According to the Regional Plan Association's Report, *Getting Back on Track*, New Haven Union Station is Amtrak's tenth busiest station nationwide with over 746,000 ons and offs. With a direct trip between New Haven Union Station and Grand Central Terminal running approximately one hour and 45 minutes, Union Station is the second most common departure point into Grand Central, behind Stamford. While Union Station is part of the larger rail system, the station is vital to the continued recovery, revitalization, and resilience of the target area communities. With both communities located directly adjacent to the rail yard, Union Station provides residents with commuting opportunities and increased mobility, as well as providing opportunities to bring visitors and economic opportunities to the target area. On a larger scale, the station and rail yard, as part of the larger line, is vital to the economic base for Connecticut as well as the larger North East Corridor, which is estimated to contribute more than \$50 billion annually to the national economy.

Over 200 buildings in the target area were inundated during Sandy, with an additional 100 buildings located within the FEMA designated 100-year floodplain. Following Sandy, over \$1.7 million was spent on recovery efforts to homes and infrastructure across New Haven. Receiving \$78,142 in FEMA Individual and Household Program grants, the city still faces an unmet need of \$142,679 for owner occupied housing. Additionally, sub grantees including the City of New Haven, New Haven Housing Authority, and New Haven Parking Authority received \$1,153,681 in FEMA public assistance funds for 7 projects immediately following Sandy. The recovery and repairs to homes and infrastructure in the area, however, did not include resilient measures to protect these damages from future storm events. The affordable housing community directly adjacent to Union Station and the larger downtown area suffers from chronic flooding during simultaneous high tide and heavy rain conditions resulting in repetitive losses, stagnating economic growth in a community that is otherwise a strong candidate for economic investment. The community faces the continued threat of future storm events and sea level rise, as well as more chronic flooding from storm water backup, an eroding shoreline, disconnected neighborhoods, vulnerable populations and a lack of affordable housing that hinder the community's resiliency and ability to recover from future events. Looking forward, the target area has continued

recovery needs that if met, will enhance the resilience of community moving forward against current and future threats.

Hurricane Sandy emphasized the need for drainage improvements in the Long Wharf area that would mitigate flooding during future coastal storm events as well as more regular lesser storm events. According to NOAA National Climactic Data Center, three flash floods and two severe storms were recorded in New Haven between 2005 and 2010. Following two storms in the Spring and Summer of 2010, over thirty properties in the city applied for FEMA Individual assistance. More recently, a March 2013 Nor'easter resulted in \$8,249,992 FEMA public assistance funds granted to the city.

The community needs an integrated storm water management strategy that utilizes both hard and soft infrastructure to expand the system capacity while simultaneously reducing the amount of water entering the system. A system of green infrastructure or detention basins would reduce pressure on the system, while an increased storage capacity at the J3 bypass would reduce the risk of back-up. This system would reduce the risk of flooding and damages to the local housing, streets, and infrastructure and promote opportunities for new development. In particular, this would benefit the residents of the Hill to Downtown community, a low-moderate income neighborhood, as well as the Church Street Affordable Housing Complex, which face particular resiliency hardships (see below).

The State of Connecticut has received \$4M in CDBG-DR Tranche 2 allocations to address the J3 bypass flooding through a Mitigation and Resiliency Project for Union Avenue. Designed to alleviate storm water damage and flooding events impacting Union Avenue, this project would mitigate damages and build resiliency against future flooding events. The City of New Haven is currently using a portion of this funding to undertake a study of the existing stormwater management system and an additional \$2.5 million to help install bioswales and green infrastructure throughout the city. Totaled at \$40,00,000, the City of New Haven faces an unmet need of \$37,500,000 to advance this project.

Hurricane Sandy revealed the need to develop drainage improvements in conjunction with coastal protection measures to reduce the risk of flooding in future events. Within the target area, the Long Wharf

coastline is susceptible to erosion from sea level rise and wave action, creating vulnerable points along the shoreline. Interventions to stabilize the shoreline will protect Long Wharf Park that serves as a buffer zone protecting I-95, the key regional coastal interstate highway servicing the region between New York and Boston, and the greater Long Wharf area against storm surge and wave action. Stabilizing the shoreline will additionally preserve Long Wharf Park, a key recreational and environmental asset in the community, home to tidal waves and salt marshes that provide habitat for shorebirds. New Haven Harbor is also contains oyster beds that contribute to the local ecology and regional economy. The Connecticut oyster industry represents 92% of the northeast production and accounts for a \$62 million industry.

Addressing the risk of storm and coastal flooding in the area sets the stage to address larger economic revitalization and social cohesion efforts that support resiliency in the long-term. A legacy of the 1950s era of urban renewal, the Long Wharf and Hill to Downtown communities are isolated from each other and from the surrounding neighborhoods by unappealing roadways and large scale infrastructure. The existing street network limits the connection between the two communities; residents of Hill-to-Downtown cannot easily access the commercial properties or waterfront recreation opportunities located in Long Wharf. This disconnection extends to the surrounding neighborhood, limiting the connection to, and between, key assets including Union Station, Yale-New Haven Hospital, Yale University, and the Downtown.

This lack of community connectivity and social cohesion reduces the community's resilience to future flood events. The current isolation of the Hill to Downtown area limits residents' ability to mobilize or evacuate, or reach critical facilities, including nearby medical centers, during storm events. Additionally, as discussed in the City of New Haven's *Hill-to-Downtown Community Plan*, the existing conditions are limiting economic revitalization of the community. Much of the properties within Long Wharf and Hill to Downtown remain underused or neglected, and in the case of Long Wharf, at low-density. In addition to exacerbating the socio-economic conditions of the neighborhood, the lack of economic livelihood reduces the community's ability to quickly respond and recover following future events.

### **South End East, Bridgeport Target Area**

South End East project area encompasses the eastern portion of South End as well as Downtown Bridgeport, extending north to just above Bridgeport Station. The South End East target area includes the following census tracts, 705, 706, and 704 (partial). With South End located on a barrier peninsula, and the downtown facing the Pequonnock River, South End East remains one of the most vulnerable communities in Bridgeport.

During Sandy, the downtown area experienced flooding as surge inundated from the Pequonnock River. This water flowed down to the South End, converging with surge from the Long Island Sound to inundate the South End East community. Within the target area, 31.2 acres containing 211 buildings were inundated resulting in over 100 FEMA Individual Assistance Household inspections completed in this area, with 89 properties affected.

Downtown Bridgeport, located to the north of the rail line, contains mostly commercial and institutional buildings. Surge ranged from 1 to 5 feet along the coastline, but only inundated the area as far inland as Water Street, sparing most properties in the Downtown from damage. Bridgeport Station and rail, located at an elevation of approximately 11' NAVD88, avoided damages. South of I-95, the community consists of single family homes, industry, and critical infrastructure including the PSE&G Plant, Bridgeport Power, and the Fuel Depot. Surge as high as 7 feet inundated this area, flooding streets and damaging residential properties.

Throughout the target area, residents relayed accounts of power outages that lasted from a few hours to over a week. The United Illuminated Company which serves the larger region reported that over 250,000 customers experienced outages. Of the roughly 57,835 Bridgeport customers, over 41% or 23,414 still experienced outages 4 days following the onset of Sandy.

### **Unmet Recovery Need & Future Resilience in Bridgeport**

Over 200 buildings in the target area were inundated during Sandy, with an additional 100 located within the FEMA designated 100-year floodplain. Following Sandy, over \$1.9 million was been spent in recovery to homes and infrastructure in Bridgeport. Receiving \$1,317,104 in FEMA Individual and Household Program grants, Bridgeport still faces an unmet need of \$42,610,158 for owner occupied housing (\$1,110,158) and multi-

family housing (\$41,500,000). The target area of South End East accounts for roughly \$350,000 in documented unmet recovery need for owner occupied housing, according to DOH. However, in conversations with the community, it appears that the unmet need may be significantly greater. In speaking to residents during the outreach process, many residents seemed unaware of opportunities to apply for assistance, many explained specific damages to their homes that had not been repaired and even community facilities, such as the Mount Zion Methodist Church, a cultural landmark in the community suffered extensive damages (estimated \$500,000), that have precluded their ability to reopen the sanctuary since Sandy. Additionally, sub grantees including the City of Bridgeport and City of Bridgeport Housing Authority received \$637,031 in FEMA public assistance funds for 8 projects immediately following Sandy. This recovery, and repairs to homes and infrastructure in the area, however, did not include resilient measures to protect these damages from future storm events. The community faces the continued threat of future storm events and sea level rise, as well as economic and social needs that hinder the community's resiliency and ability to recover from future events. Looking forward, the target area has continued recovery needs that if met, will enhance the resilience of community moving forward against current and future threats.

Hurricane Sandy emphasized the need for protective measures in the South End East that will mitigate flooding during future coastal storm events. A system of integrated coastal protection measures would reduce the risk of flooding and damages to local housing, streets, and infrastructure, including key assets such as the United Illuminating power facilities.

These strategies need to be developed in conjunction with drainage improvements that mitigate stormwater flooding that occurs on a more chronic basis and which exacerbates flooding from surge during coastal storm events. In South End East, as well as throughout the city, the sewer and stormwater system infrastructure is aging, including an existing outfall that runs along Singer Street in the target area and drains into Bridgeport Harbor during CSO events. Flooding can also occur on a more regular basis as stormwater flows south from a higher elevation at Downtown Bridgeport. Residents of South End East described extensive ponding under the Rail underpasses at Lafayette Street and Myrtle Street following rain events. East of Park Avenue, only 5 of the north-south running roadways pass under the elevated rail and I-95 to connect South End



East with downtown Bridgeport. Of these, only Myrtle Avenue and Park Avenue lie outside of the 100-year floodplain, with Myrtle susceptible to flooding from rain or drainage backup. The protection of these intersections is vital to resident egress and emergency evacuation in future events.

Following Sandy, the city of Bridgeport, including the South End East neighborhood, was selected to compete in HUD's Rebuild by Design National Competition. A collaborative initiative of the President's Hurricane Sandy Rebuilding Task Force, the competition connected design, funding, and implementation strategies to create implementable solutions for resilient communities. Led by unabridged Architecture, the Bridgeport Team developed a web of interventions to protect the larger Bridgeport Area, entitled Resilient Bridgeport: Claim the Edge, Connect the Center. In the South End, the proposal included a berm running along Seaside Park to serve as a flood barrier that incorporated water retention, access, and protected utility infrastructure, as well as a South End Resilience Center along Park Avenue. The proposal was awarded \$10 million in CDBG-DR funds in 2014. CT DOH and the City of Bridgeport are working together to identify a pilot projects to address the resiliency needs of Bridgeport's South End/Black Rock Harbor. The projects proposed for South End including constructing a multifunctional berm, elevating Singer Street, studying the feasibility of an onshore CSO park, and living breakwaters total over \$65 million. Addressing the risk of storm and coastal flooding in the area creates the first layer of protection, creating opportunities to address larger economic and community efforts that support resiliency in the long term. By the 1930s, the South End was an industrial center due to its favorable location near both port and rail. During the 1980s, however, a shift away from manufacturing and subsequent job loss led to an economic decline. Today, many of these former industrial buildings remain vacant or underutilized, along Railroad Avenue, Myrtle Avenue, Atlantic Street, and Broad Street. Similarly, the housing stock and conditions have remained mostly unchanged, with only 34 units of housing constructed across the entire South End peninsula since 1990.

While the community has begun to recover with new businesses in the service industries and small light manufacturing shops, the full extent of development needed to revitalize the economy has been limited. With the future risk of storm events and flooding damages, the community has a difficult time attracting new development in the area. Today, over 66% of existing structures throughout the entire peninsula were built before 1940.

Flood protection projects and programs provide the first step in promoting development opportunities for the 24 vacant or underutilized parcels, with a combined land value of over \$750,000, in the target area.

According to the South End Neighborhood Revitalization Zone (NRZ) Strategic Plan, as well as numerous resident accounts throughout the Phase II process, the South End East community is isolated from its surrounding communities by a disconnected street network and large scale infrastructure. While lying within a mile radius, the target area is disconnected from Downtown Bridgeport, cut off by I-95 and the MetroNorth/Amtrak railroad tracks. Similarly, running east-west, the University of Bridgeport interrupts the peninsula's street grid, creating disconnect between South End East and South End West. While the community has access to the shorefront via Seaside Park, a key recreational asset, the target area is cut off from the eastern shoreline by large scale industrial uses including a PSE&G coal power plant and fuel depot.

This current isolation limits resident's ability to mobilize or evacuate during storm events. Additionally, as discussed the NRZ Strategic Plan, the existing conditions limit the economic revitalization of the community, as well as Downtown Bridgeport. Protecting existing corridors between the two neighborhoods, such as Broad Street, as well as developing a resilient street network that connects north-south as well as east-west will increase resident's mobility and access to existing and potential commercial and economic opportunities in the downtown, as well as bring new development to the South End East as well.

## **Exhibit D.b. Resilience Needs within Recovery Needs**

### **Exhibit D.b.1. Actions to Limit Effects of the Qualified Disaster Event**

As demonstrated by the two target areas, Sandy had resilience, economic, environmental, and social impacts within individual communities and municipalities, as well as across the region, state, and northeast corridor. Inundating the cost, the storm directly damaged homes, commercial centers, and key infrastructure.

The State of Connecticut incurred an estimated \$70 billion in damages following Sandy. The cost these damages have been felt by individuals, businesses, insurance, and local, state, and federal government.

A study by the University of Connecticut Center for Economic Analysis found that following Sandy, from November 2012 to December 2014, approximately 7,103 jobs were lost which approximately half of these losses impacting small businesses. In monetary terms, the study estimated that these losses resulted in reduction in personal incomes from small businesses by \$90 million, disposable incomes by \$150 million, and government revenues by \$39 million during those 26 months. The State received roughly \$159 million of federal funding in the form of CDBG-DR funds, with unmet need still totaling more than \$158 million from housing (\$135,789,167) and infrastructure (\$22,360,508). The State has received additional federal funding in the form of \$220 million paid to homeowners and businesses from the National Flood Insurance Program, \$43 million in low-interest disaster loans from the Small Business Administration, \$42 million in FEMA aid to municipalities, \$14 million in emergency housing aid from FEMA, \$10.5 million administered by the Department of Social Services, and \$4.5 million in transportation funding for preparation and repairs, and \$3 million from the Department of the Interior for coastal resiliency and restoration.

In New Haven County, Sandy caused damages totaling over \$1.3 million to homes and infrastructure, while some unmet need remains, much of this “cost” was covered by insurance and the federal government including \$78,142 in FEMA Individual and Household Grants, and \$1,153,681 in FEMA Public Assistance Grants. In Bridgeport, Sandy caused damages totaling over \$3.1 million to homes and infrastructure, while some unmet need remains, much of this was covered by insurance and the federal government including \$1,317,104 in FEMA Individual and Household Grants and \$637,031 in FEMA Public Assistance Grants.

If the proposed project, including the pilot projects in the Long Wharf, New Haven and South End East, Bridgeport target areas, had been implemented prior to the qualifying disaster of Sandy, the communities would have had substantially reduced flooding and damage to residential and commercial buildings and key infrastructure.

For Bridgeport, Table 1 presents the evaluation results for the two cases. For the 7 percent discount rate, the proposed infrastructure investments yield a net present value of \$9.6 million, and a benefit-cost ratio of 1.23. At a 5 percent discount rate, the proposed infrastructure investments yield a net present value of \$19.9 million, and a benefit-cost ratio of 1.47.

Over the 100-year analysis period (2016-2115), there are \$52.0 million in benefits at a 7% discount rate, in 2015 dollars and \$62.6 million in benefits at a 5% discount rate.

**Table 1. Benefit Cost Analysis Summary Results**

<b>Scenario</b>	<b>Net Present Value (2015 \$ millions disc.)</b>	<b>Benefit Cost Ratio</b>
Case A (7 percent discount rate)	\$9.6	1.23
Case B (5 percent discount rate)	\$52.0	1.47

*Source: WSP | Parsons Brinckerhoff, 2015*

For New Haven, Table 1 presents the evaluation results for the two cases. For the 7 percent discount rate, the proposed infrastructure investments yield a net present value of \$3.3 million, and a benefit-cost ratio of 1.04. At a 5 percent discount rate, the proposed infrastructure investments yield a net present value of \$34.0 million, and a benefit-cost ratio of 1.40.

Over the 100-year analysis period (2016-2115), there are \$88.6 million in benefits at a 7% discount rate, in 2015 dollars and \$119.9 million in benefits at a 5% discount rate.

**Table 2. Benefit Cost Analysis Summary Results**

<b>Scenario</b>	<b>Net Present Value (2015 \$ millions disc.)</b>	<b>Benefit Cost Ratio</b>
Case A (7 percent discount rate)	\$3.3	1.04
Case B (5 percent discount rate)	\$34.0	1.40

*Source: WSP | Parsons Brinckerhoff, 2015*

### **Exhibit D.b.2. Total Resilience Investment**

The two pilot projects included in the proposal are designed to create more vital, resilient neighborhoods in the present and future, ultimately allowing communities to withstand and recover more quickly from all future extreme events, shocks, and stresses. While these investments were developed specifically for each individual community, both present visions of how resiliency can be incorporated through Connecticut.

In the Long Wharf neighborhood, the total investment in resilience needed is \$62.3 million dollars. This investment includes the following measures and cost:

- Management of coastal and inland storm water convergence in Long Wharf neighborhood (\$38.5 million)
- Street and neighborhood storm water improvements (\$3.8 million)
- Coastal protection strategy, living shoreline along Long Wharf coast (\$20.1 million)

In Bridgeport, the total investment in resilience needed is \$43.3 million dollars. This investment includes the following measures and cost:

- Street raising and street improvements along University Avenue (\$5.8 million)
- Community center restoration (\$1 million)
- Earthen berm extending to Ferry Landing (\$36.3 million)
- Flood design guideline recommendations (\$330,000)
- District energy feasibility study (\$300,000)

These two projects will function as pilot sites, with best practices and lessons learned guiding the future resiliency of other affected communities in the region. To address the resilience planning and project needs in the remaining municipalities, the State of Connecticut will establish a Connecticut

Connections Coastal Resilience Plan, requiring \$4.9 million in funding, to fund and carry out resilience measures and create a network of coastal municipalities throughout the State.

### **Exhibit D.b.3. Vulnerable Populations**

LMI populations in the State of Connecticut were disproportionately affected by Hurricane Sandy, and remain especially vulnerable to risk from future storm events and rising sea levels. A CCM report on disproportionate burdens show that a small percentage (4 out of 25) distressed towns are located along the state's coast. In Fairfield and New Haven counties, over 1,298 multifamily housing developments sustained damaged, with three public housing properties (581 units) sustaining the most damage. In total, eight public housing properties (815 units) in the FEMA 100-year floodplain need to be elevated, rehabilitated or relocated at a total cost of \$240,000 with an unmet need of \$150,000,000. These vulnerable populations will be disproportionately impacted by future storm events and SLR as LMI communities lack the means for preparedness and response, and the ability to recover as quickly after events as more financially secure communities.

In New Haven, the Union Station / Long Wharf target area is home to roughly 16,700 residents. According to the HVRI Social Vulnerability Index, a majority of the Long Wharf target area is within the top fifth percentile of communities vulnerable to environmental hazards in the country. As described in Attachment F- Benefit Cost Analysis, 7,990 residents or 65% of the population in the target area is considered LMI, with 15.27% of the population unemployed. The average area median household income is \$34,998, which is substantially lower than the statewide median household income of \$69,461.

The Long Wharf target area is home to LMI housing developments including the Robert T. Wolfe Apartment (93 units), Katherine Harvey Terrace (23 units), and the Church Street South Apartments (301 units) that face particular recovery and resiliency needs. The Robert T. Wolfe Apartments and Church Street South Apartments experience chronic flooding from rain events, especially when coupled with high tide conditions which will be exacerbated with sea level rise. During Sandy, as well as during more regular flooding events,

streets located within Church Street Village were flooded, limiting residents' access to evacuation routes and emergency egress.

While located across from Union Station, the Church Street South Apartments remain isolated from the larger community, which in turn creates a disconnect between the upland areas, Hill to Downtown, Medical Center, and Long Wharf neighborhoods. This lack of social cohesion hinders the community's ability to prepare and recover from events and remain resilient in the face of future shocks and stresses.

In Bridgeport, the target area is home to roughly 4,400 residents. According to the HVRI Social Vulnerability Index, a majority of the South End East target area is within the top fifth percentile of communities vulnerable to environmental hazards in the country. As described in Attachment F- Benefit Cost Analysis 85% of the population in the target area is considered LMI, with the average area median household come at \$21,102. 21.20% of the population is unemployed; 11% above 65 years old, and 30% have not graduated from high school.

The target areas' biggest obstacle to continued recovery and resilience is economic redevelopment. Already experiencing economic downturn, Sandy resulted in flooding in the area that shut down or relocated remaining businesses and further exacerbated vacancies in the neighborhood. With over 24 properties vacant today, the vulnerability of the area to future storm events and sea level rise has limited the opportunities for redevelopment in the area.

#### **Exhibit D.b.4. Factors contributing to or hindering disaster recovery & resilience**

The following factors exacerbate and hinder, disaster recovery and resiliency in the two target project areas, New Haven and Fairfield County, and across the state.

- **Heavy reliance on an aging and interconnected transportation network in flood-prone areas:**

The State's proposed project is predicated on the State's transportation dense transportation network that runs along the coastline. Low to moderate income neighborhoods often depend on public transportation for access to work and for egress during emergencies. During storms,

floodwater can inundate critical transportation infrastructure such as rail line underpasses, making evacuation difficult or impossible and hampering recovery efforts. While the two pilot projects protect sections of this critical infrastructure, vulnerable points along the system remain.

- **Large income disparities and a shortage of affordable housing in communities of economic opportunity.** Many of the most vulnerable citizens are in need of quality affordable housing. In order to address these needs in an era of constrained resources it is important to add new housing as well as preserve affordable housing presently serving households in need. Connecticut has the second most unequal household income distribution in the country and has had the greatest growth in household income inequality (Hero, 2009). Connecticut's highest-income households (top 5%) received a quarter (24.9%) of all the income in the state. The poorest 20% received 3.3% of all income. The Gini Index (a measure of inequality) for Fairfield County in 2007 was 0.534, one of the highest in the nation (Figure 38).
- **Challenged but improving inter-municipal coordination:** The home-rule tradition has limited inter-municipal planning for transportation, water management, and flood control.
- **Extensive brownfields:** Connecticut's industrial history along rivers and the coastline left a legacy of contaminated properties. These contaminants can be quickly mobilized during floods or more gradually as water tables rise and shorelines erode.
- **Environmental justice concerns:** Several municipalities with unmet needs have state-defined environmental justice communities and traditionally disenfranchised groups.

#### **Exhibit D.c. Appropriate Approaches**

Hurricane Sandy revealed the social, environmental, and economic impacts when the state's network of communities, transportation, and infrastructure is interrupted. To protect this system, the State of Connecticut proposes a Resiliency Network approach as the optimal choice to improve disaster recovery and resiliency across



the state. Building off of the notion of Resilient Corridors introduced in Phase 1, the Resiliency Network is dependent on a strengthened infrastructure network which provides the opportunity to encourage resilient development, supported by the concepts of Resilient Transit Oriented Development and Resilience Corridors.

- **Resilient Transit Oriented Development:** Transit-Oriented Development (TOD) is a physical development influenced by and oriented to transit. TOD is inherently resilient as this development concentrates development around transit with development that can service and interact with mass transit use, creating energy and land efficient development.
- **Resilience Corridors:** Resilient corridors are protected corridors that provide connections between upland areas, shorefront communities, and critical infrastructure to strengthen economic resilience while adapting to future flooding. These corridors will set new development datums for future growth of communities that will rise up out of the flood plain and continue to thrive under sea level rise conditions.

The State of Connecticut proposes a multi-tiered strategy consisting of a Statewide Long Term Resilience Initiative that includes a regional approach and 2 pilot projects that address the recovery and resilience needs of Bridgeport and New Haven, the region, and state.

**Statewide Long Term Resilience Initiative:**

This initiative is led by State Agencies fostering Resiliency (SAFR), a collaboration between nine State Agencies, Yale University and the Connecticut Conference of Municipalities. Formed during NDRC Phase 1, Governor Dannel P. Malloy has since signed a letter formalizing SAFR as a statewide organization responsible for the resilience and sustainability of vulnerable communities along Connecticut’s coast and inland waterways. Chaired by OPM, SAFR is responsible for the creation of a Statewide Resilience Roadmap based on the best climate impact research and data. SAFR will also serve in an oversight position, assisting OPM in creating state wide resilience policy.

The statewide initiative aims to expand revitalization and resiliency across Connecticut. The main tenets of the program include focusing community development around transit (resilient TOD), creating

corridors resilient to climate change (resilient corridors), developing energy, economic and social resilience, increasing transit connectivity, adapting structures and critical infrastructure in the flood zone to withstand occasional flooding and protecting communities through healthy buffering ecosystems, where critical services, infrastructure and transport hubs are located on safer, higher ground, and where strong connections exist between the two. Increasing investment in identified TOD *resilience zones* provides an opportunity to increase economic resilience by strongly tying back to the regional transportation network and regional economic opportunities. These investments represent a ‘no regrets’ approach to climate adaptation. In addition to providing long-term resilience, they provide myriad co-benefits that strengthen communities and economic opportunities in the short term and between storms. Resilient corridors connect communities and regions and create opportunities for ecological and economic investment that will help communities, especially the coastal communities vulnerable to flooding,

### **Regional Approach**

The regional approach aims to address the recovery, revitalization, and resiliency needs within New Haven and Fairfield Counties. CIRCA will organize and implement plans in coastal municipalities impacted by the qualifying disaster of Sandy in Fairfield and New Haven counties, to develop short-term and long-term resilience strategies tailored to each community. These new plans will follow upon the planning effort taken for the pilot communities, establishing a local advisory committee to shepherd the plan, identifying all “shocks” and “stresses” impacting the community and developing strategies that break down institutional silos and solve for economic, social and environmental challenges facing the community in Bridgeport and New Haven. Coordinated through CIRCA, these plans will “network” across the region to coordinate resiliency measures between communities, build off of lessons learned from initial studies and develop actionable projects that can be implemented using the funds dedicated in the State to support resilience actions. These plans will be based on downscaled, regional, watershed-

based flood risk maps created from climate-forced hydrology and ocean dynamic modeling and incorporating sea level rise impacts.

**Pilot Projects:**

As described in Exhibit E.a.1, the State of Connecticut proposes 2 pilot projects in New Haven and Bridgeport. The proposed projects represent feasible opportunities to bolster the State's Resilient Network approach, strengthening connections between transportation and local communities as a means to reduce future flood risk, promote social cohesion, and revitalize the community. Coupled with the Statewide Resilience Initiative, the pilot projects represent projects that can be replicated through the region, but which individually contribute to the resiliency of the larger region as well. The pilot projects will provide valuable lessons learned and metrics toward the implementation of resilience projects in other communities.

**EXHIBIT E**

**FACTOR 3: PHASE 2 SOUNDNESS OF APPROACH**

### **Exhibit E.a. Sound Approach Description.**

The National Disaster and Resilience Competition (NDRC) proposal for the state of Connecticut is predicated on both the unique north-south bedrock terrain and the critical role of east-west rail and road transportation corridors spanning Connecticut's coastal urban communities. The State is prioritizing projects that illustrate economic, infrastructural, environmental and social cohesion benefits. The following proposal provides a long-term vision for establishing more resilient coastal communities; where structures and critical infrastructure in the flood zone are adapted to withstand occasional flooding and are protected by healthy buffering ecosystems; where critical services, infrastructure and transport hubs are located on safer, higher ground; and where strong connections exist between these natural and built conditions.

### **Project community development objectives.**

- Improve mobility of at risk residents during emergency storm conditions through 1) protection of low-lying coastal neighborhoods from storm surge flooding and 2) better, more resilient access to road and rail transportation corridors connecting these communities to neighboring metropolitan and inland regions;
- Provide new, multi-purpose, energy and greenway infrastructure services to low income communities;
- Reduce damage to residential properties and commercial businesses through construction of green infrastructure elements that mitigate storm water runoff and storm surge flooding;
- Expand opportunities for residents to live and work near rail transportation through developing new, and strengthening the resilience of existing, transit oriented development (TOD);

**Criteria and process for identifying target areas.** To prioritize projects for the NDRC Application, SAFR developed a resiliency framework that identifies projects that support TOD and strengthen

critical corridors within the regional economy, with a specific focus on meeting the unmet needs of vulnerable lower-income people in the most impacted and distressed areas of the region. The process for identifying target areas and projects included robust outreach to municipal agencies and key stakeholders. This process built upon the lessons learned in Rebuild by Design and involved direct participation of eleven coastal and riverine municipalities from two Connecticut counties that were classified by HUD in May 2014 as having the most existing unmet need and high levels of economic and environmental distress as a result of Hurricane Sandy in 2012. In preparation for the Phase 1 application, The NDRC team undertook a robust process of outreach and engagement with over 50 stakeholder consultations, 3 public hearings and open houses, a project website, site visits, and social media campaigns implemented throughout these two previously identified counties (Fairfield and New Haven).

**Exhibit E.a.8. Consultation and coordination with other jurisdictions.**

The Phase 2 application included active design and planning participation from the municipalities identified during Phase 1 and a rigorous selection process to identify the target areas. Kicking off the Phase 2 application, each municipality in Fairfield and New Haven counties was invited to a Webinar hosted by the State Agencies for Resilience (SAFR) in which SAFR described the NDRC competition in detail and requested all municipalities interested in being a part of the NDRC proposal to submit a Letter of Interest (LoI). Every municipality that submitted this LoI was invited to a day-long design charrette in which eleven municipalities and state agencies worked together to map needs and assets in each community. During the process they developed a short list of potential resilience projects that could be united and combined together to form a coordinated and cohesive network of solutions for resilient corridors and transit oriented development. The following information and factors were

gathered and used to determine which of the municipal design proposals and target areas were best suited for pilot interventions within the NDRC application:

- Portion of the municipal population with low or moderate household income (LMI);
- Government long and short-term commitment to and engagement with resiliency values;
- Unmet need and social or environmental distress as result of hurricane Sandy;
- Community interest;
- Existing opportunities for leverage within the municipality.

Ultimately, the Union Station / Long Wharf neighborhood in New Haven and the South End East neighborhood in Bridgeport were identified as priority intervention sites, strongly exhibiting each of the conditions necessary for a sound and successful NDRC project application. These two sites will function as pilot sites, and then the best practices and lessons learned can guide the further resilience efforts of other affected communities. In order to address the resilience planning and project needs in the remaining municipalities within New Haven and Fairfield counties, the State of Connecticut will establish a *Connecticut Connections Coastal Resilience Plan*, assisting in each of these additional municipalities to find funding and carry out resilience measures, ultimately creating a network of coastal municipalities who share best practices and resources in coastal resilience adaptation and planning.

**Exhibit E.a.8. Consultation and ally with other jurisdictions in region during both phases with local resilience, recovery and revitalization investments within the project area.**

The two proposed pilot projects in Bridgeport and New Haven (described at the bottom of this section) represent the culmination of a long and thoughtful process coordinated by the State of Connecticut during Phase 1 and Phase 2 of the NDRC application. In developing these projects, the applicant

consulted in depth with government agencies at municipal and state levels of governance as well as resident stakeholders, small and large business owners, and professional experts. Forty six (46) agencies and organizations were consulted within Phase 1 of the application process. The purpose of these consultations was to identify communities within Connecticut that had unmet need after Hurricane Sandy and to develop optimal policy and programmatic approaches that would alleviate the remaining unmet need while addressing future climate risks within the region. An additional 50 consultations were made within Phase 2 of the application period. The Phase 2 consultations were organized with the goal of soliciting feedback about project and program design from residents within the target communities and from subject matter experts. During this phase the project held two *Pop-up Presentations* at the New Haven public library and Bridgeport South End East Community Centre respectively, had five design working sessions with stakeholder groups, architecture firms and municipal technical staff in Bridgeport and New Haven, presented project ideas to city council committees on two occasions and met with the Army Corps of Engineers (USACE) to discuss project feasibility and technical soundness of approach. The project has also organized two public meetings on October 12<sup>th</sup> 2015 in Bridgeport and October 13<sup>th</sup> 2015 in New Haven, in which the final draft NDRC application will be presented and public comments will be solicited. These efforts have provided multiple venues for citizen participation before submission of the project application to HUD on October 27<sup>th</sup> 2015. A notable outcome of these Phase 2 consultations is the *Municipality Regional Resiliency Planning Guidebook*; a book that documents unmet need and opportunities for resilient development beyond the pilot intervention areas in New Haven and Bridgeport, and throughout many coastal and riverine municipalities in Connecticut.

During Phase II the project consulted and coordinated with 18 recovery and resilience investments in Fairfield and New Haven counties. The pilot projects in New Haven and Bridgeport



actively build upon prior CDBG-DR funding, while the application program, SAFR will facilitate replication and policy institution of resilience values across the wider inland and coastal Connecticut region. In 2014 the City of Bridgeport developed a team to submit an entry for the HUD Rebuild by Design competition. The entry focused on protection solutions in Bridgeport South End neighborhood. The project was awarded \$10 million dollars for infrastructure improvements to preserve the South End community and generate economic growth, focusing on the historic Marina Village Housing. The NDRC pilot project knits the south end communities together tying these Rebuild by Design investments to downtown Bridgeport to build upon the significant investments being undertaken in and around the station area to expand the Central CBD and station TOD area, while ensuring protection of the Bridgeport train station in the face of future sea level rise and climate related storms. In New Haven, the pilot project focuses on solving for the convergence of inland and coastal storm water flooding at and around New Haven Union Station. This pilot project builds on, and requires the involvement of, an existing CDBG-DR funded hydrological study quantifying storm water runoff from upland regions in the City of New Haven. In order to achieve this coordination and better understand how NDRC projects and program could build on and improve existing resilience-related programs, the project conducted a policy workshop during Phase II (August 2015) with members of SAFR. The following key programs were identified as being integral for resilience and recovery in Connecticut's coastal communities. Collectively, these and other programs represent non-Federal investment of over 8.9 million dollars, which provided an opportunity for leverage within the NDRC pilot projects. It is important to note that the State of Connecticut incurred an estimated \$360 million dollars in damage during the tie back event of Hurricane Sandy, and received only \$22.4 million dollars in Department of Housing and Urban Development (HUD) disaster recovery funds as of the Tranche 2 funding round in June 2014 (<http://www.huffingtonpost.com/2012/11/15/superstorm-sandy-connecticut->

[hurricane\\_n\\_2136276.html](http://hurricane.n.2136276.html) and <http://ctmirror.org/2014/06/20/feds-give-connecticut-little-to-recover-from-sandy/>). Compared to the combined Federal recovery aid of \$2.5 billion dollar allocated to New York and New Jersey after Hurricane Sandy, Connecticut is left with significant unmet recovery need..

1. Shore Up CT is a State of Connecticut-funded low interest loan program that provides financing for property owners in coastal municipalities located in Flood Zones VE or AE to finance property elevations, wind proofing and other flood protections.
2. CT DEEP Micro-grid Grant and Loan Program that provides technical and financial support for local distributed energy generation for critical facilities.
3. LetsGOCT! which proposes \$10 Billion in funding for infrastructure improvements over the next ten years.
4. LI Sound Stewardship Program which allocates \$20 Million for Green Infrastructure improvements focused on our most significantly impacted coastal communities
5. CT DOT Complete Streets Guidelines and DEEP Green Infrastructure Grant-In-Aid program, both focused on the next generation of street design to improve mobility, pedestrian connectivity and storm-water management of critical public realm assets

In Phase 2, the project also reached out to community members, talking with them about access to, and knowledge of the abovementioned programs. The project found a disconnect between community knowledge of some programs such as *SHORE UP Connecticut*, and it found strong community support and desire to expand other programs such as the *Micro-Grid Grant and Loan Program*. The NDRC project will address Connecticut's larger programmatic framework by working with SAFR to make improvements to existing resilience related programs at both the state and municipal level.

### **Exhibit E.a.3. Description of CDBG-NDR Projects**

Understanding state-wide resilience programs and identifying key areas for program improvement created a foundation for a series of pilot projects in New Haven and Bridgeport that serve as a new model for coastal development in Connecticut communities. These projects are designed to create more vital, resilient neighborhoods in the present and future, ultimately allowing communities to withstand and recover more quickly from all future extreme events, shocks and stresses. Although the proposed projects in New Haven and Bridgeport are distinct investments, developed in the context of each communities unique characteristics, both projects represent visions of how a resilient corridor and transit oriented development can look along the historic and topographically diverse Connecticut coastline.

In addition to these pilot projects, the State of Connecticut will establish a *Connecticut Connections Coastal Resilience Plan*, extending the NDRC Phase 1 concept to multiple locations within the MID-URN areas of Fairfield and New Haven Counties. Development of a resilience plan within these counties will serve as a pilot resilience plan for all of Connecticut.

#### **Exhibit E.a.3.a. NDRC Bridgeport Project Proposal.**

The proposed NDRC project in Bridgeport, Connecticut includes redeveloping key streets in Bridgeport's South End East neighborhood to form a network of resilient corridors, construction of a multi-purpose earthen berm between Tongue Point and the rail viaduct on Ferry Access Road, a feasibility study for connecting existing, isolated, neighborhood energy initiatives and a revision of existing flood plain development guidelines governing future growth in Bridgeport's South End. Each specific project application is described in the following sections.

Street Raising and Street Improvements (Bridgeport). Streets in the South End East neighborhood will be improved and raised in order to create a *Resilient Corridor Network*. The corridors are multi-purpose; serving as complete streets that provide multi-modal transportation options for residents, while protecting against future flooding from tidal waters during 50-, 100- and 500- year storms. This network leverages the South End's existing ridgeline along Park Avenue, connecting this naturally elevated street to key lateral streets through strategically designed and landscaped street elevation. Raising sections of the east-west streets will ensure the local community has vehicular and public transit access to the Park Avenue corridor during major storm events and sets a new, higher, ground plain for future long term development. The initial pilot street raising is anticipated for University Avenue, but eventually other lateral street connections such as Linden, Gregory and Atlantic streets could also be raised out of the 100-year floodplain. As part of the state funded Green Streets program, public streets within this pilot resilient corridor network will be retrofit with green infrastructure improvements such as installing median rain gardens and bio-swales to retain and prevent damage from storm water flooding. More ambitious flood management strategies will be undertaken for University Avenue in coordination with the raising of University, to develop guidelines for resilient street raising that can be replicated in low-lying areas throughout the State.

Earthen Berm (Bridgeport). The Bridgeport *Resilient Corridor Network* includes an earthen berm extending up to 9.4 feet in height constructed at the outer edge of the South End East neighborhood between Tongue Point and the rail viaduct at Ferry Access Road. The northern section of the berm would tie into the existing high ground at the rail abutment near the I-95 bridge and the southern section of the berm would tie into the two existing re-development sites; construction of an elevated natural gas fired power plant at the existing site of the Bridgeport Harbor Generating Station (1 Atlantic Street) and redevelopment of the former Remington Shaver facility brown field site (60 Main Street).

Both of these redevelopment plans address climate resilience through raising new industrial and mixed-use residential spaces eight feet above FEMA Mean High Water (MHW) levels. The earthen berm will connect these new elevated facilities using a raised public greenway, and create an opportunity for relocation and bioremediation of the existing Fuller 4 Combined Sewer Overflow (CSO) outfall, as a landscape feature of the greenway. Extending north, the berm will be integrated into the protection strategy for the UI owned power station adjacent to the berm, creating efficiencies in protection by integrating individual utility site protection into a larger protection strategy for the community. This component of the project capitalizes on existing private sector investment in order to protect all low and moderate income residents within the South End East neighborhood from flood damage, while providing elevated, scenic, pedestrian and bicycle access to downtown Bridgeport and to the TOD at the Bridgeport Train Station. In the long term, it is envisioned that the berm would extend north to the Downtown edge and transition to a sea wall outboard of the railroad platform, protecting downtown Bridgeport from future 500 year storm surge and estimated sea level rise by the year 2100.

Revision of existing flood plain design guidelines governing South End East neighborhood

(Bridgeport). Using the 1 Atlantic and 60 Main street developments as precedents, the project will work with FEMA, the United States Army Corps of Engineers (USACE) and the CT DEEP to build progressively upon existing flood plain design guidelines, incorporating cutting edge technologies and national innovation strategies as permissible strategies. Additional private building-level retrofits in the project area would be governed by the new flood design guidelines to ensure that future development is designed as an integral component of the resilient corridor network. The berm serves both as protection and as a critical connection to downtown Bridgeport, the Amtrak station and the amenities centered in the CBD. Isolated from the downtown by recent developments, this community has suffered from losing the through traffic that once passed through the community from downtown to the waterfront.

This project, by strengthening the Broad Street corridor as the new Main Street of South End and building a new pedestrian waterfront connection directly into and through South End from downtown, will re-establish the economic connection to downtown that this community sorely needs and create the basis for reinvestment on a number of currently vacant sites that are ripe for redevelopment. The raising of University Avenue and the berm create a new paradigm for protection that promotes redevelopment and rebuilds community through a continued relationship with the water as opposed to just keeping out the water.

Bridgeport South End District Energy Infrastructure (Bridgeport). Bridgeport's South End is home to three uncoordinated energy distribution networks. The first network includes the Public Service Enterprise Group (PSE&G), a major land owner in the South End East neighborhood operating two coal fired power plants with plans to build one additional gas fired power plant at 12 Ferry Access Road, all within the project target area. Nearby, the University of Bridgeport Renewable Energy Research Laboratory is the recipient of \$2.2 million dollar Connecticut Department of Energy and Environmental Protection (CT DEEP) grant developing a micro-grid from fuel cell technology that provides power to six campus buildings including two residence halls. And recently the Green Bank of Connecticut has funded installation of a district heating loop that will capture low temperature heat from the Wheelabrator waste-to-energy plant and re-distribute it to buildings in the South End neighborhood. The project believes there is potential to network discrete systems, creating unique energy ecosystem that provides redundant power in event of emergency or during peak demand. The study would analyze how new and existing networked energy infrastructure can be housed within the newly constructed berm and raised streets, protecting this critical infrastructure from damage due to tree fall (when elevated above streets) and flooding (when buried underground) in this low lying exposed region of Bridgeport, investigate new district-wide energy opportunities that could be

replicated throughout the region and create stronger communication bonds between local residents, the City, not-for-profit institutions, private investors and energy providers in this neighborhood to establish a collective path forward to community preservation, social cohesion and economic expansion as this community rises up to protect itself against the impacts of sea level rise.

### **Exhibit E.a.3.b. NDRC New Haven Project Proposal**

In New Haven, Union Station and the rail yard are a critical local, regional and national infrastructure asset that must be protected to ensure the continued operations of the Northeast rail corridor. The neighborhood surrounding Union Station experiences chronic flooding from rain events, and when coupled with high tide conditions, this creates a convergence of water, damaging homes, key regional infrastructure and industrial properties that provide many jobs to New Haven's working class families. These conditions will only be exacerbated with expected sea level rise. The project approach to New Haven Station will be to solve for the upland and coastal flooding conditions simultaneously, protecting the Long Wharf neighborhood and train station. In doing so, the project will enable future economic development opportunities in this downtown area.

Management of coastal and inland storm water convergence in Long Wharf neighborhood (New Haven). Improve conveyance at the major storm water junction through a bypass and dry canal storm water retention system, establishing the Long Wharf area as a storm water detention basin. J3 Junction will be outfitted with an Archimedes screw as physical infrastructure and public art feature connecting to the New Haven Downtown Art Walk. Wet-dry storm water detention basins will be integrated into the Long Wharf neighborhood landscape creating key submergible wetland spaces in the neighborhood in order to protect existing industrial, transportation related and recreational development. Lastly, a secondary berm will be constructed in the Long Wharf neighborhood coupled with an inflatable gate

sealing the southern the two lane I-95 underpass at Canal Dock Road. In the long-term, as predicted sea level rise takes place, further protection to I-95 will be required and the berm constructed to protect the rail yard will continue to serve as protection against potential overtopping. This layered approach to protection provides immediate critical protection that is then enhanced with further protections in the long-term that address future climate change impacts.

Street and neighborhood improvements (New Haven). Extensive bioswale network using pervious pavement and other natural catchment techniques to retain storm water runoff from upland areas constructed along local streets including: South Orange Street, Meadow Street, Malcom Court, Columbus Street and Union Avenue. Complete Street components will include expansion of multi-modal transportation right-of-way, enhanced pedestrian accommodations, expansion and gap filling of the local and regional bikeway system, landscape features, tree planting and additional innovative stormwater management technologies will be implemented on both interior and major civic streets in the local neighborhood. Lastly, we propose a design competition involving graduate students to be organized to work with the local community and create a vision to support HUD's existing presence in the community. The competition will provide innovative ideas for design of affordable and mixed income housing units as part of TOD development. This competition can either be run as part of the annual HUD Innovation and Affordable Housing annual student competition, or it can be run as a parallel venture, involving multi-disciplinary teams from both the academic and residential community in New Haven.

Coastal Protection Strategy (New Haven). Coastal protection measures along Long Wharf to protect the coastal edge against erosion from wave action and the effects of sea level rise. Protection includes restoration and enhancement of coastal resources employing a Living Shorelines approach for wave energy dissipation and habitat benefit. The approach includes restoring and creating tidal wetland



fringe along the length of Long Wharf Drive incorporated with the potential for onland and in-water structural features such as sills and narrow, linear created islands to provide protection for stable wetland development. More structural elements such as rip rap will be minimized, but are necessary at key locations to protect vulnerable and critical assets such as the sewer pump station.

The proposed NDRC project recognizes the critical position of New Haven Union Station and associated rail yard in the regional economy and it advocates for a hybrid of passive, green infrastructure and mechanically engineered solutions in adapting the surrounding neighborhood to be more resilient to future natural disasters and long term change along the Northeastern United States seaboard.

#### **Exhibit E.a.4. Decreased risk to vulnerable populations and improved community resilience.**

All project interventions are designed to meet FEMA Base Flood Elevations (BFE) for 100 year flood events, and a 1 foot sea level rise by 2050, while providing one foot of freeboard elevation protection (<http://www.fema.gov/freeboard>). The protection measures in New Haven and Bridgeport are designed with capacity for extensions that can be deployed upon availability of funding and that will protect against 500 year flood events and account for an estimated 6 foot sea level rise by 2100.

The communities and properties most damaged by storm water and upland flooding in both cities are LMI households and industrial businesses. These land use sectors are of critical concern to the cities of New Haven and Bridgeport because they are places of employment and residence for vulnerable populations and this project will reduce the threat of coastal and inland flood damage over an area of 16 million square feet.

In Bridgeport, the project will set a new datum for future development using University Avenue and the earthen berm as precedents. Eventually, the ground plane of the entire South End East

neighborhood in Bridgeport will be raised in elevation between one and 11 feet. In New Haven, the Long Wharf neighborhood will be reconfigured to allow for flooding from inland storm water and coastal storm surge, creating a submergible region that simultaneously supports development and protects the New Haven Union Station and surrounding neighborhood. Both projects bring economic investment back into socially vulnerable and economically declining neighborhoods. Both project bring direct and immediate opportunities for new affordable housing. Street improvements in both areas will provide reliable emergency egress for these populations in event of a storm and reduce the risk of flooding which alleviates the financial burden of restoration from these low income neighborhoods. In addition, construction of resilient corridors will protect these important neighborhoods, providing the community with better motorized and non-motorized egress, service utilities, and natural spaces for recreation and education, improving urban quality of life.

In New Haven, a HUD led design competition will explore how affordable housing located in a flood plain can be redesigned, pushing the boundary of innovation within affordable housing design. Development of a networked energy ecosystem in Bridgeport, will alleviate chronic power shortages due to storms in the neighborhood, and provide a cleaner, safer neighborhood atmosphere and a platform to test new district scale energy technologies.

Currently, the State of Connecticut does not have a regional coastal resilience plan. A program for providing future climate projections for coastal vulnerabilities will inform risk-based decision-making at the municipal and regional level. This *Connecticut Connections Coastal Resilience Plan* will guide state policy and funding priorities for the future through SAFR, prioritizing and addressing the needs of vulnerable populations in the region. The preparation of urban environmental conceptual designs for resilience will ensure that funding is targeted at resilience-enhancing actions.

### **Exhibit E.a.7. Feasible and implementable by project partners.**

Both pilot projects are based on feasible, effective, and practical designs that will perform their intended goals. The concepts for the projects were developed in meetings and in close consultation with many agencies, local municipal representatives and residents/businesses in the affected areas. The formation and continuation of SAFR as a state level entity plays a critical role in the implementation of project components.

### **Exhibit E.a.7.ii. Design Practices, Codes, Standards.**

The projects address, and when relevant, propose recommendations to related existing policies and programs. Throughout project implementation the following established codes, standards and best practices in Connecticut and abroad may be used:

- 2012 International Energy Conservation Code
- 2012 International Residential Code
- 2014 National Electric Code
- 2012 International Building Code
- New Haven Zoning Ordinance , 2015
- Natural Wastewater Treatment Systems, Ronald W. Crites and E. Joe Middlebrooks
- Connecticut Regulations for Floodplain Management
- Adapting to the Rise: A Guide for Connecticut's Coastal Communities, The Nature Conservancy
- Complete Streets Design Manual, City of New Haven
- New York City, Department of Design and Construction, High Performance Infrastructure Guidelines

Other projects in target area that the NDRC pilot project will partner with include:

- Route 34 Corridor Downtown Crossing Project
- Hill-to-Downtown Neighborhood Plan
- University of Bridgeport micro-grid project
- HUD RBD Project for Bridgeport
- Multiple New Haven Railyard Resilience improvements
- New TOD Investments at Union Station and in Downtown Bridgeport

SAFR and SAFR Partners have demonstrated success in managing data collection and planning efforts at scales similar to NDRC project implementation (see Factor 01). In 2016 CIRCA will complete a nearly \$500,000 project on mapping shoreline change, coastal protection, waves and sea level for the National Oceanic and Atmospheric Administration (NOAA) Coastal Resilience Network. Finally in preparing the NDRC Phase I application, SAFR and Partners conducted a regional vulnerability assessment using existing data sets supplemented by concept planning to address vulnerabilities for the entire coastal region. The experiences and strategic roles of SAFR members and Partners render the origination more than capable, and appropriate, for NDRC project implementation.

**Exhibit E.a.7.i. Increased resilience to current and future disasters.**

The project creates a long term vision for resilient coastal communities through proposing a new datum of development in key downtown Bridgeport neighborhoods and by creating a model for natural wetland and built structure coexistence in New Haven's Long Wharf neighborhood. These pilot projects will increase resilience to current and future disasters in the target areas of New Haven and Bridgeport. Establishment of SAFR and the *Connecticut Connections Coastal Resilience Plan* will

allow these, and other, resilient designs and planning strategies to be to be expanded and replicated in all coastal and riverine Connecticut communities.

In addition, both the MetroNorth and Amtrak rail infrastructure run along the Northeast corridor through the project region. The project resilient TOD concept can be replicated throughout this entire area and ultimately through the Northeast Region, rendering the pilot projects in New Haven and Bridgeport as models for the entire coast. As demonstrated by recent projects inland riverine communities in Connecticut, resilient TOD development also applies to those communities that connect to the Hartford-Springfield line and future commuter train between Hartford and New Haven. The *Connecticut Connections Coastal Resilience Plan* will identify at a municipal-scale the current and future risks to the impacts of climate change for the coast of Connecticut as well as utilizing economic resilience as a tool to impact overall resilience. Quantifying the impact of the planning project will depend on the implementation of projects, however, a suite of projects has the potential to address the nearly \$480 billion in insured assets within 35 miles of Connecticut’s coast, prevent power outages for the 650,000 people who lost power during Sandy, kept the jobs of 78,000 people who claimed unemployment after Sandy, stopped the overflow of 20 million gallons of raw sewage to Long Island Sound, and saved the \$360 million in estimated overall loss to Connecticut from Sandy. Lastly, this planning is an eligible activity under 24 CFR §570.205.

**Exhibit E.a.2. Project metrics for resiliency, environment, social and economic.**

	<b>Qualitative Metric</b>	<b>Quantitative Metric</b>
<b>Resiliency</b>		
reduction in property damage	With the construction of the various elements, homes and businesses will no longer be directly affected by coastal flooding, and property damages will be avoided.	Using FEMA provided data of affected buildings with the floodplain, the replacement cost of those buildings, a value for costs avoided can be derived
reduction in casualties	With the construction of the various elements, people will be better protected and accidents/casualties will be avoided.	Using FEMA provided data of affected persons within the floodplain, the Willingness to Pay Table provided by FEMA, a value for costs avoided can be derived

reduction in displacements	With the construction of the various elements, homes and businesses will no longer be directly affected by coastal flooding, and community displacements will be avoided.	Using FEMA provided data of affected residential buildings with the floodplain, the average household size for the community, and the FEMA permissible relocation cost per person, a value for costs avoided can be derived
reduction in property damage (rail fleet and downtown buildings) - construction of rail yard berm + storm water retention/dry canal	With the construction of the various elements, the New Haven Line rail fleet will no longer be directly affected by coastal flooding, and railcar losses due to storms will be avoided.	Number of railcars stored in yard times car cost
reduction in rail operations down time	With the construction of the berm and coastal protection, the New Haven Rail yard will no longer be directly affected by coastal flooding, and rail operations losses will be reduced.	Daily operating revenue of railroad, divided by the number of railcars serviced in the yard per day times the number of day's yard is out of service results in a loss that would be avoided assuming the improvements are in place.
Long Wharf Park breakwater protection from erosion - acres of park land saved	With the construction of the breakwaters, Long wharf park would be protected from continued erosion forces, and increase the recreational space of the community.	Number of acres saved times the land value
<b>Environmental</b>		
improvement in neighborhood water quality	Wetland restoration has been shown to reduce pollutants and improve water quality, which reduces plant treatment needs	Number of acres of wetlands created times pollutant control value
Protection of species breeding ground - blue crab, fish habitat along the coast of Long Wharf	New Haven bay represents 82% of CT's \$62 million annual aquaculture industry and protecting species breeding grounds is important ecologically and economically	
<b>Community Development</b>		
benefits to low/moderate income households	With the construction of the various elements, homes will no longer be directly affected by coastal flooding, and home values will increase	Calculated as a simple percentage increase in parcel value
improved living environment	New AFH will be introduced, improving the living arrangements for these households	Number of new units, new households, and value of new workers
active lifestyle - access to green way, complete streets, biking, walking	With the construction of the berm and complete streets, more recreational mobility will occur improving peoples lifestyles	miles of additional pathways times the number of potential users times VTI benefit
<b>Economic Revitalization</b>		
regional economic impact	With the construction of the various elements, homes and businesses will no longer be directly affected by coastal flooding, and worker productivity will be maintained	
reduced insurance cost	With the construction of the various elements, homes and businesses will no longer be directly affected by coastal	Using FEMA provided data of affected buildings with the floodplain, the insurance cost of the buildings before the

	flooding, and insurance costs will be reduced	improvements, a value for costs avoided can be derived
construction jobs / maintenance jobs	Each improvement will create temporary construction jobs that will spend a portion of their income on the local economy. Additionally, any AFH created brings in permanent jobs that also spend money within the local economy.	Number of temporary jobs x income x the percentage of income spent within the local economy; number of times the number of permanent jobs derived, times the income generated times the percentage of income spent on the local economy.

**Exhibit E.a.3. Addressed unmet recovery need and framed recovery issues.**

Residents in the Long Wharf and Hill-to-Downtown communities have an estimated unmet recovery need of \$142 thousand dollars from damage by Hurricane Sandy, and these community face a continued threat of future storms and sea level rise. Recent storms and chronic flash floods in New Haven emphasize the need for improved drainage and storm water management in this low-lying region. As one of Amtrak’s busiest railway stations in the United States, New Haven Union Station relies directly upon the resilience of the Long Wharf neighborhood success. In Bridgeport, 19 percent of the buildings in the South End East neighborhood were inundated with flooding during Hurricane Sandy, causing severe damage in a total of 89 properties. Severe power outages were experiences throughout the region as the PSE&G facilities located in the South End East neighborhood were shut down from inundation. In this neighborhood there is still an estimated \$350 thousand dollars in unmet need, and much of this damage falls on low and middle income households.

**Exhibit E.a.4. Approach Model for future development that is replicable and holistic.**

- Resilient corridors, enhanced development opportunities in higher elevation resilience hubs, and improved flood and wave protection and enhanced rebuilding standards for existing development in low lying areas can be applied along Connecticut coastline due to topography of state

- Transit oriented development can be applied to each station along the Amtrak and MetroNorth rail line in Connecticut, connecting Boston and New York City, as well as the future New Haven to Springfield line expected to be in service in 2017.

**Exhibit E.b. Benefit Cost Analysis**

For Bridgeport, Table 1 presents the evaluation results for the two cases. For the 7 percent discount rate, the proposed infrastructure investments yield a net present value of \$9.6 million, and a benefit-cost ratio of 1.23. At a 5 percent discount rate, the proposed infrastructure investments yield a net present value of \$19.9 million, and a benefit-cost ratio of 1.47.

Over the 100-year analysis period (2016-2115), there are \$52.0 million in benefits at a 7% discount rate, in 2015 dollars and \$62.6 million in benefits at a 5% discount rate.

**Bridgeport Benefit Cost Analysis Summary Results**

<b>Scenario</b>	<b>Net Present Value (2015 \$ millions disc.)</b>	<b>Benefit Cost Ratio</b>
Case A (7 percent discount rate)	\$9.6	1.23
Case B (5 percent discount rate)	\$52.0	1.47

*Source: WSP / Parsons Brinckerhoff, 2015*

For New Haven, Table 1 presents the evaluation results for the two cases. For the 7 percent discount rate, the proposed infrastructure investments yield a net present value of \$3.3 million, and a benefit-cost ratio of 1.04. At a 5 percent discount rate, the proposed infrastructure investments yield a net present value of \$34.0 million, and a benefit-cost ratio of 1.40.

Over the 100-year analysis period (2016-2115), there are \$88.6 million in benefits at a 7% discount rate, in 2015 dollars and \$119.9 million in benefits at a 5% discount rate.



New Haven Benefit Cost Analysis Summary Results

Scenario	Net Present Value (2015 \$ millions disc.)	Benefit Cost Ratio
Case A (7 percent discount rate)	\$3.3	1.04
Case B (5 percent discount rate)	\$34.0	1.40

Source: WSP / Parsons Brinckerhoff, 2015

**Exhibit E.c. Opportunities for scaling, scoping and phasing proposed project, including relevant funding amounts and timing associated.**

Both pilot projects in New Haven and Bridgeport, as well as the State Resilience Planning Program are designed for long term scale-ability and phasing. In Bridgeport project applications include elevation of University Avenue at the cost of \$5.7 million dollars and construction of a greenway berm that will protect downtown Bridgeport and the train station from 100 year storms at the cost of \$29.4 million dollars. In order to plan for 500 year storms and sea level rise by 2100, these key project components will be increased in both scale and scope. Atlantic, Linden, Gregory and Austin streets will be raised in the South End East neighborhood by 2100, funded by the Department of Transportation *Let's Go CT* infrastructure program. A 4' sea wall will be installed at the top of the greenway berm to prevent against future storm surge, and the northern end of the berm will be extended to Stratford Avenue transitioning to a sea wall outboard of the railroad platform. In New Haven the storm water management eco-system in the Long Wharf neighborhood east of Church Street will be replicated west of Church Street to Hallock Avenue and funded by the Grants-in-Aid Green Infrastructure program. Interstate 95 will be retrofit to serve as a flood barrier during 500 year storms through addition of a 700 foot long, 3' tall sea wall at the lowest elevation near Church Street and permanent closure of Canal Dock and Long Wharf roads. The act of using infrastructure as a mitigation tool against flooding will be increased in scope throughout the Connecticut region, focusing on reinforcement of northeast corridor rail way and I-95 for coastal protection and will be funded through

the *Lets Go CT* infrastructure program. The *Connecticut Connections Coastal Resilience Plan* will include additional municipalities effected by riverine and coastal, focusing initially on all 15 coastal municipalities in New Haven and Fairfield counties and eventually on all municipalities in the State of Connecticut, in partnership with the Connecticut's three council of regional governments. The initial portion of the *Connecticut Connections Coastal Resilience Plan* will be funded through NDRC and staggered over the period out to 2019 with 3-4 municipalities per year. If necessary plans will be prioritized for municipalities who participated in the Solicitation of Interest process during the Phase II application, and who are priority areas as CDBG entitlementment communities with LMI. Long term support for this program will come from state agency coffers who are members of the State Agencies Fostering Resilience.

**Exhibit E.d. Project Schedule and environmental review, procurement, state or local permits and any other bureaucratic required for your project.**

New Haven NDRC project components		Total project cost	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos
1	Stormwater System	38,515,457.38	Stormwater Feasibility Study											Design				Construction									
1	Long Wharf Dry Canal		Dry Canal Feasibility Study											Design				Construction									
1	I-95 Plug		I-95 Plug Feasibility Study					I-95 Plug Design			Installation of Plug							Construction									
1	New Haven Railyard Protection Berm/Elevated Street Design		Feasibility Study for Protection											Berm Design				Construction									
2	Street and neighborhood storm water improvements	3,816,320.00	Feasibility Study for Roadway Design											Design				Construction									
3	Coastal Protection Strategy, living shoreline with stone revetment edge	20,051,460.00	Feasibility Study and EIS											Design				Construction									
<b>Estimated Total</b>		<b>62,383,237.38</b>																									
Bridgeport NDRC project components		Total project cost	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	
1	University Avenue, elevated street with integral multi-functional wall	5,790,400.00	Feasibility Study for Protection											Berm Design				Construction									
2	Community Center Restoration	1,000,000.00	Design											Construction													
3	Earthen berm extending to Ferry Landing	29,456,460.00	Feasibility Study and EIS											Design				Construction									
4	Flood Design Guideline recommendations	330,000.00												Design				Design Guidelines Report									
5	District energy feasibility study	0.00	Feasibility Study and EIS																								
<b>Estimated Total</b>		<b>43,309,669.60</b>																									
State level programs		Total project cost	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	Mos	
1	State Agencies Fostering Resilience (SAFR) operation	385,000	HUD Staff Allocation																								
2	Connecticut Connections Coastal Resilience Plan	4,500,000.00	Staff Org		Feasibility Studies - All Municipalities											Next Steps Recommendations and Funding											
<b>Total budget</b>		<b>110,577,906.98</b>																									

The two pilot projects in New Haven and Bridgeport would require coordination, environmental review, and permitting with the following agencies:

- Connecticut Department of Energy & Environmental Protection (CT DEEP)
- CT DEP
- CT DOT
- CT DPH

- CT DECD
- CT OPM
- Connecticut Council on Environmental Quality (CT CEQ)
- USACE
- EPA
- FEMA

To comply with the Connecticut Environmental Policy Act (CEPA), project measures in both target areas would require an Environmental Impact Evaluation (EIE). The lead State Agency would prepare the EIE, which would then be reviewed and approved by the Office of Policy and Management (OPM). To adhere to the National Environmental Policy Act (NEPA), some projects may require an environmental impact statement (EIS) in lieu of the EIE.

A list of additional state permitting is included below:

**Beach Grading Permit:**

This general permit applies to beach grading activities conducted in the area between mean high water and the high tide line within the tidal, coastal or navigable waters of the State. This general permit authorizes a maximum of one beach grading event per calendar year for a three year period. Beach grading activities waterward of mean high water require a separate authorization from the Office of Long Island Sound Programs. Registration is required to be submitted and approved in writing by the Department in order for beach grading to be authorized by this general permit. Approval of Registrations are transferrable.

**Maintenance of Catch Basins and Tide Gates**

(DEP-LIS-GP-010): This general permit applies to catch basin cleaning and tide gate repair or replacement. These activities must occur within a closed water discharge system, any portion of which is located waterward of, or whose vertical plan intersects, the high tide line in the tidal, coastal or navigable waters of the state or in tidal wetlands. No registration is required to be submitted in order for the activity to be authorized by this general permit. Upon a change in ownership or the permittee, the

new owner or permittee shall comply with all applicable conditions and requirements of this general permit.

### **Residential Flood Hazard Mitigation**

(DEP-LIS-GP-005): This general permit applies to the elevation and floodproofing of existing inhabited houses to FEMA standards, where the houses are within state permit jurisdiction but outside the state-owned public trust area, provided all appropriate local approvals have been obtained. This general permit does *not* cover further waterward encroachment of any structure, any additions or expansions to an existing house, or any reconstruction or repair of any structure damaged by hurricane, storm, erosion, flood, fire, or other casualty loss. Registration is required to be submitted *and* acknowledged in writing by the Department in order for the work to be authorized under this general permit. Registrations are transferrable.

### **Domestic Sewage**

(DEP-WPED-GP-018): This general permit applies to discharges of domestic sewage from a community sewerage system to a POTW. Registration is required for discharges from a community sewerage system. Privately owned "community sewerage systems" (such as those at condominiums) are to be properly managed and have a valid community sewerage system agreement with the municipality receiving the discharge as required by section 7-246f of the General Statutes. Municipalities seeking to initiate, create or originate a discharge from a community sewerage system do not need to register. For all other discharges of domestic sewage to a POTW no registration is required to be submitted in order for the discharges to be authorized by this general permit. Registrations are non-transferrable.

### **Groundwater Remediation Wastewater Directly to Surface Water**

(DEP-PERD-GP-020): This general permit applies to discharges of groundwater remediation wastewater generated during the process of investigating and remediating groundwater and soil, and

other related wastewaters, directly to a surface water, either through a dedicated conveyance, or through any other conveyance system that the permittee is authorized to utilize. The combined maximum daily flow of all groundwater remediation wastewater generated at the site from which such discharge takes place or is proposed to take place does not exceed ten per cent of the 7Q10 flow of the watercourse into which such wastewater is discharged or, if all such wastewater is directed to a manmade impoundment or a natural lake or pond, the combined maximum daily flow of such wastewater does not exceed one-half of one per cent of the water volume of such impoundment, lake, or pond. Discharge to waterbodies classified as public water supply (AA) is not authorized by this general permit. Registration is required to be submitted to the department in order for the discharges to be authorized by this general permit. If a registrant is proposing to use a substance to treat the discharge, or groundwater remediation wastewater to be discharged contains any pollutant, excluding temperature, solids and oxygenates, for which no limit is specified in Attachment A of the general permit, or radioactive material as defined by Section 22a-148 of the Connecticut General Statutes has been deposited on the site from which such discharge takes place or is proposed to take place, registration is required to be submitted and approved in writing by the department in order for the discharges to be authorized by this general permit.

Approval of Registrations are transferrable.

### **Stormwater and Dewatering Wastewaters from Construction Activities**

(DEEP-WPED-GP-015): This general permit applies to all discharges of stormwater and dewatering wastewater from construction activities which result from the disturbance of *one or more* total acres of land area on a site regardless of project phasing. In the case of a larger plan of development (such as a subdivision), the estimate of total acres of site disturbance shall include, but is not limited to, road and utility construction, individual lot construction (i.e., house, driveway, septic system, etc.), and all other

construction associated with the overall plan, regardless of the individual parties responsible for construction of these various elements.

The general permit dictates separate compliance procedures for Locally Approvable projects and Locally Exempt projects (as defined in the permit). Locally Exempt construction projects disturbing over 1 acre must submit a registration form and Stormwater Pollution Control Plan (SWPCP) to the Department. Locally Approvable construction projects with a total disturbed area of one to five acres are not required to register with the Department provided the development plan has been approved by a municipal land use agency and adheres to local erosion and sediment control land use regulations and the CT Guidelines for Soil Erosion and Sediment Control. Locally Approvable construction projects with a total disturbed area of five or more acres must submit a registration form to the Department. This registration shall include a certification by a Qualified Professional who designed the project and a certification by a Qualified Professional or regional Conservation District who reviewed the SWPCP and deemed it consistent with the requirements of the general permit. The SWPCP for locally approvable projects is not required to be submitted to the Department unless requested. This general permit is now transferable in accordance with section 22a-60 of the General Statutes provided a license transfer form is submitted to the commissioner.

**Exhibit E.e. Budget.**

The project budget was determined using precedent research from HUD Rebuild by Design, New York Rising design competition proposals and past experience of WSP | Parsons Brinckerhoff in infrastructure design and redevelopment projects located in Connecticut cities. CTDOT public BID reports were also referenced for cost estimation. Project implementation will be cost-effective, and the costs reported below are in line with industry standards and are appropriate for the scope of the project.

<b>New Haven NDRC project components</b>		
	Component	Total project cost
1	Management of coastal and inland storm water convergence in Long Wharf neighborhood	38,515,457.38
2	Street and neighborhood storm water improvements	3,816,320.00
3	Coastal Protection Strategy, living shoreline with stone revetment edge	20,051,460.00
	<b>Estimated Total</b>	<b>62,383,237.38</b>
<b>Bridgeport NDRC project components</b>		
	Component	Total project cost
1	University Avenue, elevated street with integral multi-functional wall	5,790,400.00
2	Community Center Restoration	1,000,000.00
3	Earthen berm extending to Ferry Landing	36,189,269.60
4	Flood Design Guideline recommendations	330,000.00
5	District energy feasibility study	0.00
	<b>Estimated Total</b>	<b>43,309,669.60</b>
<b>State level programs</b>		
	Component	Total project cost
1	State Agencies Fostering Resilience (SAFR) operation	385,000
2	Connecticut Connections Coastal Resilience Plan	4,500,000.00
		<b>4,885,000.00</b>
<b>Total budget</b>		<b>110,577,906.98</b>

**Exhibit E.f. Plan Consistency.**

The concept of this proposal is consistent with, and often times, predicated on, existing state and regional goals that are reflected in existing planning documents.

Tier I Plans

**Connecticut Climate Change Preparedness**

[http://www.ct.gov/deep/lib/deep/climatechange/connecticut\\_climate\\_preparedness\\_plan\\_2011.pdf](http://www.ct.gov/deep/lib/deep/climatechange/connecticut_climate_preparedness_plan_2011.pdf)

The Connecticut Change Preparedness Plan, released in 2011, offers strategies to address climate change vulnerabilities for the built and natural environment, agriculture, and public health. The plan offers an opportunity to increase Connecticut’s resilience to non-climate change stressors, such as increased development and demand on utilities and services as well as to create sustainable jobs. The Connecticut Climate Change Preparedness (CCCP) aligns with the proposed project in encouraging

multi-layered strategies that empower local communities to take direct action in concert with state, regional, and national efforts.

In particular, the proposed project's Regional Resilience Initiative aligns with the CCCP goal of supporting regional cooperation on climate change adaptation through involvement in regional planning activities. Additionally, the proposed project is founded on the concepts of resilient transit-oriented development and transit corridors, which, along with the two pilot projects, is consistent with the CCCP goal of determining vulnerable transportation routes and transportation options that may adversely impact natural resources and human mobility needs under future climate change.

The proposed project is consistent with the following goals outlined in the CCCP Plan:

- Encourage sustainable water capture and storage by homeowners, municipalities, businesses, and industries, and the agriculture sector with incentive programs to supplement capture and storage infrastructure
- Develop decision tools to evaluate, replacement, modification, and design life of infrastructure
- Consider the public health needs of vulnerable populations in climate change adaptation planning
- Continue to develop and update all municipal emergency preparedness plans for extreme weather events
- Assess future flooding risks to natural and built infrastructure, including agricultural operations and public health and safety
- Develop Connecticut- specific climate change projections for temperature, precipitation and sea level rise and support monitoring efforts for these climate drivers



- Identify research needs and disseminate current climate change adaptation research and technical resources to the appropriate stakeholders, and encourage future efforts through state grants
- Determine the critical public buildings, including public health facilities, schools and cultural/historic buildings that will be impacted by coastal and inland flooding, and recommend appropriate adaptation strategies that will not adversely impact natural resources
- Conduct research to understand effects of potential adaptation approaches and develop new, innovative approaches to support adaptive management
- Partner with educational institutions or organizations that conduct research
- Collaborate with other states and federal agencies to develop a coordinated regional adaptation plan
- Minimize combined sewer overflows
- Implement new or modified policies that would encourage appropriate land use and reduce repetitive losses

**State of Connecticut 2015-2019 Consolidated Plan for Housing & Community Development**

[http://www.ct.gov/doh/lib/doh/draft\\_cp\\_for\\_publication.pdf](http://www.ct.gov/doh/lib/doh/draft_cp_for_publication.pdf)

The State of Connecticut Consolidated Plan for Housing & Community Development addresses housing and community development needs of extremely low-, low- and moderate-income households in the state over five years and serves as the basis for the policies, strategies, goals, and objectives which will be implemented by the State. To do so, the plan aims to extend and strengthen partnerships

among government, private sector, for-profit and non-profit organizations. The plan establishes three overarching goals:

1. Work to ensure decent housing is available to all
2. Work to ensure that all of the state's residents live in suitable living environment
3. Work to ensure that all of the state's residents have access to economic opportunities

The proposed project is consistent with these planning goals, and in particular aims to create suitable living environments by improving the safety and livability of neighborhoods. The proposed project incorporates community development objectives, improving protection and resiliency of low-moderate income communities that incorporate expanding opportunities for residents to live and work near rail transportation through the development of strengthened, resilient transit oriented development.

The two pilot projects in Bridgeport and New Haven aim to implement these goals, providing protected and safe neighborhoods while bringing economic investment back into socially vulnerable and economically declining neighborhoods. In New Haven, the project proposes a new HUD led design competition to explore how buildings of the Church Street Village Housing could be redesigned given their existing location within the flood plain and the need for low income housing in this neighborhood, directly supporting and advancing the State of Connecticut Consolidated Plan goals.

### **State Rail Plan**

[http://www.ct.gov/dot/lib/dot/documents/dplansprojectsstudies/plans/state\\_rail\\_plan/State\\_Rail\\_Plan\\_Final\\_11-8-12.pdf](http://www.ct.gov/dot/lib/dot/documents/dplansprojectsstudies/plans/state_rail_plan/State_Rail_Plan_Final_11-8-12.pdf)

The State Rail Plan aims to support Connecticut's role in developing a growing, interconnected rail system with adjoining states, and with the New York and Boston metropolitan centers. Investments are aimed at the following priorities

- (1) New Haven Line (NHL) , importance of connecting our state's economy with New York City and the Northeast Corridor
- (2) Upgrading existing branch lines with a focus on areas that will leverage the most employment growth and economic development through transit-oriented development

The proposed project directly corresponds to the goals of the State Rail Plan. The proposed project is founded in the idea that increasing investment in identified TOD resilience zones provides an opportunity to increase economic resilience by strongly tying back to the regional transportation network and regional economic opportunities. The New Haven pilot project includes the construction of a secondary berm constructed in Long Wharf to protect Union Station, a critical section and additional step in protecting the New Haven Line.

#### **South End Neighborhood Revitalization Zone Strategic Plan (2014)**

[https://www.bridgeportct.gov/filestorage/89019/89751/94961/103639/FINAL\\_Design\\_0212.pdf](https://www.bridgeportct.gov/filestorage/89019/89751/94961/103639/FINAL_Design_0212.pdf)

The City of Bridgeport and the South End Neighborhood Revitalization Zone (NRZ) Planning Committee worked to create a comprehensive NRZ designation and strategic plan to foster and guide the revitalization of the South End. The plan aims to attract development, improve the overall neighborhood quality, increase local employment opportunities, and invest in mitigation to reduce climate risks.

The proposed project, and in particular, the Bridgeport South End East pilot project, is consistent with the NRZ plan. The pilot project includes coastal protection interventions, storm water management strategies that directly tie into and redevelop the overall quality of neighborhood development and street network.

### **Hill-to-Downtown Community Plan**

The Hill-to-Downtown Community Plan summarizes the challenges and opportunities facing this New Haven neighborhood. The plan builds on a strong foundation of market research and community input, which recognizes Downtown New Haven's growing appeal as a location for new homes, businesses, and recreation. The plan lists the following goals for this neighborhood:

- Encourage Development of Commercial, Residential, and Retail Space in the Areas Around Union Station and within the Medical District Areas
- Strengthen the Existing Neighborhood
- Improve Connectivity within the District and to Downtown
- Create New Job Opportunities for Residents
- Expand the City's Tax Base

The proposed project's New Haven pilot project directly addressed the goals included in this planning document. The pilot projects includes street and neighborhood improvements at Church Street Village Housing, the reconstruction of Union Avenue, and protection for the New Haven Rail Yard that will extend bicycle and pedestrian connections and knit together Long Wharf, Union Station The Hill and Downtown New Haven.

**EXHIBIT F**

**FACTOR 4: PHASE 2 LEVERAGE**

SAFR has tremendous support for its resilience program and for its two pilot projects. SAFR can boast more than \$225 million in direct leverage for its program and pilot projects, illustrating support at the Federal, State and Local level.

Leverage starts with the allocation of State funding and the commitment of State agency staff who have dedicated their time to develop the program, refine the approach, organize the involved agencies, set the mission for SAFR, outreach to the Councils of Government and the Municipalities, select and implement the resilience pilots and build the organizational infrastructure and funding support for program continuation throughout the region and eventually across the state.

#### **Exhibit F.7. Sources of Leverage**

**Not-for-profit leverage - CIRCA.** Through monies garnered from the (\$2.5 Million) Pollution Control Act Settlement, DEEP established CIRCA as the scientific research institution dedicated to understand the impacts of sea level rise and the effects of climate change. CIRCA has been a central entity in driving the resilience agenda, shaping the mission of SAFR, researching climate change and structuring the resilience approach.

**Direct Leverage for Pilot Projects.** Both of the pilot projects in New Haven and in Bridgeport are promoting “green” streets that support larger stormwater management and pedestrian connectivity goals. CTDOT and DEEP are each committing to provide \$1 million (\$2 Million) from LetsGOCT! and from the Green Infrastructure Grants in Aid programs respectively to develop green infrastructure guidelines and pilot those guidelines on the rebuilt streets in our pilot communities. Resilient TOD is central to the mission of SAFR’s resilience program.

**New Haven.** The implementation of the upland and coastal stormwater management program in New Haven is tied directly to a number of investments that collectively create the opportunity to implement this resiliency pilot. A critical element of the New Haven pilot is the reconstruction of Union Avenue which fronts Union Station as a “green” street that both demonstrates innovative stormwater management technologies and creates enhanced mobility opportunities and increased pedestrian activity, enhancing the sense of arrival and place in the front door to the Union Station TOD. The construction of the Union Station garage and pedestrian access to the station (\$50 Million) will open up new pedestrian connections between the station, its users and the surrounding community along Union Avenue. The reconstruction of Route 34 to create the Downtown Crossing is converting the adjacent former by-pass through New Haven into the central gateway access into the City. This realignment will reconstruct the primary access along Orange Street from downtown New Haven directly into Union Station, reconnecting the Hill to the Downtown and establishing Union Station as an accessing mass transit center to the downtown. This (\$68 million) project includes new bicycle connections, two new roadway connections connecting previously disconnected neighborhoods, significant improvements to the pedestrian realm and new economic development opportunities. Our pilot project to remove the chronic upland flooding condition that plagues the communities surrounding Route 34 will enable long sought economic development to re-establish itself along Route 34, filling the empty space between Union Station and downtown New Haven.

The development of protection for the New Haven Rail Yard offers co-benefits by extending the bicycle and pedestrian connections constructed as part of Route 34 into Long Wharf along the historic Vision Trail, knitting together Long Wharf, Union Station, The Hill and Downtown New Haven.

The State of Connecticut is taking measures to protect its most important regional economic asset, the New Haven Rail Yard which is the center of operations for Amtrak, Metro North and CTDOT rail operations along the Northeast corridor in Connecticut.

The raised road protection berm that we will build along the Vision Trail, Brewery Street and Church Street extended will be integrated into the protection measures being undertaken by CTDOT to protect critical facilities along the southern portion of the railyard. CTDOT is in the process of reconstructing and raising critical infrastructure, and reconstructing two of its critical rail operations buildings to protection against future 100 year storm conditions. Our work to raise local streets will tie into this (\$30 million) effort. Tying into this reconstruction project will significantly shorten the length of the berm and raised road protection required to protect the rail yard. CTDOT, in concert with Yale University, is committing \$100 thousand to a study of resilience technologies to incorporate into I-95 as we look to future impacts of climate change.

The Water Pollution Control Authority in New Haven is getting into the act as well, committing (\$70 Million) over the next five years to construct a new sanitary pump and make improvements along Union Avenue to alleviate back-ups and ensure separation of the sanitary and sewer systems, which currently are compromised during heavy rain events. A series of local initiatives are underway to advance the studies, plans and designs that will be implemented through this pilot. The City of New Haven commissioned the (\$1.2M) Hill to Downtown study to identify and conceptually design the new local street system adjacent to Union Station to support TOD development and increased stormwater detention in the chronically flooding HUD funded Church Street Village. Our pilot will advance these concepts and realize the proposed street system to promote stormwater management, increased connectivity, enhanced placemaking, economic growth and new housing opportunities. Along the waterfront, where we are proposing a living coastal protection initiative to protect the coastline, Long



Wharf Park and ultimately the Long Wharf infrastructure, including I-95, from coastal erosion, a number of iterative initiatives that support the protection are being undertaken. The City of New Haven has committed (\$160 thousand) to the reconstruction of the main coastal outfall to reduce back-up into downtown New Haven. The City has also committed (\$700 thousand) to the resilience improvements and reconstruction of Long Wharf and the boathouse property which represent pieces of the coastline.

**In Bridgeport**, where our pilot will integrate raised street and berm protection for the South End communities, multiple partners are coordinating protection measures to integrate protection into our design to achieve economies of scale in the overall protection of South End and construction an integrated protection system that encourages greater connectivity, increases natural stormwater management strategies and integrates protection into the urban fabric. PSE+G energy is committing to raising a berm to protect its critical infrastructure that will tie into the Bridgeport berm where our raised University Avenue meets our berm. The developers of 60 Main Street re in the process of designing a new 360 unit housing development will commit (\$10 Million) to raise its development to connect our protection along the eastern edge of University Avenue. The berm reconstruction is being coordinated with the UI Utility company to integrate their protection strategy with the berm reconstruction to gain economies of scale and limit potential duplication of protection. CTDOT is spending \$10 million on improvements to downtown Bridgeport station to integrate the station into the surrounding TOD. The City is utilizing FTA funds to make local street improvements surrounding the station to enhance pedestrian movement and foster economic development. DEEP is committing (\$2 Million) to establish a Micro grid at the University of Bridgeport and (\$ 2 Million) funding to develop a companion Micro Grid system in downtown Bridgeport to provide local energy sources that will operate when local power is lost to serve the community and support recovery during and after storm events. The

University facilities rest on high ground and represent an important community amenity both in times of crisis and as a not-for-profit neighbor. The berm itself will create a safe connection to downtown Bridgeport and the Bridgeport Transit hub and will serve as the extension to the Pequonnock River Trail. USDOT has committed (\$1.6 Million) in CMAQ funds to construct this waterfront trail through downtown Bridgeport. This trail can now be tied into a safe pathway connecting all the way to the waterfront parks that extends along the southern shore of the South End. In Bridgeport, multiple local efforts are underway to support the protection pilot, including the South End NRZ, a community based plan to establish community based resilience plan for South End and the City of Bridgeport Resilience rezoning guidelines to establish new design standards for building in within the City.

In all, just within the pilot communities, more than \$225 Million in direct leverage is being committed to support our pilot projects.

**Supportive Leverage.** The CT Resilience program will build upon the two initial pilot projects by supporting the implementation of resilience planning throughout the target region in the near term and across the entire state in the long-term. The regional program is supported by Statewide and regional State funding programs that will assure the implementation of resilience measures and the continuation of the program long after the effort is catalyzed by HUD NDRC funding. Central to the long-term growth of SAFR's resiliency program, are two new programs established by the General Assembly, administered by DEEP and supported by SAFR to promote new resilient technologies and practices. The Long Island Stewardship and Resiliency Program is a new program funded for (\$20 million) dedicated to the protection of costal marshes and other natural buffer areas and for grants-in-aid to increase the resiliency of wastewater treatment facilities. Grants-in-aid to municipalities to encourage low impact design of green municipal infrastructure to reduce nonpoint source pollution (\$20 million) and grants-in-aid to municipalities for open space land acquisition and development for conservation

and recreational purposes (\$8 million). Led by DOT, OPM and DECD, multiple agencies are dedicating funding to develop TOD plans and implementation projects. The State is committed to implementing TOD in its pilot communities (\$375,000), its target region, (\$925,000) and across the State.

DOT is also working with the City of Bridgeport to construct a new station and TOD. DOH is leading an effort to relocate more than 150 residents from a flood plain condition in South Bridgeport to this new TOD location (using CDBG funds). The state has dedicated \$6.7 Million to the environmental analysis and design of this new station which will become a 2<sup>nd</sup> critical economic center in Bridgeport. Promoting development oriented toward transit networks will reduce climate and air quality impacts from transportation and relieve pressure on undeveloped land. Expanding housing choice within resilience zones will expand access to regional economic opportunities and help to support economically and socially diverse communities. Providing additional housing opportunities within the community also supports long-term community resiliency and social cohesion as residents affected by flooding will have ample housing choices that allow them to stay within their own communities. Mitigating flood risks with green infrastructure and living shorelines presents numerous opportunities to improve environmental quality.

**Financing resilience.** The Applicant has consulted with CIRCA's advisory committee, Connecticut Green Bank (a public private partnership, which is approaching \$100 million in value for private financing for climate mitigation), the CDI, Munich Reinsurance America Inc., State Farm, the Housing Authority Insurance Group, and on the potential opportunities to finance the mitigation investments needed in Connecticut. These discussions on opportunities to use cost savings and other incentives to support mitigation will continue to be a priority for the State. Connecticut Green Bank has already contributed a pilot district heating loop in Bridgeport as part of a series of energy improvements that will tie into overall resilience in the Bridgeport pilot.

**Co-benefits as leverage.** Enhancing the resilience of the transportation network will result in cost savings from reduced business interruption, stabilized property values, and most importantly improved

emergency access which reduce the loss of life and property. Using TOD as a tool for economic resilience creates the potential to leverage private investment as well as public funding from the Governor's second-term priority of a "best-in-class transportation system" and funding to support smart growth. Green infrastructure can improve storm water management and reduce the investment needed to upgrade sewer infrastructure and improve water quality.

**Committed and potential leverage.** Potential sources of leverage have been identified for projects in Phase 2 which have the potential to extend the reach of this approach beyond the MID counties. This leverage totals approximately \$2.75 billion including: Connecticut DOT 2015-2019 Capital Infrastructure Program (\$1.7 billion FY 2015); State-Sponsored Housing Portfolio revitalization plan (\$300M); Clean Water Fund (\$480M 2015 with \$103M set-aside for green infrastructure and adaptation); Drinking Water State Revolving Fund (\$133.6M SFY 2014&2015); Connecticut Microgrid Grant and Loan Program (\$23.1M); Shore Up Connecticut loans (\$25M); bond funds under the State's Hazard Mitigation Buyout Assistance Program (\$4M); Bond Funds for Beach Erosion or Flood Control Project; and the Connecticut Institute for Resilience and Climate Adaptation with a seed budget of \$2.5M.

**Philanthropic Leverage.** With the support of the Tremaine Foundation, the Applicant will continue reaching out to the philanthropic community including the Fairfield County Community Foundation and the Community Foundation for Greater New Haven.

Supportive leverage for this program and pilot projects totals well in excess of \$400 million, which would exceed the 1.5 commitment of supporting leverage above direct leverage for the project.

**EXHIBIT G**

**FACTOR 5: PHASE 2 REGIONAL COORDINATION AND LONG TERM COMMITMENT**

For the State of Connecticut to move forward with its resilience mission, it must integrate its resilience program into the fabric of its capital program and embed its goals into the policies of its agencies.

SAFR is building a resilience program that will last by achieving both of these goals.

**Exhibit G.b. Legislative Action - Agency Communication and Coordination:** The inception of the State Agencies Fostering Resilience (SAFR) established within the state structure a body dedicated to thinking about the importance of resilience. This organization, which has been formed through the participation of nine State agencies, has set into motion a series of changes to ensure that Resilience in the State of Connecticut will be last lasting and transformative. The effort undertaken by SAFR as a loose connection of agencies with a shared mission has resulted in the formation of an executive letter from Governor Malloy to formalize SAFR as a State Policy Making Body. The formation of SAFR is a key element in ensuring the long-term commitment of the State's resilience mission.

The measurable outcomes of the formalization of SAFR will lead to the development of new programs that focus on resilience, the modification of existing programs to conform to the mission and vision established by SAFR and the transformation of the guidelines, capital programs and policies of the partner agencies.

**Resilience Programs.** Long-Term Commitment can be both structural, in the form of agency participation, new dedicated staff and new organizations (aka CIRCA), and programmatic, in the form of new statewide policies, new resilience programs and shifts in the approach of traditional funding towards more resilient solutions. In CT, through the efforts of SAFR, significant advancements have been made in this arena.

The Connecticut Climate Preparedness Plan, released in 2013, advanced legally-mandated efforts to prepare for climate change. The Connecticut Long-Term Recovery Committee and the Shoreline Preservation Task Force laid the foundation for two laws passed since Sandy: An Act Concerning the Permitting of Certain Coastal Structures by the Department of Energy and Environmental Protection and An Act Concerning Climate Change Adaptation and Data Collection. The first law required the consideration of sea level rise in the state's civil preparedness plan, applications to the Clean Water Fund, state and municipal plans of Conservation and Development, as well as in municipal evacuation or hazard mitigation plans, and also required the development of best practices for coastal structures. The second law led to the creation of the above mentioned Connecticut Institute for Resilience & Climate Adaptation, a UConn-DEEP partnership, which was established to support adaptation to rising sea levels.

The Long Island Sound Stewardship and Resiliency Program is a new program funded for \$20 million dedicated to the protection of coastal marshes and other natural buffer areas and for grants-in-aid to increase the resiliency of wastewater treatment facilities. A second program, also funded for \$20 million provides grants-in-aid to municipalities to encourage low impact design of green municipal infrastructure to reduce nonpoint source pollution. And a third new program will provide grants-in-aid to municipalities for open space land acquisition and development for conservation and recreational purposes. This third grant totals \$8 million, bringing a total of \$48 million in new funds to foster resiliency in our pilot communities, target region and throughout the State.

Outcomes from these programs will include the number of new resilience projects that lead to the use of green technologies in the protection of natural resources and the total number of acres of natural open space dedicated to enhancing local resilience measures.

**Exhibit G.a. Lessons Learned - Resilient TOD.** Many existing programs are being folded into SAFR's resilience mission. This can be seen in the high level of regional programs that are providing supporting leverage and the programs that are helping to implement our two resilient pilots in Bridgeport and New Haven. As noted, resilient TOD is the primary land use directive of the SAFR resilience program. TOD supports creation of new growth through energy efficient means, dedicates funds to the growth of mass transit, an energy efficient mobility strategy for the State and positions new growth in places where resilient growth can be achieved. The State, through its LetsGOCT program has established a five year capital program focused on the expansion of mass transit alternatives and the creation of economic opportunities in the places surrounding its mass transit corridors. The Northeast corridor, the economic engine of the region, is arguably the State's most important corridor. Investments in that corridor can be tied to the growth strategies for both pilot communities.

In New Haven, the protection of the New Haven rail yard and Union Station, the reconstruction of the downtown crossing to re-establish linkages between the station and downtown and the construction of new amenities at Union Station include hundreds of millions of dollars being spent in support of mass transit improvements and TOD as the local economic engine for the community. The pilot in New Haven builds off of the LetsGO CT investments being made in New Haven to build long-term economic prosperity in New Haven. The investments in New Haven will be measured in new economic development outside the flood plain, increased ridership in New Haven, new residential growth and new affordable housing starts in the Union Station district.

Bridgeport similarly is building around its downtown and reshaping its communities to connect to downtown Bridgeport and to a new station at Barnum Station. Communities that have been cut off from the downtown will be reconnected to the center, creating new economic opportunity, new residential growth and increased ridership. Investments in the new station in Barnum are being coupled



with relocations of residential properties in high risk locations to reshape land use patterns while encourage reinvestment in the City. These programs, which are connecting the priorities of multiple agencies, illustrate the new sense of integration towards meeting resilience policy fostered by the creation of SAFR.

**Lessons Learned - Resilient Corridors.** A second critical mission element of the SAFR resilience strategy is Resilient Corridors. Both pilot communities are building resilient corridors that are designed to alter the approach to development in flood plain areas in dense urban conditions where the flood plain extends deep into downtown areas. By raising corridors and not just protection the edge, a new paradigm for development is being established in both Bridgeport and New Haven. These raised streets set a new datum for future development outside the flood plain, encourage new growth in communities that otherwise would be seeing a downward cycle in investment and set the groundwork for meaningful long-term community rebuilding. These corridors will be measured in the number of raised street corridors constructed and also in the number of new developments these raised corridors foster. Additional measurable actions include the use of new technologies to recreate the urban condition and attract new investment. Multiple state programs are being scrutinized to support these corridors, from the CTDOT Complete Streets guidelines to DEEP's Green Streets program, new guidelines for how streets can be rebuilt to enhance mobility, connectivity, pedestrianization, stormwater management and increased natural elements are being considered. Local planning and investments are following suit with increased bikeway and green corridor planning and implementation that will feed these "green" corridors. For example, in Bridgeport, the CMAQ funded \*\*\*\*\* trail which was designed to extend to South End can now be incorporated into the raised street connecting South End to the downtown Bridgeport and the Amtrak station. In New Haven, plans for the historic Vision Trail can now be extended along the raised corridor in Long Wharf that will also protect the New Haven Rail Yard and

Station. The synergies between raised corridors and green street plans will result in the creation of new amenities that will enhance living conditions and attract new investment while decreasing risk.

Measurables in this category would include new lane miles of green streets developed, new linear feet of bikeway and trailway construction and new economic investment along these corridors.

**Energy corridors.** Corridors come in all shapes and sizes. An example of a critical resilient corridor can be an infrastructure corridor or an energy corridor. Energy resiliency is critical to the future economy of Connecticut. The State has developed a MicroGrid program to support the development of locally protected energy sources to support communities in times of need and reduce our reliance on the grid. The State has dedicated an additional \$15M to the Microgrid Pilot Program. Two of the initial projects will benefit Bridgeport and Fairfield, communities heavily impacted by Sandy. The Bridgeport project will help prevent critical infrastructure (City Hall, Police Headquarters, and Senior Center) from going offline during major events. The Fairfield Public Safety Microgrid project will benefit the town's emergency operation center, fire department headquarters, police station, a cell tower and the homeless shelter at Operation Hope.

**Exhibit G.b. Legislative Action – Green Infrastructure Fund Coordination.** The State of Connecticut recognizes that significant advancements are being made in local major and minor street (re)development. These improvements can be factored into both resilient TOD and resilient corridor priority strategies established in SAFR's resilience plan. In order to catalyze the development of streets that increase stormwater detention and advance multi-modal and pedestrianization goals, the state must establish new guidelines for street construction that will serve as the guidance for street reconstruction projects throughout the state to promote greater resilience. As part of the HUD NDRC effort, CTDOT and DEEP are collaborating to take the best practices of CTDOT Complete Streets guidance and

DEEP's Green Infrastructure program to PILOT new "green" street strategies in our two pilot communities that will serve as pilot implementation projects to set the bar for the development of a comprehensive "resilient street" guidelines to be produced by SAFR. The state is committed to providing \$2 million in funding from the DOT LetsGoCT budget and DEEP Green Infrastructure budget to both establish new standards and implement the Bridgeport and New Haven pilots. This partnership, established by SAFR as the first multi-agency resilient guideline initiative should establish clear criteria and specific design approaches to garner approvals and permits to construct resilient streets in the State of Connecticut.

Effective Date of Action – by Spring of 2017

Measurable Outcomes: establishment and roll-out of a new set of resilient guidelines for streets, miles of new resilient streets built on an annual basis based upon the new guidelines, and the amount of reduced stormwater runoff created from these revised street designs.

Key Milestones: (1) SAFR coordination of agency effort – development of agency priorities and timeline; (2) develop initial guidelines and select approach to innovative implementation for one street in Bridgeport and one street in New Haven.

**Exhibit G.c. Raising Standards - Improving the built environment.** One year after Sandy, the Shore Up CT program was created and supported with \$25 million in bond funds. Shore Up CT, administered by CT DOH, helps property owners located in flood zones VE or AE finance or refinance property elevations and retrofits for flood and wind proofing. Eligible properties include those not otherwise eligible for assistance programs such as second homes, commercial properties, and owner-occupied multifamily units. The program elevates all residential properties higher than the minimum

standard to the 500-year flood height +1' which adds 3' of protection on average. Shore Up Ct's goal is to complete 20 loans in the first 12 months. (NEED AN UPDATE ON STATUS) Applications correlate well with the areas hit hardest by Sandy, which demonstrates that the program is reaching target areas. As the average loan is approximately \$125,000, the initial \$25 million investment has the potential to improve around 200 homes. The program is a revolving loan fund so it can assist homeowners well into the future.

Measurable Impact: Number of homes improved.

**Easements.** In areas impacted by Irene and Sandy, some residents have chosen to relocate outside of the floodplain. In the Old Field Creek area of West Haven, floodplain easements will be acquired on 33 properties through the Natural Resources Conservation Service Emergency Watershed Protection Program. The easements will be converted to open space in perpetuity and will prevent future damages and risks to public safety and improve critical habitat. As the program continues, measurable outcomes will include the number of acres of open space in the flood plain removed from development and the number of residents and businesses that are effectively moved to high ground, preserving open space, creating new public amenities and continuing the growth of the local economy while reducing risk.

**Building codes.** Several local communities have enacted regulations providing an additional safety margin for vulnerable structures. Darien, Greenwich, Stamford, and our pilot community of New Haven all require an additional foot of freeboard for all new residential, non-residential, and manufactured homes in the VE, A, AE flood hazard zones. Stratford requires an additional foot for structures in the VE zone. Our other pilot community, Bridgeport, recently added additional amended zoning regulations to facilitate building to new elevations. These communities have set the bar for local and statewide zoning and building code standards conducive to risk avoidance. SAFR will monitor these local measures and support future rezoning and building code modifications to respond to sea

level rise. In both Bridgeport and New Haven, the raising of streets will set new datum for future development by lifting the public infrastructure that supports new development. This pilot will “open the door” for other street raising pilots to structure opportunities for development in denser communities where relocation may not be viable. A measurable outcome of these code changes and street raisings will be the total number of buildings that are taken out of the flood zone through enacting legislation and the economic value of new developments outside the flood zone.

**Floodplain management.** Connecticut's Flood Management statutes extend beyond FEMA’s requirements. All activities must comply with the requirements of CGS 25-68d(b) and Section 25-68h-1, and through 25-68h-3 of the Regulations of CT State Agencies, and this includes any projects using public funding (whether state actions or federal passed through a state agency). Any activity within the floodplain must be in compliance with the National Flood Insurance Program (NFIP). All critical facilities must be elevated 1’ above the 500-year flood elevation. Furthermore, proposals must promote long-term non-intensive floodplain uses and have utilities located to discourage floodplain development. The Connecticut Coastal Management statutes seek to ensure that coastal development protects natural resources like living shorelines, minimizes risks to life and property, and minimizes shoreline armoring.

**Exhibit G.c. Raising Standards - Commitment to Research and Planning.** SAFR member DEEP established Connecticut Institute for Resilience & Climate Adaptation (CIRCA) as a not-for-profit (UConn) arm to research future sea-level rise impact scenarios and assess how the impacts of climate change will affect the future growth of the State. In the next stage of the growth, CIRCA will expand its research to forecast SLR impacts in CT to provide necessary targets for the development of protection

measures that will be used in the designs of our pilot communities. Outcomes of this effort will be the monies saved in planning, design and construction by having clear and accepted SLR targets.

**Exhibit G.c Raising Standards** – In Bridgeport and New Haven, as part of the street raising design pilots, new design standards for buildings to meet raised roadways will be developed to enable new development to react to and work with the new development datums established in these communities.

Effective Date: Design Standards will be developed in concert with pilot projects with a projected completion by Spring of 2017.

Measurable Impacts: New residential and commercial redevelopment project realize by establishment of new development datum. New raised road projects enact in State of Connecticut to respond to SLR and new FEMA flood plain calculations.

**Exhibit G.d. Resilience Actions related to plan updates or alignments.** CIRCA will organize and implement plans in each of the nine municipalities in our target region (Fairfield and New Haven counties) to develop short-term and long-term resilience strategies tailored to each community. These plans will be informed by research undertaken by SAFR to establish clear protection targets for coastal flooding. These plans will coordinate resilience actions with new programs and existing modified programs established to support SAFR’s resilience mission, thereby coordinating the expenditures of funds to promote resilience across the region and the State. These new plans will follow upon the planning effort taken for the pilot communities, establishing a local advisory committee to shepherd the plan, identifying all “shocks” and “stresses” impacting the community and developing strategies that break down institutional silos and solve for economic, social and environmental challenges facing the

community. Coordinated through CIRCA, these plans will “network” across the region to coordinate resiliency measures between communities, build off of lessons learned from initial studies and develop actionable projects that can be implemented using the funds dedicated in the State to support resilience actions. The outcomes of this effort will be the growth of the staff of CIRCA, the number of communities that advance through the planning program and the total funds expended to plan, design and implement resilient measures in keeping with SAFR’s resilience mission.

Timeline for Implementation: Resilience plans will be developed between January of 2016 and October of 2017

Measurable Outcomes: Each municipality will be required to develop a resilience plan with specific implementation projects and local policy initiatives outlined. Measurable outcomes will include total funding dedicated to the implementation of resilience measures from State and local programs.

#### **Exhibit G.e. Resilience Actions related to financing and economic issues.**

**Measuring success.** Project-specific metrics will be developed for each program component in Phase 2. These metrics are likely to include: the increased number of affordable housing units created outside of flood zones or benefiting from mitigation measures; the increased number of housing units and amount of commercial building space built or renovated within a half mile of a rail or bus station; the increased number of property owners with access to affordable financing for mitigation measures; the increased number of towns participating in the Community Rating System; the increased capacity of green infrastructure to manage surface run-off; the reduction in the number of households with limited egress from their homes during times of flooding; and reduction in the number (or value) of properties exposed to flood risk.