CITY OF BEACON, NEW YORK
ONE MUNICIPAL PLAZA
BEACON, NY 12508

Councilmember Terry Nelson, Ward 1
Councilmember Air Rhodes, Ward 2
Councilmember George Mansfield, At Large
Councilmember Jodi M. McCredo, Ward 3
Councilmember Amber J. Grant, At Large
Councilmember Dan Aymar-Blair, Ward 4
City Administrator Anthony Ruggiero
Mayor Lee Kyriacou

April 20, 2020
7:00 PM
City Council Agenda

Call to Order

Pledge of Allegiance

Roll Call

Public Comment:

Each speaker may have one opportunity to speak up to three minutes on any subject matter other than those which are the topic of a public hearing tonight. Please sign in at the podium. This segment will last no longer than thirty minutes, with speakers recognized in the order they appear on the sign-in sheet. A second public comment opportunity will be provided later in the meeting for those who do not get to speak during this first segment.

a. Virtual Meeting Notice

Public Hearings:

- Public Hearing to Discuss a Proposed Local Law to Create Chapter 106, Article 4 of the Code of the City of Beacon Regarding NY Stretch Energy Code
- Public Hearing to Discuss a Proposed Local Law to Amend Chapter 223, Section 41.18.E(7) of the Code of the City of Beacon Regarding Building Height in the Central Main Street District
- Public Hearing to Discuss a Local Law to Amend Chapter 223, Section 61.3 of the Code of the City of Beacon Regarding Noticing Public Hearings
- Public Hearing to Discuss a Proposed Local Law to Amend Chapter 211, Article II, Section 10 and 12 and Article III, Section 15 of the Code of the City of Beacon Regarding Vehicles and Transportation

Reports:

- Council Member Terry Nelson
- Council Member Air Rhodes
- Council Member George Mansfield
- Council Member Jodi M. McCredo
- Council Member Amber J. Grant
- Council Member Dan Aymar-Blair
- City Administrator, Anthony Ruggiero
- County Legislators
- Mayor Lee Kyriacou

Local Laws and Resolutions - Consent Agenda:

1. Resolution Adopting the New York Stretch Energy Code 2020
2. Resolution Setting a Public Hearing to Discuss a Proposed Local Law to Create Section 223-26.5 and Amend Section 223-63 of the Code of the City of Beacon Regarding Short Term Rentals for May 18, 2020
3. Resolution Accepting a Sight Easement Regarding Saint Luke's Place Subdivision
4. Resolution Accepting Offer of Dedication of Portion of Union Street
5. Resolution Approving the Beacon Farmer's Market Interim Operations
6. Resolution to Extend Tow Agreement with Cervones Autobody

Local Laws and Resolutions:

2nd Opportunity for Public Comments:

Each speaker may have one opportunity to speak up to three minutes on any subject matter other than those which are the topic of a public hearing tonight. This segment will last no longer than thirty minutes. Those who spoke at the first public comment segment are not permitted to speak again.

Adjournment:

Upcoming Agenda Items:

City of Beacon Council Agenda
4/20/2020

Title:

Virtual Meeting Notice

Subject:

Background:

ATTACHMENTS:

Description	Type
Virtual Meeting Notice	Cover Memo/Letter

NOTICE OF CHANGE IN PUBLIC MEETING LOCATION

PLEASE TAKE NOTICE, that effective immediately and based upon notices and health advisories issued by Federal, State and Local officials related to the COVID-19 virus, the City Council will not hold in-person meetings. Until further notice, all future City Council meetings (including public hearings) will be held via videoconferencing, as permitted by the NYS Open Meetings Law. Due to public health and safety concerns, the public will not be permitted to attend at the remote locations where the City Council members will be situated. The public, however, will be able to fully observe the videoconference meeting and comment during regular City Council meetings (i.e for public hearings and during designated public comment periods). To the extent internet access is not available, the public can attend and comment via telephone by dialing + 1 929 205 6099 and entering the Webinar ID 924 1166 6627 and entering password 192083. The City Council's agenda is available online in advance of meetings at http://www.cityofbeacon.org/index.php/agendas-minutes/. The public can email written comments or questions for regular City Council Meetings by 5pm on the day of the meeting addressed to cityofbeacon@cityofbeacon.org. Any member of the public who has questions should contact the City Administrator in advance of the meeting at 845 838 5010 or aruggiero@cityofbeacon.org.

PLEASE TAKE FURTHER NOTICE, that any Executive Session of the Council will be initiated with the Council first convening on the public videoconferencing site, and then adopting a motion to go into Executive Session.

PLEASE TAKE FURTHER NOTICE, that the City Council Meeting of Monday, April 20, 2020 at 7:00pm can be accessed live at https://www.youtube.com/channel/UCvPpigGwZDeR7WYmw-SuDxg

City of Beacon Council Agenda
4/20/2020

Title:

Public Hearing to Discuss a Proposed Local Law to Create Chapter 106, Article 4 of the Code of the City of Beacon Regarding NY Stretch Energy Code

Subject:

Background:

ATTACHMENTS:

Description	Type
Letter from NYSERDA to Mayor Kyriacou and the City of Beacon City Council Regarding Stretch Code	Cover Memo/Letter
Proposed Local Law to Create Chapter 106 Article 4 of the Code of the City of Beacon Regarding Stretch Code	Local Law
NY Stretch Energy Code	Backup Material
NY Stretch Energy Code FAQ	Backup Material
Stringency Analysis Summary	Cover Memo/Letter
Stretch Code Commercial Cost Effectiveness Analysis	Backup Material
Stretch Code Residential Provisions Cost Effectiveness Analysis	Backup Material
Stretch Code Adoption Guide and Model Resolution Language	Backup Material
Public Hearing Notice Confirmation Poughkeepsie Journal	Backup Material

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ANDREW M. CUOMO
Governor

RICHARD L. KAUFFMAN
Chair

ALICIA BARTON
President and CEO

April 20, 2020

Mayor Lee Kyriacou
City of Beacon
One Municipal Plaza
Beacon, NY 12508

Mayor Kyriacou and Beacon City Council members:

It is my honor to provide comments to you today in support of the city of Beacon's adoption of the NYStretch Energy Code. While COVID-19 is the top challenge to our communities right now, we know that climate change is a crisis we must continue to address for the sake of future generations. New Yorkers are tough and regardless of the challenge, we can win but we must work together.

As such, NYStretch is an initiative NYSERDA is supporting statewide to help achieve reduced energy consumption and reduce greenhouse gas emissions through adoption of an advanced energy code. Working with the city of Beacon to adopt NY Stretch Energy Code is the type of partnership that is needed in order to achieve Governor Cuomo's nation-leading climate goals. NYStretch supports these goals which include an 85 percent reduction in greenhouse gas emissions by 2050 and economy-wide carbon neutrality.

NYStretch is a pivotal tool to significantly reduce energy consumption, operating costs, utility costs, and greenhouse gas emissions for years to come by ensuring buildings and homes are built beyond minimum code requirements. NYStretch is based on proven technologies and construction techniques and underwent a vigorous public stakeholder review process. The result is a cost-effective model code that can save roughly 11 percent in energy costs over minimum code requirements. In addition to saving money and energy, the adoption of NYStretch can also help boost local economies, increase property values, protect the environment and position your community at the forefront of the state's efforts to accelerate the adoption of clean renewable technologies.

For the public record, I've included the materials that NYSERDA has developed to aid in your adoption of NYStretch, namely the NYStretch Energy Code document, the Adoption Guide and Resolution Template, the Stringency Analysis Summary as well as the cost effectiveness analyses, and Frequently Asked Questions. Other tools and resources will be available in the near future to assist with code compliance, enforcement and implementation.

I commend you and the city council for leading by example in the adoption of the NYStretch Energy Code.

Sincerely,

Janet Joseph

Janet Joseph, Senior Vice President, Strategy & Market Development

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LOCAL LAW NO. ____ OF 2020

CITY COUNCIL
CITY OF BEACON

PROPOSED LOCAL LAW TO CREATE CHAPTER 106, ARTICLE IV OF THE CODE OF THE CITY OF BEACON

A LOCAL LAW to create Chapter 106, Article IV of the Code of the City of Beacon concerning the NYStretch Energy Code.

BE IT ENACTED by the City Council of the City of Beacon as follows:

Section 1. Legislative Intent

The City of Beacon City Council seeks to protect and promote the public health, safety, and welfare of its residents by mandating energy efficient building standards. On May 12, 2020, the 2020 Energy Conservation Construction Code of New York State (ECCCNYS), updated by the New York State Fire Prevention and Building Code Council, will become effective and must be complied with for residential and commercial buildings unless a more restrictive energy code is voluntarily adopted by a local jurisdiction. In 2019, the New York State Energy Research and Development Authority (NYSERDA) developed and published the NYStretch Energy Code 2020 (hereinafter referred to as NYStretch), a more energy efficient building code than the 2020 ECCCNYS. This proposed Local Law seeks to modify the City of Beacon City Code to adopt NYStretch and to enact more restrictive regulations as they relate to new or substantially renovated buildings.

Section 2. Amendment

Chapter 106, Article IV of the Code of the City of Beacon entitled "NYStretch Energy Code 2020" is hereby created as follows:

§ 106-29 **NYStretch Energy Code 2020**

Effective for all building permit applications submitted on or after October 1, 2020, the NYStretch Energy Code 2020, published by the New York State Energy Research and Development Authority (hereafter referred to as "NYStretch"), shall be applicable to all new construction and substantial renovations in the City of Beacon.

Section 3. Authority

The proposed local law is enacted pursuant to New York Energy Law §11-109(1), and Municipal Home Rule Law §10 and in accordance with the procedures detailed in Municipal Home Rule §20.

Section 4. **Ratification, Readoption and Confirmation**

Except as specifically modified by the amendments contained herein, Chapter 106 of the City of Beacon is otherwise to remain in full force and effect and is otherwise ratified, readopted and confirmed.

Section 5. **Numbering for Codification**

It is the intention of the City of Beacon and it is hereby enacted that the provisions of this Local Law shall be included in the Code of the City of Beacon; that the sections and subsections of this Local Law may be re-numbered or re-lettered by the Codifier to accomplish such intention; that the Codifier shall make no substantive changes to this Local Law; that the word "Local Law" shall be changed to "Chapter," "Section" or other appropriate word as required for codification; and that any such rearranging of the numbering and editing shall not affect the validity of this Local Law or the provisions of the Code affected thereby.

Section 6. Severability

The provisions of this Local Law are separable and if any provision, clause, sentence, subsection, word or part thereof is held illegal, invalid or unconstitutional, or inapplicable to any person or circumstance, such illegality, invalidity or unconstitutionality, or inapplicability shall not affect or impair any of the remaining provisions, clauses, sentences, subsections, words or parts of this Local Law or their petition to other persons or circumstances. It is hereby declared to be the legislative intent that this Local Law would have been adopted if such illegal, invalid or unconstitutional provision, clause, sentence, subsection, word or part had not been included therein, and if such person or circumstance to which the Local Law or part hereof is held inapplicable had been specifically exempt there from.

Section 7. **Effective Date**

This Local Law shall take effect on October 1, 2020.

NYStretch Energy Code — 2020

An Overlay of the 2018 International Energy Conservation Code and ASHRAE Standard 90.1-2016

Version 1.0 | July 2019

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

PREFACE

The NYStretch Energy Code 2020 project was undertaken by NYSERDA to develop a pivotal tool for New York jurisdictions to support the State's energy and climate goals by accelerating the savings obtained through their local building energy codes. Authorities having jurisdiction have the legal ability to voluntarily adopt NYStretch-Energy.

The NYStretch Code was developed as a statewide model code to save more energy than New York's minimum code and to be readily adopted as a more stringent local standard to the ECCCNYS. It was developed with the following goals:

- Technically sound
- Thoroughly reviewed by stakeholders
- Written in code enforceable language
- Fully consistent with the 2018 IECC, ASHRAE 90.1-2016, and uniform codes

For communities that adopt it, the NYStretch Code will provide greater savings over the ECCCNYS for both residential and commercial buildings.

Marginal Markings

Solid vertical lines in the margins of Parts 1, 2, and 3 indicate a technical change from the requirements of 2018 IECC and ASHRAE 90.1-2016. Black, right-facing arrows in the left-hand margin indicate a deletion from the requirements.

Unaffected Provisions

The chapters, sections, tables, and other provisions in the 2018 IECC and ASHRAE 90.1-2016 not amended by NYStretch Code shall continue in full force and effect. Nothing in the NYStretch Code shall be construed as deleting all or part of any unaffected provision.

Severability

If any portion of the NYStretch Energy Code 2020, the 2018 IECC or ASHRAE 90.1-2016 is held by a court of a competent jurisdiction to be illegal or void, such holding shall not affect the validity of any other portion of the NYStretch Code, the 2018 IECC or ASHRAE 90.1-2016

Implied license / Use of NYStretch

While a jurisdiction may adopt one or both of the Commercial and Residential provisions, it is NYSERDA's desire, but not a rule, that the NYStretch be adopted as written. Changes to or deletions of the provisions contained herein may affect energy savings, cost savings, and enforceability. Jurisdictions are encouraged to contact NYSERDA codes@nyserda.ny.gov before considering any changes to the NYStretch.

DISCLAIMER

Version 1 of NYStretch Energy Code-2020 (NYStretch) is an overlay of the 2018 International Energy Conservation Code (2018 IECC) and ASHRAE Standard 90.1-2016 (ASHRAE). It does not reflect changes the New York State Fire Prevention and Code Council may adopt for the 2020 New York State Energy Conservation Construction Code (2020 NYS ECCC). Visit https://www.dos.ny.gov/DCEA/CodeUpdate.html for updates on the 2020 NYS ECCC.

Furthermore this version of NYStretch does not contain changes to it that New York City may adopt for the 2020 Energy Conservation Code of New York City (2020 ECC NYC). Visit https://www1.nyc.gov/site/buildings/codes/energy-conservation-code.page for updates on the 2020 ECC NYC.

It is NYSERDA's intent to release a version of NYStretch that will overlay the 2020 NYS ECCC upon release of that code by New York State Department of State.

Stringency of NYStretch

NYSERDA recognizes that there are differentials between the requirements of the IECC and ASHRAE paths in NYStretch. It is NYSERDA's intent to create two separate inclusive code books, one for the IECC paths and another for the ASHRAE paths and find and correct the differentials between those code provisions such that they are consistent with the intent and stringency of NYStretch. Until that time, where there is a differential between the paths, the more stringent of the requirements will prevail.

Rights under NYSERDA's license agreement with International Code Council, Inc.

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ACKNOWLEDGEMENTS

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Table of Contents

PART 1

1 Amendments to 2018 International Energy Conservation Construction Code Commercial Provisions

1.1 Amendments to Section C401.2 Application

C401.2 Application. *Commercial buildings* shall comply with one of the following compliance paths:

1. ASHRAE Compliance Path (prescriptive): The requirements of ASHRAE 90.1-2016 (as amended) Section 4.2.1.1(a). The building shall also comply with the following:
    a. The *building thermal envelope* opaque assembly requirements of Section C402.1.4.

       EXCEPTION: *Semi-heated spaces* in compliance with ASHRAE 90.1-2016 (as amended) are not required to comply with Section C402.1.4.
    b. The *fenestration* requirements of Section C402.4.

       EXCEPTION: Semi-heated spaces in compliance with ASHRAE 90.1-2016 (as amended) are not required to comply with Section C402.4.3.
    c. The interior and exterior lighting power allowance requirements of Section C405.3.2 and Section C405.4.2, respectively.
    d. The requirements of Section C406 and tenant spaces shall comply with the requirements of Section C406.1.1.
    e. The requirements of Section C408 (note: in lieu of Section C408.4, the requirements of 5.9.2 prevail) and, if mandated by local ordinance, Appendix CC.
2. ASHRAE Compliance Path (Section 11): The requirements of ASHRAE 90.1-2016 (as amended) Section 4.2.1.1(b). The building shall also comply with Section C408 (note: in lieu of Section C408.4, the requirements of 5.9.2 prevail) and, if mandated by local ordinance, Appendix CC.
3. ASHRAE Compliance Path (Appendix G): The requirements of ASHRAE 90.1-2016 (as amended) 4.2.2.1(c). The building shall also comply with Section C408 (note: in lieu of Section C408.4, the requirements of 5.9.2 prevail) and, if mandated by local ordinance, Appendix CC.
4. Prescriptive Compliance Path: The requirements of Sections C402 through C406 and C408, and, if mandated by local ordinance, Appendix CC.

1.2 Amendments to Section C402.1 General (Prescriptive)

C402.1 General (Prescriptive). Building thermal envelope assemblies for buildings that are intended to comply with the code on a prescriptive basis in accordance with the compliance path described in Item 4 of Section C401.2, shall comply with the following:

1. The opaque portions of the building thermal envelope shall comply with the specific insulation requirements of Section C402.2 and the thermal requirements of the *U-, C- and F-factor*-based method of Section C402.1.4, or the component performance alternative of section C402.1.5.
2. Roof solar reflectance and thermal emittance shall comply with Section C402.3.
3. Fenestration in building envelope assemblies shall comply with Section C402.4.
4. Air leakage of building envelope assemblies shall comply with Section C402.5.

Alternatively, where buildings have a *vertical fenestration* area or skylight area exceeding that allowed in Section C402.4, the building and building thermal envelope shall comply with Section C401.2, Item 1 or Section C401.2, Item 2 or Section C401.2, Item 3.

Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C403.10.1 or C403.10.2.

1.3 Replace Section C402.1.3 Insulation Component R-Value-Based Method

C402.1.3 (Reserved for jurisdictions choosing to allow the provisions of Appendix CB)

1.4 Amendments to Table C402.1.4 Opaque Thermal Envelope Assembly Maximum Requirements: U-Factor Method

Table C402.1.4
Opaque Thermal Envelope Assembly Maximum Requirements, U-Factor Method[a,b]

CLIMATE ZONE	4		5		6	
	All other	Group R	All other	Group R	All other	Group R
Roofs						
Insulation Entirely above roof deck	U-0.030	U-0.030	U-0.030	U-0.030	U-0.029	U-0.029
Metal buildings	U-0.035	U-0.035	U-0.035	U-0.035	U-0.028	U-0.026
Attic and other	U-0.020	U-0.020	U-0.020	U-0.020	U-0.019	U-0.019
Walls, above grade						
Mass[e]	U-0.099	U-0.086	U-0.086	U-0.076	U-0.076	U-0.067
Metal building	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048
Metal framed	U-0.061	U-0.061	U-0.052	U-0.052	U-0.047	U-0.044
Wood framed and other[c]	U-0.061	U-0.061	U-0.048	U-0.048	U-0.048	U-0.046
Walls, below grade						
Below-grade wall[c]	C-0.119	C-0.092	C-0.119	C-0.092	C-0.092	C-0.063
Floors						
Mass[d]	U-0.057	U-0.051	U-0.057	U-0.051	U-0.051	U-0.051
Joist/framing	U-0.033	U-0.033	U-0.033	U-0.033	U-0.027[f]	U-0.027[f]
Slab-on-grade floors						
Unheated slabs	F-0.52	F-0.52	F-0.52	F-0.51	F-0.51	F-0.434
Heated slabs	F-0.63	F-0.63	F-0.63	F-0.63	F-0.63	F-0.63
Opaque doors						
Swinging	U-0.50	U-0.50	U-0.37	U-0.37	U-0.37	U-0.37
Garage door <14% glazing	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/m^2, 1 pound per cubic foot = 16 kg/m^3.
ci = Continuous insulation, NR = No Requirement, LS = Liner System.

a. Where assembly U-factors, C-factors, and F-factors are established in ANSI/ASHRAE/IESNA 90.1 Appendix A, such opaque assemblies shall be a compliance alternative where those values meet the criteria of this table, and provided that the construction, excluding the cladding system on walls, complies with the appropriate construction details from ANSI/ASHRAE/ISNEA 90.1 Appendix A.
b. Where U-factors have been established by testing in accordance with ASTM C1363, such opaque assemblies shall be a compliance alternative where those values meet the criteria of this table. The R-value of continuous insulation shall be permitted to be added to or subtracted from the original tested design.
c. Where heated slabs are below grade, below-grade walls shall comply with the U-factor requirements for above-grade mass walls.
d. "Mass floors" shall be in accordance with Section C402.2.3.
e. "Mass walls" shall be in accordance with Section C402.2.2.

1.5 Addition of New Section C402.1.4.2 Thermal Resistance of Mechanical Equipment Penetrations (Mandatory)

C402.1.4.2 Thermal resistance of mechanical equipment penetrations (Mandatory). When the total area of penetrations from mechanical equipment listed in Table C403.2.3(3) exceeds 1 percent of the opaque above-grade wall area, the mechanical equipment penetration area shall be calculated as a separate wall assembly with a default U-factor of 0.5.

Exception: Where mechanical equipment has been tested in accordance with testing standards approved by the authority having jurisdiction, the mechanical equipment penetration area may be calculated as a separate wall assembly with the U-factor as determined by such test.

1.6 Amendments to Section C402.2 Specific Building Thermal Envelope Insulation Requirements (Prescriptive)

C402.2 Specific building thermal envelope insulation requirements (Prescriptive). Insulation in building thermal envelope opaque assemblies shall comply with Sections C402.2.1 through C402.2.8 and Table C402.1.4.

1.7 Addition of New Section C402.2.8 Continuous Insulation (Mandatory)

C402.2.8 Continuous insulation (Mandatory). In new construction, structural elements of balconies and parapets that penetrate the *building thermal envelope*, shall comply with one of the following:

1. Structural elements penetrating the *building thermal envelope* shall be insulated with *continuous insulation* having a minimum thermal resistance of R-3.
2. Structural elements of penetrations of the *building thermal envelope* shall incorporate a minimum R-3 thermal break where the structural element penetrates the *building thermal envelope*.

1.8 Amendments to Section C402.4 Fenestration (Prescriptive)

C402.4 Fenestration (Prescriptive). Fenestration shall comply with Sections C402.4.1 through C402.4.5 and Table C402.4. Daylight responsive controls shall comply with this section and Section C405.2.3.

1.9 Amendments to Table C402.4 Building Envelope Fenestration Maximum U-Factor and SHGC Requirements

Table C402.4
Building Envelope Fenestration Maximum U-Factor and SHGC Requirements

CLIMATE ZONE	4	5	6
Vertical Fenestration			
U-Factor			
Fixed fenestration	0.36	0.36	0.34
Operable fenestration	0.43	0.43	0.41
All other vertical fenestration			
All fenestration	0.30	0.27	0.27
Entrance doors	0.77	0.77	0.77
SHGC			
PF < 0.2	0.36	0.38	0.40
0.2 ≤ PF < 0.5	0.43	0.46	0.48
PF ≥ 0.5	0.58	0.61	0.64
Skylights			
U-Factor	0.48	0.48	0.48
SHGC	0.38	0.38	0.38
PF = Projection Factor. a. U-factor and SHGC shall be rated in accordance with NFRC 100.			

1.10 Amendments to Section C402.5 Air Leakage--Thermal Envelope (Mandatory)

C402.5 Air leakage--thermal envelope (Mandatory). The *thermal envelope* of buildings shall comply with Section C402.5.9 or shall comply with Sections C402.5.1 through C402.5.8 and C408.4. New buildings not less than 25,000 square feet and not greater than 50,000 square feet, and less than or equal to 75 feet in height, shall show compliance through testing in accordance with Section C402.5.9.

1.11 Addition of New Section C402.5.9. Air Barrier Testing

C402.5.9 Air Barrier Testing. The *building thermal envelope* shall be tested in accordance with ASTM E779 at a pressure differential of 0.3 inch water gauge (75 Pa) or an equivalent method approved by the code official and shall be deemed to comply with the provisions of this section when the tested air leakage rate of the building thermal envelope is not greater than 0.40 cfm/ft^2 (2.0 L/s * m^2). Where the

compliance is based on such testing, the building shall also comply with Sections C402.5.5, C402.5.6, and C402.5.7. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the code official and the building owner.

1.12 Amendments to Section C403.7.4 Energy Recovery Ventilation Systems (Mandatory)

C403.7.4 Energy recovery ventilation systems (Mandatory). Where the supply airflow rate of a fan system exceeds the values specified in Tables C403.7.4(1) and C403.7.4(2), the system shall include an energy recovery ventilation system. The energy recovery ventilation system shall be configured to provide a change in the enthalpy of the outdoor air supply of not less than 50 percent of the difference between the outdoor air and return air enthalpies, at design conditions. Where an air economizer is required, the energy recovery ventilation system shall include a bypass or controls that permit operation of the economizer as required by Section C403.5.

Exception: An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code*.
2. Laboratory fume hood systems that include not fewer than one of the following features:
   - 2.1 Variable-air-volume hood exhaust and room supply systems configured to reduce exhaust and makeup air volume to 50 percent or less of design values.
   - 2.2 Direct makeup (auxiliary) air supply equal to or greater than 75 percent of the exhaust rate, heated not warmer than 2°F (1.1°C) above room setpoint, cooled to not cooler than 3°F (1.7°C) below room setpoint, with no humidification added, and no simultaneous heating and cooling used for dehumidification control.
3. Systems serving spaces that are heated to less than 60°F (15.5°C) and that are not cooled.
4. Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site-solar energy.
5. Heating energy recovery in Climate Zones 1 and 2.
6. Cooling energy recovery in Climate Zones 3C, 4C, 5B, 5C, 6B, 7, and 8.
7. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
8. Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design ventilation outdoor air flow rate. Multiple exhaust fans or outlets located within a 30-foot radius from the *outdoor air* supply unit shall be considered a single exhaust location.
9. Systems expected to operate less than 20 hours per week at the *outdoor air* percentage covered by Table C403.7.4(1).
10. Systems exhausting toxic, flammable, paint or corrosive fumes, or dust.
11. Commercial kitchen hoods used for collecting and removing grease vapors and smoke.

1.13 Amendments to Section C403.8.1 Allowable Fan Horsepower

C403.8.1 Allowable fan horsepower (Mandatory). Each HVAC system having a total fan system motor nameplate horsepower exceeding 5 hp (3.7 kW) at fan system design conditions shall not exceed the allowable *fan system motor nameplate hp* (Option 1) or *fan system bhp* (Option 2) shown in Table C403.8.1(1). This includes supply fans, exhaust fans, return/relief fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single-zone variable air volume systems shall comply with the constant volume fan power limitation.

Exceptions:

1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
2. Individual exhaust fans with motor nameplate horsepower of 1 hp (0.746 kW) or less are exempt from the allowable fan horsepower requirement.
3. Fans supplying air to active chilled beams.

1.14 Amendments to Table C403.8.1(1) Fan Power Limitation

Table C403.8.1(1)
Fan Power Limitation

	Limit	Constant volume	Variable volume
Option 1: Fan system motor nameplate hp	Allowable nameplate motor hp	hp $\leq$ CFM_s*0.0009	hp $\leq$ CFM_s* 0.0011
Option 2: Fan system bhp	Allowable fan system bhp	bhp $\leq$ CFM_s X 0.00088 + A	bhp $\leq$ CFM_s X 0.0010 + A

For SI: 1 bhp = 735.5 W, 1 hp = 745.5 W, 1 cfm = 0.4719 L/S
Where:
CFM_s = The maximum design supply airflow rate to conditioned spaces served by the system in cubic feet per minute.
hp = The maximum combined motor nameplate horsepower.
bhp = The maximum combined fan brake horsepower.
A = Sum of [PD X CFM_D/4131]
Where:
PD = Each applicable pressure drop adjustment from Table C403.8.1 (2) in. w.c.
CFM_D = The design airflow through each applicable device from Table C403.8.1(2) in cubic feet per minute.

1.15 Amendments to Section C405.2.1 Occupant Sensor Controls

C405.2.1 Occupant sensor controls. Occupant *sensor controls* shall be installed to control lights in the following space types:

1. Classrooms/lecture/training rooms.
2. Conference/meeting/multipurpose rooms.

3. Copy/print rooms.
4. Corridor/transition areas.
5. Dining areas.
6. Lounges/breakrooms.
7. Enclosed offices.
8. Open plan office areas.
9. Restrooms.
10. Storage rooms.
11. Locker rooms.
12. Other spaces 300 square feet (28 m^2) or less that are enclosed by floor-to-ceiling height partitions.
13. Warehouse storage areas.

1.16 Addition of New Section C405.2.1.4 Occupant Sensor Control Function for Egress Illumination

C405.2.1.4 Occupant sensor control function for egress illumination. In new buildings, luminaires serving the exit access and providing means of egress illumination required by Section 1008.1 of the *International Building Code*, including luminaires that function as both normal and emergency means of egress illumination shall be controlled by a combination of listed emergency relay and occupancy sensors, or signal from another building control system that automatically reduces the lighting power by 50 percent when unoccupied for longer than 15 minutes.

Exceptions:

1. Means of egress illumination serving the exit access that does not exceed 0.02 watts per square foot of building area is exempt from this requirement.
2. Emergency lighting designated to meet Section 1008.3 of the *International Building Code.*

1.17 Amendments to Section C405.2.3 Daylight Responsive Controls

C405.2.3 Daylight responsive controls. *Daylight-responsive controls* complying with Section C405.2.3.1 shall be provided to control the electric lights within *daylight zones* in the following spaces:

1. Spaces with a total of more than 100 watts of general lighting within sidelit zones complying with Section C405.2.3.2. General lighting does not include lighting that is required to have specific application control in accordance with Section C405.2.4.
2. Spaces with a total of more than 100 watts of general lighting within toplit zones complying with Section C405.2.3.3.

Exceptions: Daylight responsive controls are not required for the following:

1. Spaces in health care facilities where patient care is directly provided.

2. Lighting that is required to have specific application control in accordance with Section C405.2.4.
3. Sidelit zones on the first floor above grade in Group A-2 and Group M occupancies.
4. New buildings where the total connected lighting power calculated in accordance with Section C405.3.1 is not greater than the adjusted interior lighting power allowance (LPA_{adj}) calculated in accordance with Equation 4-9:

$$LPA_{adj} = [LPA_{norm} \times (1.0 - 0.4 \times UDZFA / TBFA)] \quad \textbf{(Equation 4-9)}$$

Where:

LPA_{adj} = Adjusted building interior lighting power allowance in watts.

LPA_{norm} = Normal building lighting power allowance in watts calculated in accordance with Section C405.3.2 and reduced in accordance with Section C406.3 where Option 2 of Section C406.1 is used to comply with the requirements of Section C406.

UDZFA = Uncontrolled daylight zone floor area is the sum of all sidelit and toplit zones, calculated in accordance with Sections C405.2.3.2 and C405.2.3.3, that do not have daylight responsive controls.

TBFA = Total building floor area is the sum of all floor areas included in the lighting power allowance calculation in Section C405.3.2.

1.18 Amendments to Section C405.2.3.2 Sidelit Zone

C405.2.3.2 Sidelit zone. The sidelit zone is the floor area adjacent to vertical *fenestration* that complies with all of the following:

1. Where the fenestration is located in a wall, the sidelit zone shall extend laterally to the nearest full-height wall, or up to 1.0 times the height from the floor to the top of the fenestration, and longitudinally from the edge of the fenestration to the nearest full-height wall, or up to 2 feet (610 mm), whichever is less, as indicated in Figure C405.2.3.2.
2. The area of the fenestration is not less than 24 square feet (2.23 m^2).
3. The distance from the fenestration to any building or geological formation that would block *access* to daylight is no greater than one-half of the height from the bottom of the fenestration to the top of the building or geologic formation.
4. The visible transmittance of the fenestration is not less than 0.20.

1.19 Amendments to Section C405.2.6 Exterior Lighting Controls

C405.2.6 Exterior lighting controls. Exterior lighting systems shall be provided with controls that comply with Sections C405.2.6.1 through C405.2.6.5. Decorative lighting systems shall comply with Sections C405.2.6.1, C405.2.6.2, and C405.2.6.4.

Exceptions:

1. Lighting for covered vehicle entrances and exits from buildings and parking structures where required for eye adaptation.
2. Lighting controlled from within dwelling units.

C405.2.6.1 (Daylight shutoff) is unchanged.

C405.2.6.2 (Decorative lighting shutoff) is unchanged.

C405.2.6.3 Lighting setback. Lighting not controlled in accordance with Section C405.2.6.2 shall be controlled so that the total wattage of such lighting is automatically reduced by not less than 50 percent by selectively switching off or dimming luminaires at one of the following times:

1. From not later than midnight to not earlier than 6 a.m.
2. From not later than one hour after business closing to not earlier than one hour before business opening.
3. During any time where activity has not been detected for 15 minutes or more.

C405.2.6.4 (Exterior time-switch control function) is unchanged.

1.20 Addition of New Section C405.2.6.5 Outdoor parking area lighting control

C405.2.6.5 Outdoor parking area lighting control. Outdoor parking area luminaires mounted 24' or less above the ground shall be controlled to automatically reduce the power of each luminaire by a minimum of 50 percent when no activity has been detected for at least 15 minutes. No more than 1500 W of lighting power shall be controlled together.

Exception: Outdoor parking areas with less than 1,000 watts of lighting.

1.21 Amendments to Table C405.3.2(1) Interior Lighting Power Allowances: Building Area Method

TABLE C405.3.2(1)
Interior Lighting Power Allowances: Building Area Method

BUILDING AREA TYPE	LPD (w/ft^2)
Automotive facility	0.64
Convention center	0.70
Courthouse	0.74
Dining: bar lounge/leisure	0.69
Dining: cafeteria/fast food	0.66
Dining: family	0.61
Dormitory [a, b]	0.52
Exercise center	0.65
Fire station [a]	0.50
Gymnasium	0.67
Health care clinic	0.68
Hospital [a]	0.86
Hotel/motel [a, b]	0.70
Library	0.78
Manufacturing facility	0.60
Motion picture theater	0.62
Multifamily [c]	0.49
Museum	0.68
Office	0.69
Parking garage	0.12
Penitentiary	0.67
Performing arts theater	0.85
Police station	0.68
Post office	0.62
Religious building	0.72
Retail	0.91
School/university	0.67
Sports arena	0.76
Town hall	0.72
Transportation	0.51

TABLE C405.3.2(1)

Interior Lighting Power Allowances: Building Area Method (continued)

BUILDING AREA TYPE	LPD (w/ft^2)
Warehouse	0.41
Workshop	0.83

a. Where sleeping units are excluded from lighting power calculations by application of Section R405.1, neither the area of the sleeping units nor the wattage of lighting in the sleeping units is counted.
b. Where dwelling units are excluded from lighting power calculations by application of R405.1, neither the area of the dwelling units nor the wattage of lighting in the dwelling units is counted.
c. Dwelling units are excluded. Neither the area of the dwelling units nor the wattage of lighting in the dwelling units is counted.

1.22 Amendments to Table C405.3.2(2) Interior Lighting Power Allowances: Space-By-Space Method

Table C405.3.2(2)
Interior Lighting Power Allowances: Space-by-Space Method

COMMON SPACE TYPES [a]	LPD (w/ft^2)
Atrium	
Less than 40 feet in height	0.023 per foot in total height
Greater than 40 feet in height	0.40 + 0.02 per foot in total height
Audience seating area	
In an auditorium	0.63
In a convention center	0.65
In a gymnasium	0.43
In a motion picture theater	0.64
In a penitentiary	0.28
In a performing arts theater	1.34
In a religious building	0.98
In a sports arena	0.42
Otherwise	0.40
Banking activity area	0.79
Breakroom (See Lounge/Breakroom)	
Classroom/lecture hall/training room	
In a penitentiary	1.06
Otherwise	0.74
Computer room	1.16
Conference/meeting/multipurpose room	0.93
Confinement cells	0.52
Copy/print room	0.50
Corridor	
In a facility for the visually impaired (and not used primarily by the staff) [b]	0.81
In a hospital	0.81
In a manufacturing facility	0.28
In a primary or secondary school (and not used primarily by the staff)	0.74
Otherwise	0.58
Courtroom	1.06

COMMON SPACE TYPES [a]	LPD (w/ft^2)
Dining area	
In bar/lounge or leisure dining	0.62
In cafeteria or fast food dining	0.53
In a facility for the visually impaired (and not used primarily by the staff) [b]	1.48
In family dining	0.54
In a penitentiary	0.72
Otherwise	0.53
Electrical/mechanical room	0.39
Emergency vehicle garage	0.41
Food preparation area	0.92
Guestroom [c, d]	0.75
Laboratory	
In or as a classroom	1.04
Otherwise	1.32
Laundry/washing area	0.43
Loading dock, interior	0.51
Lobby	
For an elevator	0.52
In a facility for the visually impaired (and not used primarily by the staff) [b]	2.03
In a hotel	0.68
In a motion picture theater	0.38
In a performing arts theater	0.82
Otherwise	0.9
Locker room	0.45
Lounge/breakroom	
In a healthcare facility	0.53
Otherwise	0.44
Office	
Enclosed	0.85
Open plan	0.78
Parking area, interior [i]	0.11
Pharmacy area	1.23
Restroom	
In a facility for the visually impaired (and not used primarily by the staff) [b]	0.81

COMMON SPACE TYPES [a]	LPD (w/ft^2)
Otherwise	0.75
Sales area	1.06
Seating area, general	0.38
Stairway (See space containing stairway)	
Stairwell	0.50
Storage room	0.43
Vehicular maintenance area	0.53
Workshop	1.09

BUILDING TYPE SPECIFIC SPACE TYPES [a]	LPD (w/ft^2)
Automotive (See Vehicular Maintenance Area above)	
Convention Center—exhibit space	0.69
Dormitory—living quarters [c, d]	0.46
Facility for the visually impaired [b]	
In a chapel (and not used primarily by the staff)	0.89
In a recreation room (and not used primarily by the staff)	1.53
Fire Station—sleeping quarters [c]	0.19
Gymnasium/fitness center	
In an exercise area	0.50
In a playing area	0.75
Healthcare facility	
In an exam/treatment room	1.16
In an imaging room	0.98
In a medical supply room	0.54
In a nursery	0.94
In a nurse's station	0.75
In an operating room	1.87
In a patient room [c]	0.45
In a physical therapy room	0.84
In a recovery room	0.89
Library	
In a reading area	0.77
In the stacks	1.20

BUILDING TYPE SPECIFIC SPACE TYPES [a]	LPD (w/ft^2)
Manufacturing facility	
In a detailed manufacturing area	0.86
In an equipment room	0.61
In an extra-high-bay area (greater than 50' floor-to-ceiling height)	0.73
In a high-bay area (25-50' floor-to-ceiling height)	0.58
In a low-bay area (less than 25' floor-to-ceiling height)	0.61
Museum	
In a general exhibition area	0.61
In a restoration room	0.77
Performing arts theater—dressing room	0.35
Post Office—Sorting Area	0.66
Religious buildings	
In a fellowship hall	0.54
In a worship/pulpit/choir area	0.98
Retail facilities	
In a dressing/fitting room	0.49
In a mall concourse	0.79
Sports arena—playing area	
For a Class I facility [e]	2.26
For a Class II facility [f]	1.45
For a Class III facility [g,j]	1.08
For a Class IV facility [h,j]	0.72
Transportation facility	
In a baggage/carousel area	0.40
In an airport concourse	0.31
At a terminal ticket counter	0.48
Warehouse—storage area	
For medium to bulky, palletized items	0.27
For smaller, hand-carried items	0.65

a. In cases where both a common space type and a building area specific space are listed, the building area specific space type shall apply.

b. A 'Facility for the Visually Impaired' is a facility that is licensed or will be licensed by local or state authorities for senior long-term care, adult daycare, senior support or people with special visual needs.

c. Where sleeping units are excluded from lighting power calculations by application of Section R405.1, neither the area of the sleeping units nor the wattage of lighting in the sleeping units is counted.

BUILDING TYPE SPECIFIC SPACE TYPES [a]	LPD (w/ft^2)
d. Where dwelling units are excluded from lighting power calculations by application of Section R405.1, neither the area of the dwelling units nor the wattage of lighting in the dwelling units is counted. e. Class I facilities consist of Professional facilities; and Semi-professional, Collegiate, or Club facilities with seating for 5,000 or more spectators. f. Class II facilities consist of Collegiate and Semi-professional facilities with seating for fewer than 5,000 spectators; Club facilities with seating for between 2,000 and 5,000 spectators; and Amateur League and High School facilities with seating for more than 2,000 spectators. g. Class III facilities consist of Club, Amateur League, and High School facilities with seating for 2,000 or fewer spectators. h. Class IV facilities consist of Elementary School and Recreational facilities, and Amateur League and High School facilities without provisions for spectators. i. The wattage of lighting in daylight transition zones and ramps without parking is excluded. j. Pool surfaces are excluded. Neither the surface area of the swimming or spa pool nor the wattage of the lighting serving them shall be counted.	

1.23 Amendments to Table C405.4.2(2) Lighting power allowances for building exteriors

Table C405.4.2(2)
Lighting Power Allowances for Building Exteriors

	LIGHTING ZONES			
	Zone 1	**Zone 2**	**Zone 3**	**Zone 4**
Base Site Allowance	350 W	400 W	500 W	900 W
Uncovered Parking Areas				
Parking areas and drives	0.03 W/ft^2	0.04 W/ft^2	0.05 W/ft^2	0.05 W/ft^2
Building Grounds				
Walkways and ramps less than 10 feet wide	0.5 W/linear foot	0.5 W/linear foot	0.6 W/linear foot	0.7 W/linear foot
Walkways and ramps 10 feet wide or greater, plaza areas special feature areas	0.10 W/ft^2	0.10 W/ft^2	0.11 W/ft^2	0.14 W/ft^2
Dining areas	0.65 W/ft^2	0.65 W/ft^2	0.75 W/ft^2	0.95 W/ft^2
Stairways	0.6 W/ft^2	0.7 W/ft^2	0.7 W/ft^2	0.7 W/ft^2
Pedestrian tunnels	0.12 W/ft^2	0.12 W/ft^2	0.14 W/ft^2	0.21 W/ft^2
Landscaping	0.03 W/ft^2	0.04 W/ft^2	0.04 W/ft^2	0.04 W/ft^2
Building Entrances and Exits				
Pedestrian and vehicular entrances and exits	12.6 W/linear foot of opening width	12.6 W/linear foot of opening width	20 W/linear foot of opening width	20 W/linear foot of opening width
Entry canopies	0.20 W/ft^2	0.25 W/ft^2	0.4 W/ft^2	0.4 W/ft^2
Loading docks	0.35 W/ft^2	0.35 W/ft^2	0.35 W/ft^2	0.35 W/ft^2
Sales Canopies				
Free-standing and attached	0.40 W/ft^2	0.40 W/ft^2	0.6 W/ft^2	0.7 W/ft^2
Outdoor Sales				
Open areas (including vehicle sales lots)	0.20 W/ft^2	0.20 W/ft^2	0.35 W/ft^2	0.50 W/ft^2
Street frontage for vehicle sales lots in addition to “open area” allowance	No allowance	7 W/linear foot	7 W/linear foot	21 W/linear foot

For SI: 1 foot = 304.8 mm, 1 watt per square foot = 1 W/0.0929 m^2.
W = watts

1.24 Addition of New Section C405.8.1.1 Power conversion system

C405.8.1.1 Power conversion system. New traction elevators with a rise of 75 feet or more in new buildings shall have a power conversion system that complies with Sections 405.8.1.1.1 through 405.8.1.1.3.

C405.8.1.1.1 Motor. Induction motors with a Class IE2 efficiency ratings, as defined by IEC EN 60034-30, or alternative technologies, such as permanent magnet synchronous motors that have equal or better efficiency, shall be used.

C405.8.1.1.2 Transmission. Transmissions shall not reduce the efficiency of the combined motor/transmission below that shown for the Class IE2 motor for elevators with capacities below 4,000 lbs. Gearless machines shall be assumed to have a 100 percent transmission efficiency.

C405.8.1.1.3 Drive. Potential energy released during motion shall be recovered with a regenerative drive that supplies electrical energy to the building electrical system.

1.25 Addition of New Section C405.9 Commercial Kitchen Equipment

C405.9 Commercial Kitchen Equipment. Commercial kitchen equipment shall comply with the minimum efficiency requirements of Tables C405.9(1) through table C405.9(5).

Table C405.9(1)
Minimum Efficiency Requirements: Commercial Fryers

	Heavy-Load Cooking Energy Efficiency	Idle Energy Rate	Test Procedure
Standard Open Deep-Fat Gas Fryers	≥ 50%	≤ 9,000 Btu/hr	ASTM Standard F1361-17
Standard Open Deep-Fat Electric Fryers	≥ 83%	≤ 800 watts	
Large Vat Open Deep-Fat Gas Fryers	≥ 50%	≤ 12,000 Btu/hr	ASTM Standard F2144-17
Large Vat Open Deep-Fat Electric Fryers	≥ 80%	≤ 1,100 watts	

Table C405.9(2)
Minimum Efficiency Requirements: Commercial Hot Food Holding Cabinets

Product Interior Volume (Cubic Feet)	Maximum Idle Energy Consumption Rate (Watts)	Test Procedure
0 < V < 13	≤ 21.5 V	ASTM Standard F2140-11
13 ≤ V < 28	≤ 2.0 V + 254.0	
28 ≤ V	≤ 3.8 V + 203.5	

Table C405.9(3)
Minimum Efficiency Requirements: Commercial Steam Cookers

Fuel Type	Pan Capacity	Cooking Energy Efficiency[a]	Idle Rate	Test Procedure
Electric Steam	3-pan	50%	400 watts	ASTM Standard F1484-18
	4-pan	50%	530 watts	
	5-pan	50%	670 watts	
	6-pan and larger	50%	800 watts	
Gas Steam	3-pan	38%	6,250 Btu/h	
	4-pan	38%	8,350 Btu/h	
	5-pan	38%	10,400 Btu/h	
	6-pan and larger	38%	12,500 Btu/h	

a. Cooking Energy Efficiency is based on heavy load (potato) cooking capacity

Table C405.9(4)
Minimum Efficiency Requirements: Commercial Dishwashers

Machine Type	High Temp Efficiency Requirements		Low Temp Efficiency Requirements		Test Procedure
	Idle Energy Rate[a]	Water Consumption[b]	Idle Energy Rate[a]	Water Consumption[b]	
Under Counter	≤ 0.50 kW	≤ 0.86 GPR	≤ 0.50 kW	≤ 1.19 GPR	ASTM Standard F1696-18
Stationary Single Tank Door	≤ 0.70 kW	≤ 0.89 GPR	≤ 0.60 kW	≤ 1.18 GPR	
Pot, Pan, and Utensil	≤ 1.20 kW	≤ 0.58 GPSF	≤ 1.00 kW	≤ 0.58 GPSF	
Single Tank Conveyor	≤ 1.50 kW	≤ 0.70 GPR	≤ 1.50 kW	≤ 0.79 GPR	
Multiple Tank Conveyor	≤ 2.25 kW	≤ 0.54 GPR	≤ 2.00 kW	≤ 0.54 GPR	ASTM Standard F1920-15
Single Tank Flight Type	Reported	GPH ≤ 2.975x + 55.00	Reported	GPH ≤ 2.975x + 55.00	
Multiple Tank Flight Type	Reported	GPH ≤ 4.96x + 17.00	Reported	GPH ≤ 4.96x + 17.00	

a. Idle results shall be measured with the door closed and represent the total idle energy consumed by the machine including all tank heater(s) and controls. Booster heater (internal or external) energy consumption should not be part of this measurement unless it cannot be separately monitored per US EPA Energy Star Commercial Dishwasher Specification Version 2.0.

b. GPR = gallons per rack; GPSF = gallons per square foot of rack; GPH = gallons per hour; x = sf of conveyor belt (i.e., W*L)/min (maximum conveyor speed).

Table C405.9(5)
Minimum Efficiency Requirements: Commercial Ovens

Fuel Type	Classification	Idle Rate	Cooking-Energy Efficiency, %	Test Procedure
Convection Ovens				
Gas	Full-Size	≤ 12,000 Btu/h	≥ 46	ASTM F1496 - 13
Electric	Half-Size	≤ 1.0 Btu/h	≥ 71	
	Full-Size	≤ 1.60 Btu/h		
Combination Ovens				
Gas	Steam Mode	≤ 200P[a]+6,511 Btu/h	≥ 41	ASTM F2861 - 17
	Convection Mode	≤ 150P[a]+5,425 Btu/h	≥ 56	
Electric	Steam Mode	≤ 0.133P[a]+0.6400 kW	≥ 55	
	Convection Mode	≤ 0.080P[a]+0.4989 kW	≥ 76	
Rack Ovens				
Gas	Single	≤ 25,000 Btu/h	≥ 48	ASTM F2093 - 18
	Double	≤ 30,000 Btu/h	≥ 52	

a. P = Pan Capacity: The number of steam table pans the combination oven is able to accommodate as per the ASTM F – 1495 – 05 standard specification.

1.26 Addition of New Section C405.10 Electric Vehicle Charging Station Capable

C405.10 Electric vehicle charging station capable. New parking garages and new parking lots powered by the energy services for a building, and with 10 or greater parking spaces, shall provide either:

1. Panel capacity and conduit for the future installation of minimum 208/240V 40-amp outlets for 5 percent of the total parking spaces and not less than two parking spaces; or
2. Minimum 208/240V 40-amp outlets for 5 percent of the total parking spaces and not less than two parking spaces.

1.27 Addition of New Section C405.11 Solar-Ready Zone

C405.11 Solar-ready zone (Mandatory). New *buildings* shall comply with the provisions of Appendix CA.

1.28 Addition of Section C405.12 Whole Building Energy Monitoring

C405.12 Whole building energy monitoring. Measurement devices shall be installed in new buildings to individually monitor energy use of each of the following types of energy supplied by a utility, energy provider, or plant that is not within the building:

1. Natural gas
2. Fuel oil
3. Propane
4. Steam
5. Chilled Water
6. Hot Water

Exceptions:

1. Buildings less than 25,000 square feet (2,325 m^2).
2. Group R buildings with less than 10,000 square feet of common area (930 m^2).
3. Fuel use for on-site emergency equipment.

1.29 Addition of Section C405.13 Whole Building Electrical Monitoring

C405.13 Whole building electrical monitoring. Each new building shall have a measurement device capable of recording electrical energy use every 60 minutes and the capability to report use on an hourly, daily, monthly, and annual basis. The measurement device shall be capable of retaining the recorded data for 36 months.

Exceptions:

1. Buildings less than 25,000 square feet (2,325 m^2).
2. *Group R* buildings with less than 10,000 square feet of common area (930 m^2).
3. Fuel use for on-site emergency equipment.

1.30 Replacement of Section C406.1 Requirements

C406.1 Requirements. Buildings shall comply with at least one of the following Sections.

1. More efficient HVAC equipment in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced digital lighting controls in accordance with Section C406.4.
4. Dedicated outdoor air systems with energy recovery ventilation in accordance with Section C406.5.
5. Enhanced envelope performance in accordance with Section C406.6.
6. Reduced air infiltration in accordance with Section C406.7.

1.31 Amendment to Section C406.1.1 Tenant Spaces

C406.1.1. Tenant spaces. Tenant spaces shall comply with Section C406.2, C406.3, C406.4 or C406.7. Alternatively, tenant spaces shall be in compliance with Section C406.5 or C406.6 where the entire building is in compliance.

Exception: Previously occupied tenant spaces that comply with this code using Section C501.

1.32 Replacement and Renaming of Section C406.5 On-Site Renewable Energy

C406.5 Dedicated outdoor air system. Buildings containing equipment or systems regulated by Section C403.3.4, C403.4.3, C403.4.4, C403.4.5, C403.6, C403.8.4, C403.8.5, C403.8.5.1, C403.9.1, C403.9.2, C403.9.3 or C403.9.4 shall be equipped with an independent ventilation system designed to provide not less than the minimum 100-percent outdoor air to each individual occupied space, as specified by the International Mechanical Code. The ventilation system shall be equipped with an energy recovery system meeting the requirements of Section C403.7.4, without exception (Note: C406.5 cannot be selected where ERV is prohibited by the *International Mechanical Code* or otherwise prohibited.) The HVAC system shall include supply-air temperature controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperatures. The controls shall reset the supply-air temperature not less than 25 percent of the difference between the design supply-air temperature and the design room-air temperature.

1.33 Replacement and Renaming of Section C406.6 Dedicated Outdoor Air System

C406.6 Enhanced envelope performance. The thermal performance of the envelope shall demonstrate a 15 percent improvement compared to the requirements of Section C402.1.5.

1.34 Replacement and Renaming of Section C406.7 Reduced Energy Use in Service Water Heating

C406.7 Reduced air infiltration. Air infiltration shall be verified by whole building pressurization testing conducted in accordance with Section C402.5.9. The measured air leakage rate of the building envelope shall not exceed 0.25 cfm/ft^2 (2.0 L/s x m^2) under a pressure differential of 0.3 in. water (75 Pa), with the calculated surface area being the sum of the above and below grade building envelope. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the code official and the building owner.

Exception: For buildings with more than 250,000 square feet (25 000 m^2) of conditioned floor area, air leakage testing need not be conducted on the whole building where testing is conducted on representative above-grade sections of the building. Tested areas shall total not less than 25 percent of the conditioned floor area and shall be tested in accordance with this section.

1.35 Replacement of Section C407 Total Building Performance

Section C407
Total Building Performance

C407.1 Scope. This section establishes criteria for compliance using total building performance. Buildings following the total building performance path must comply with ASHRAE 90.1-2016 (as amended), demonstrating compliance under Section 11 or Appendix G of such standard.

1.36 Amendments to Section C408.2 Mechanical Systems and Service Water-Heating Systems Commissioning and Completion Requirements

C408.2 Mechanical, renewable energy, and service water heating systems commissioning and completion requirements. This section is required when one of the following conditions is met:

1. The *building* is not less than 25,000 square feet (2,325 m^2).
2. The total mechanical equipment capacity being installed is greater than 480,000 Btu/h (140.7 kW) cooling capacity.
3. The combined *service water-heating* and space-heating capacity is greater than 600,000 Btu/h (175.8 kW).

Prior to passing the final mechanical and plumbing inspections, the *registered design professional or approved agency* shall provide evidence of systems *commissioning* and completion in accordance with the provisions of this section.

Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner or owner's authorized agent and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

Mechanical systems, renewable energy, and *service water heating* systems shall include, at a minimum, the following systems (mechanical and/or passive) and associated controls:

1. Heating, cooling, air handling and distribution, ventilation, and exhaust systems, and their related air quality monitoring systems.
2. Air, water, and other energy recovery systems.
3. Manual or automatic controls, whether local or remote, on energy using systems including but not limited to temperature controls, setback sequences, and occupancy-based control, including energy management functions of the building management system.
4. Plumbing, including insulation of piping and associated valves, domestic and process water pumping, and mixing systems.
5. Mechanical heating systems and service water heating systems.
6. Refrigeration systems.

7. Renewable energy and energy storage systems where installed generating capacity is not less than 25kW.
8. Other systems, equipment and components that are used for heating, cooling or ventilation, and affect energy use.

C408.2.1 Commissioning Plan is unchanged.

1.37 Amendments to Section C408.2.2 Systems Adjusting and Balancing

C408.2.2 Systems adjusting and balancing. HVAC systems shall be balanced in accordance with ANSI/ASHRAE 111, "Testing, Adjusting, and Balancing of Building HVAC Systems" or other approved engineering standards.

C408.2.2.1 Air systems balancing is unchanged.

C408.2.2.2 Hydronic systems balancing is unchanged.

1.38 Addition of New Section C408.4 Air Barrier Commissioning

C408.4 Air barrier commissioning. Prior to passing final inspection, the registered design professional or approved agent shall provide evidence of air barrier commissioning and substantial completion in accordance with the provisions of sections C408.4.1 through C408.4.3.

C408.4.1 Documentation. Construction documents shall include documentation of the continuous air barrier components included in the design and a field inspection checklist that includes all requirements necessary for maintaining air barrier continuity and durability in accordance with Section C402.5.1.

C408.4.2 Field inspections. Reports from field inspections during project construction showing compliance with continuous air barrier requirements including proper material handling and storage, use of approved materials and material substitutes, proper material and surface preparation, and air barrier continuity shall be provided to the owner and, upon request, to the code official. Air barrier continuity shall be determined by testing or inspecting each type of unique air barrier joint or seam in the building envelope for continuity and defects.

C408.4.3 Report. A final commissioning report indicating compliance with the continuous air barrier requirements shall be provided to the building owner and, upon request, to the code official**.**

1.39 Addition of New Section C502.2.3.1 Commissioning

C502.2.3.1 Commissioning. New heating, cooling, and duct system components that are part of the addition and the controls that serve them shall comply with Sections C408.2.2, C408.2.3 and C408.2.5.

Exception: Mechanical systems in additions where the total mechanical equipment capacity of the building is less than 480,000 Btu/h (140.7 kW) cooling capacity and 600,000 Btu/h (175.8 kW) combined service water heating and space heating capacity.

1.40 Addition of New Section C502.2.4.1 Commissioning

C502.2.4.1 Commissioning. New service hot water system components that are part of the addition and the controls that serve them shall comply with Sections C408.2.2, C408.2.3, and C408.2.5.

Exception: Service hot water systems in additions where the combined service water heating and space heating capacity of the building is less than 600,000 Btu/h (175.8 kW).

1.41 Addition of New Section C502.3 Air Barriers

C502.3 Air barriers. The thermal envelope of additions shall comply with Sections C402.5.1 through C402.5.8.

1.42 Addition of New Section C503.3.4 Air Barriers

C503.3.4 Air barriers. The thermal envelope of alterations shall comply with Sections C402.5.1 through C402.5.8.

1.43 Addition of New Section C503.4.2 Commissioning

C503.4.2 Commissioning. New heating, cooling and duct system components that are part of the alteration and the controls that serve them shall comply with Sections C408.2.2, C408.2.3, and C408.2.5.

Exceptions: Mechanical systems in alterations where the total mechanical equipment capacity of the building is less than 480,000 Btu/h (140.7 kW) cooling capacity and 600,000 Btu/h (175.8 kW) combined service water heating and space heating capacity.

1.44 Addition of New Section C503.5.1 Commissioning

C503.5.1 Commissioning. New service hot water system components that are part of the alteration and the controls that serve them shall comply with Sections C408.2.2, C408.2.3, and C408.2.5.

> **Exception:** Service hot water systems in alterations where the combined service water heating and space heating capacity of the building is less than 600,000 Btu/h (175.8 kW).

1.45 Addition of New Appendix CB
Rated R-value of Insulation—Commercial

Appendix CB
Rated *R*-Value of Insulation – Commercial

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

Section CB101
Scope

CB101.1 General. These provisions shall be applicable for new construction where an Insulation R-value based method is required.

Section CB102
Insulation Component *R*-Value-Based Method

CB102.1 General. The opaque portions of the building thermal envelope shall comply with the specific insulation requirements of Section C402.2 and the thermal requirements of the R-value-based method of Section CB102.2.

CB102.2 Insulation component *R*-value-based method. *Building thermal envelope* opaque assemblies shall comply with the requirements of Sections C402.2 and C402.4 based on the *climate zone* specified in Chapter 3. For opaque portions of the *building thermal envelope* intended to comply on an insulation component *R-value* basis, the *R*-values for insulation shall be not less than that specified in Table CB102.2. Commercial buildings or portions of commercial buildings enclosing *Group R* occupancies shall use the R values from the "*Group R*" column of Table CB102.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than *Group R* shall use the *R*-values from the "All other" column of Table CB102.2.

Table CB102.2

Opaque Thermal Envelope Insulation Component Minimum Requirements, R-Value Method[a, h]

CLIMATE ZONE	4 EXCEPT MARINE		5 AND MARINE 4		6	
	All other	Group R	All other	Group R	All other	Group R
Roofs						
Insulation Entirely above roof deck	R-33ci	R-33ci	R-33ci	R-33ci	R-33ci	R-33ci
Metal buildings[b]	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS
Attic and other	R-53	R-53	R-53	R-53	R-53	R-53
Walls, above grade						
Mass[f]	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci
Metal building	R-13 + R-13ci	R-13+ R-19.5ci	R-13+ R-19.5ci	R-13+ R-19.5ci	R-13+ R-19.5ci	R-13+ R-19.5ci

Metal framed	R-13 + R-8.5ci	R-13 + R-8.5ci	R-13 + R-11ci	R-13 + R-11ci	R-13+ R13.5ci	R-13+ R14.5ci
Wood framed and other	R-13 + R-4.5ci or R-19 + R-1.5ci	R-13 + R-4.5ci or R-19 + R-1.5ci	R-13 + R-9ci or R-19 + R-5ci	R-13 + R-9ci or R-19 + R-5ci	R-13 + R-9ci or R-19 + R-5ci	R-13 + R-9.5ci or R-19 + R-6ci
Walls, below grade						
Below-grade wall[c]	R-7.5ci	R-10ci	R-7.5ci	R-10ci	R-10ci	R-15ci
Floors						
Mass[d]	R-15ci	R-16.7ci	R-15ci	R-16.7ci	R-16.7ci	R-16.7ci
Joist/framing	R-30	R-30[e]	R-30[e]	R-30[e]	R-38	R-38
Slab-on-grade floors						
Unheated slabs	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below
Heated slabs[g]	R-20 for 48" below + R-5 full slab	R-20 for 48" below + R-5 full slab	R-20 for 48" below + R-5 full slab	R-20 for 48" below + R-5 full slab	R-20 for 48" below + R-5 full slab	R-20 for 48" below + R-5 full slab
Opaque doors						
Non-Swinging	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/ m^2, 1 pound per cubic foot = 16 kg/m^3.
ci = Continuous insulation, NR = No Requirement, LS = Liner System.

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.

b. Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the U-factor compliance method in Table C402.1.4.

c. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.

d. "Mass floors" shall be in accordance with Section C402.2.3.

e. Steel floor joist systems shall be insulated to R-38.

f. "Mass walls" shall be in accordance with Section C402.2.2.

g. The first value is for perimeter insulation and the second value is for slab insulation. Perimeter insulation is not required to extend below the bottom of the slab.

h. Not applicable to garage doors. See Table C402.1.4.

1.46 Addition of New Appendix CC
Additional Power Distribution System Packages—Commercial

Appendix CC
Additional power distribution system packages – Commercial

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

Section CC101
Scope

CC101.1 General. These provisions shall be applicable for new construction where additional power distribution system packages are required.

Section CC102
Additional Power Distribution System Packages

CC102.1 General (Mandatory). New buildings shall comply with at least one of the following:

1. Additional *on-site renewable energy* in accordance with Section CC102.2.
2. Electrical energy monitoring in accordance with Section CC102.3.
3. Interoperable automated demand-response (AutoDR) infrastructure in accordance with Section CC102.4.
4. Electric vehicle charging stations in accordance with Section CC102.5.
5. Automatic receptacle controls in accordance with CC102.6.

CC102.2 On-site renewable energy. The total minimum rating of *on-site renewable energy* systems shall be one of the following:

1. Not less than 1.71 Btu/hr/ft^2 (5.4 w/m^2) or 0.50 w/ft^2 of conditioned floor area.
2. Not less than 3 percent of energy use within the building for mechanical, service hot water heating, and lighting regulated in Chapter 4 [CE].

CC102.3 Electrical energy monitoring. Buildings shall comply with Sections CC102.3.1 through CC102.3.4. Buildings shall be equipped to measure, monitor, record, and report electricity consumption data for each end-use category listed in Table CC102.3.1. For buildings with tenants, the end-uses in Table CC102.3.1 shall be separately monitored for the total building load and (excluding shared systems) for each individual tenant.

Exception:

1. Up to 10 percent of the load for each of the end uses shall be allowed to be from other electrical loads.
2. Individual tenant spaces that have their own utility services and meters and have less than 5,000 square feet (465 m^2) of conditioned floor area.

CC102.3.1 End-use metering categories. Meters or other approved measurement devices shall be provided to collect energy use data for each end-use category specified in Table CC102.3.1. These meters shall have the capability to collect energy consumption data for the whole building or for each separately metered portion of the building. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all the energy used by that category. Not more than 5 percent of the measured load for each end-use category specified in Table CC102.3.1 shall be from a load not within that category.

TABLE CC102.3.1
ENERGY USE CATEGORIES

LOAD CATEGORY
HVAC systems
Interior lighting
Exterior lighting
Receptacle circuits
Total electrical energy

CC102.3.2 Meters. Meters and other measurement devices required by this Section shall be configured to automatically communicate energy consumption data to the data acquisition system required by Section CC102.3.3. Source meters shall be any digital-type meter. Lighting, HVAC, and other building systems that can monitor their energy consumption shall not require meters. Current sensors are an alternative to meters, provided they have a tested accuracy of +/-2 percent. Required metering systems and equipment shall be able to provide not less than hourly data that is fully integrated into the data acquisition system and produce a graphical energy report in accordance with Sections CC102.3.3 and CC102.3.4.

CC102.3.3 Data acquisition systems. A data acquisition system shall have the capability to store data from the required meters and other sensing devices for not less than 36 months. The data acquisition system shall be able to store real-time energy consumption data and provide hourly, daily, monthly, and yearly logged data for each end-use category required by Table CC102.3.1.

CC102.3.4 Graphical energy report. A permanent reporting mechanism shall be provided in the building that can be accessed by building operation and management personnel. The reporting mechanism shall be able to graphically provide the energy consumption data for each end-use category required by Table CC102.3.1 for not less than every hour, day, month and year for the previous 36 months.

CC102.4 Interoperable automated demand-response (AutoDR) infrastructure. The building controls shall be designed with automated demand-response (Auto-DR) infrastructure capable of receiving demand-response requests from the utility, electrical system operator, or third-party DR program provider, and of automatically implementing load adjustments to the HVAC and lighting systems.

Buildings shall comply with the following:

1. HVAC systems shall be programmed to allow automatic centralized demand reduction in response to a signal from a centralized contact or software point.
2. HVAC equipment with variable speed control shall be programmed to allow automatic adjustment of the maximum speed of the equipment.
3. Lighting systems with central control shall be programmed to allow automatic reduction of total connected lighting power.

CC102.5 Electric vehicle charging stations. Not less than two electric vehicle charging stations at minimum 208/240V 40 amp shall be provided on the *building site*.

CC102.6 Automatic receptacle controls. The following receptacles shall be automatically controlled in accordance with Section CC102.6.1:

1. At least 50 percent of all 125 V, 15- and 20-amp receptacles in all private offices, conference rooms, rooms used primarily for printing and/or copying functions, break rooms, classrooms, and individual workstations.
2. At least 25 percent of branch circuit feeders installed for modular furniture not shown on the construction documents.

All controlled receptacles shall be permanently marked to visually differentiate them from uncontrolled receptacles and are to be uniformly distributed throughout the space. Plug-in devices shall not be used to comply with Section CC102.6.1.

Exceptions:

1. Receptacles specifically designated for equipment intended for continuous operation (24 hours/day, 365 days/year).
2. Spaces where an automatic shutoff would endanger occupant safety or security.

CC102.6.1 Automatic receptacle control function. Automatic receptacle controls shall comply with one of the following:

1. Automatically turn receptacles off at specific programmed times, and the occupant shall be able to manually override the control device for up to two hours. An independent program schedule shall be provided for controlled areas of not more than 5000 square feet and not more than one floor.
2. Be an occupant sensor to automatically turn receptacles off within 20 minutes of all occupants leaving a space.
3. Be an automated signal from another control or alarm system to automatically turn receptacles off within 20 minutes of all occupants leaving a space.

PART 2

2 Amendments to ASHRAE 90.1-2016

2.1 Addition to Section 3.2 Definitions

Baseline building source energy: the annual *source energy* use in units of BTU for a *building* design intended for use as a baseline for rating above-standard design or when using the *performance rating method* as an alternative path for minimum standard compliance in accordance with Section 4.2.1.1.

***On-site electricity generation systems*:** systems located at the *building* site that generate electricity, including but not limited to generators, combined heat and power systems, fuel cells, and *on-site renewable energy* systems.

Proposed building source energy: the annual *source energy* use in units of BTU for a *proposed design*.

Site Energy: The amount of fuel that is consumed on-site to operate a building.

Source Energy: the total amount of primary fuel that is required to operate a building incorporating transmission, delivery, and production losses. Source Energy is calculated by multiplying site energy of each fuel type by the conversion factors in Table 4.2.1.2.

2.2 Amendments to Section 4.2.1.1 New Buildings

4.2.1.1 New Buildings

New *buildings* shall comply with either the provisions of

a. Section 5, "*Building Envelope*"; Section 6, "Heating, Ventilating, and Air Conditioning"; Section 7, "*Service Water Heating*"; Section 8, "Power"; Section 9, "Lighting"; and Section 10, "*Other Equipment*," or
b. Section 11, "*Energy Cost Budget* Method,", or
c. Appendix G, "*Performance Rating Method*", using <u>one</u> of the following methods:

1. Performance Cost Index Method. When using Appendix G, the Performance Cost Index (PCI) shall be less than or equal to the Performance Cost Index Target (PCIt) when calculated in accordance with the following:

$$PCI_t = [BBUEC + (BPF_{cost} \times BBREC)]/BBP$$

Where

PCI = Performance Cost Index calculated in accordance with Section G1.2.

BBUEC = Baseline *Building* Unregulated *Energy* Cost, the portion of the annual *energy*

cost of a *Baseline building design* that is due to *unregulated energy use*.

BBREC = Baseline *Building* Regulated *Energy* Cost, the portion of the annual *energy* cost of a *Baseline building design* that is due to *regulated energy use*.

BPF_{cost} = *Building* Performance Factor from Table 4.2.1.1. For *building* area types not listed in Table 4.2.1.1 use "All others." Where a *building* has multiple *building* area types, the required BPF_{cost} shall be equal to the area-weighted average of the *building* area types.

BBP = *Baseline Building Performance*.

Regulated *energy* cost shall be calculated by multiplying the total *energy* cost by the ratio of *regulated energy* use to total *energy* use for each *fuel* type. Unregulated *energy* cost shall be calculated by subtracting regulated *energy* cost from total *energy* cost.

2. **Performance Source Energy Index Method.** When using Appendix G, the Performance *Source Energy* Index (PSEI) shall be less than or equal to the Performance Source Energy Index Target (PSEIt) when calculated in accordance with the following:

$$PSEIt = [BBUSE + (BPF_{source} \times BBRSE)]/BBSE$$

Where

PSEI = Performance Source Energy Index calculated in accordance with Section G1.2

BBUSE = Baseline building unregulated source energy use in units of BTU, the portion of the annual site energy of a baseline building design that is due to unregulated energy use multiplied by the site to source conversion ratios in Table 4.2.1.2 for each fuel type.

BBRSE = Baseline building regulated source energy use in units of BTU, the portion of the annual site energy of a baseline building design that is due to regulated energy use multiplied by the site to source conversion ratios in Table 4.2.1.2 for each fuel type.

BPF_{source} = Building Performance Factor from Table 4.2.1.3. For building area types not listed in Table 4.2.1.3 use "All others." Where a building has multiple building area types, the required BPF_{source} shall be equal to the area-weighted average of the building area types.

BBSE = *Baseline building source energy.*

2.3 Replacement of Table 4.2.1.1 *Building* Performance Factor

Table 4.2.1.1 *Building* Performance Factor (Cost) (BPF_{cost})

Building Area Type	4A	5A	6A
Office	.54	.54	.55
Retail	.45	.42	.44
School	.45	.46	.46
Hotel/motel	.62	.56	.56
Multifamily	.67	.67	.64
Healthcare/hospital	.54	.54	.51
Restaurant	.56	.55	.55
Warehouse	.42	.42	.46
All others	.53	.52	.52

2.4 Addition of Table 4.2.1.2 Site to Source Energy Conversion Ratios

Table 4.2.1.2 Site to Source Energy Conversion Ratios

Energy Type	New York Ratio
Electricity (Grid Purchase)	2.55
Electricity (*On-site Renewable Energy* Installation)	1.00
Natural Gas	1.05
Fuel Oil	1.01
Propane & Liquid Propane	1.01
Steam	1.20
Hot Water	1.20
Chilled Water, Coal, Wood, Other	1.00

2.5 Addition of Table 4.2.1.3 Building Performance Factor (Source) (BPF_{source})

Table 4.2.1.3 Building Performance Factor (BPF_{source})

Building Area Type	4A	5A	6A
Office	.55	.55	.56
Retail	.45	.42	.43
School	.45	.45	.45
Hotel/motel	.62	.56	.54
Multifamily	.68	.68	.65
Healthcare/hospital	.56	.56	.54
Restaurant	.63	.64	.63
Warehouse	.44	.46	.49
All others	.55	.54	.54

2.6 Addition of New Section 5.2.3 Additional Requirements to Comply with Section 11 and Appendix G

5.2.3 Additional Requirements to Comply with Section 11 and Appendix G

The *building* envelope in new buildings 50,000 square feet and greater shall comply with either:

1. Section 5.5, "Prescriptive Building Envelope Option," or
2. An envelope performance factor shall be calculated in accordance with 90.1 Appendix C, and buildings shall comply with one of the following:

   i. For multifamily, hotel/motel and dormitory building area types, the margin by which the *proposed envelope performance factor* exceeds the *base envelope performance factor* shall not be greater than 15 percent. For compliance with this requirement, the *base envelope performance factor* shall be calculated using metal framing operable windows. In *buildings* with window area accounting for 40 percent or more of the *gross wall* area, the SHGC of the *vertical fenestration* on east and west oriented façade may be reduced by the following multiplier to account for the permanent site shading from existing buildings or infrastructure.

   $M_{West} = 0.18 + 0.33/WWR$

   $M_{East} = 0.35 + 0.26/WWR$

   Where:

   M_{West} = SHGC multiplier for the West façade

   M_{East} = SHGC multiplier for the East façade

   WWR = the ratio of the proposed *vertical fenestration* area to the *gross wall* area in consistent units.

   The multiplier may be applied to the rated SHGC of the *vertical fenestration* which has at least 50 percent of the area located directly opposite of the shading surfaces and no higher from the street level than the difference between the shading surface height and the shading surface distance from the façade. *Orientation* must be determined following Section 5.5.4.5, Fenestration Orientation.

   ii. For all other *building* area types, the margin by which the proposed *envelope performance factor* exceeds the *base envelope performance factor* shall be not greater than 7 percent. For compliance with this requirement, the *base envelope performance factor* shall be calculated using metal framing fixed windows.

   iii. For mixed-use *buildings* the margin shall be calculated as the *gross wall area*-weighted average of i and ii.

2.7 Addition of New Section 5.4.1.1 Continuous Insulation

5.4.1.1 Continuous Insulation

In new construction, structural elements of balconies and parapets that penetrate the *building envelope*, shall comply with one of the following:

1. Structural elements penetrating the *building* thermal *envelope* shall be insulated with *continuous insulation* having a minimum thermal resistance of R-3.
2. Structural elements of penetrations of the *building* thermal *envelope* shall incorporate a minimum R-3 thermal break where the structural element penetrates the *building* thermal *envelope*.

2.8 Amendments to Section 5.4.3.1.3 Testing, Acceptable Materials, and Assemblies

5.4.3.1.3 Testing, Acceptable Materials, and Assemblies

The *building* shall comply with whole-*building* pressurization testing in accordance with Section 5.4.3.1.3(a) or with the *continuous air barrier* requirements in Section 5.4.3.1.3(b) or 5.4.3.1.3(c). New *buildings* not less than 25,000 square feet and not greater than 50,000 square feet, and less than or equal to 75 feet in height, must show compliance through testing in accordance with Section 5.4.3.1.3(a).

The remainder of 5.4.3.1.3 is unchanged.

2.9 Amendments to Section 5.5.3 Opaque Areas

5.5.3 Opaque Areas.

For all *opaque* surfaces except *doors*, compliance shall be demonstrated by one of the following two methods:

a. Minimum rated *R-value* of insulation for the *thermal resistance* of the added insulation in framing cavities and *continuous insulation* only. Specifications listed in Normative Appendix A for each *class of construction* shall be used to determine compliance.
b. Maximum *U-factor, C-factor, or F-factor* for the entire assembly. The values for typical *construction* assemblies listed in Normative Appendix A shall be used to determine compliance.

Exceptions to 5.5.3

1. For assemblies significantly different than those in Appendix A, calculations shall be performed in accordance with the procedures required in Appendix A.

2. For multiple assemblies within a single *class of construction* for a single *space-conditioning category*, compliance shall be shown for either (a) the most restrictive requirement or (b) an area-weighted average *U-factor, C-factor, or F-factor*.
3. When the total area of penetrations from mechanical equipment listed in Table 6.8.1-4 exceeds 1 percent of the *opaque above-grade wall* area, the mechanical equipment penetration area shall be calculated as a separate wall assembly with a default *U-factor* of 0.5, and compliance shall be shown with method b. Where mechanical equipment has been tested in accordance with testing standards, approved by the *authority having jurisdiction*, the mechanical equipment penetration area may be calculated as a separate wall assembly with the *U-factor* as determined by such test.

2.10 Amendments to Section 5.6.1.1 Subsection to 5.6 Building Envelope Trade-Off Option

5.6.1.1

All components of the *building envelope* shown on architectural drawings or installed in *existing buildings* shall be modeled in the *proposed design*. The *simulation program* model *fenestration* and *opaque building* envelope types and area shall be consistent with the *construction documents*. Any *building envelope* assembly that covers less than 5 percent of the total area of that assembly type (e.g., *exterior walls*) need not be separately described, provided it is similar to an assembly being modeled. If not separately described, the area of a *building envelope* assembly shall be added to the area of an assembly of that same type with the same *orientation* and thermal properties. When the total area of penetrations from mechanical equipment listed in Table 6.8.1-4 exceeds 1 percent of the *opaque above-grade wall* area, the mechanical equipment penetration area shall be calculated as a separate wall assembly with a default *U-factor* of 0.5.

Exception to 5.6.1.1

Where mechanical equipment has been tested in accordance with testing standards approved by the *authority having jurisdiction*, the mechanical equipment penetration area may be calculated as a separate wall assembly with the *U-factor* as determined by such test.

2.11 Amendments to Section 6.5.3.1.1 Allowable Fan Horsepower

6.5.3.1.1 Allowable Fan Horsepower**.**

Each *HVAC system* having a total *fan system motor nameplate horsepower* exceeding 5 hp at *fan system design conditions* shall not exceed the allowable *fan system motor nameplate horsepower* (Option 1) or fan *system* bhp (Option 2) as shown in Table 6.5.3.1-1. This includes supply fans, return/relief fans, exhaust fans, and fan-powered *terminal* units associated with *systems* providing heating or cooling capability that operate at *fan system design conditions*. Single-zone *VAV systems* shall comply with the constant-volume fan power limitation.

Exceptions to 6.5.3.1.1

1. Hospital, vivarium, and laboratory *systems* that use flow *control devices* on exhaust and/or return to maintain *space* pressure relationships necessary for occupant health and safety or environmental *control* may use variable-volume fan power limitation.
2. Individual exhaust fans with motor *nameplate horsepower* of 1 hp or less.
3. Fans supplying air to active chilled beams.

2.12 Amendments to Table 6.5.3.1-1 Fan Power Limitation

Table 6.5.3.1-1 Fan Power Limitation

	Limit	Constant volume	Variable volume
Option 1: Fan system motor nameplate hp	Allowable nameplate motor hp	hp $\leq$ CFM_S*0.0009	hp $\leq$ CFM_S* 0.0011
Option 2: Fan system bhp	Allowable fan system bhp	bhp $\leq$ CFM_S X 0.00088 + A	bhp $\leq$ CFM_S X 0.0010 + A

For SI: 1 bhp = 735.5 W, 1 hp = 745.5 W, 1 cfm = 0.4719 L/S

Where:

CFM_S = The maximum design supply airflow rate to conditioned spaces served by the system in cubic feet per minute.

hp = The maximum combined motor nameplate horsepower.

Bhp = The maximum combined fan brake horsepower.

A = Sum of [PD X CFM_D/4131]

Where:

PD = Each applicable pressure drop adjustment from Table 6.5.3.1-2 in in. of water

CFM_D = The design airflow through each applicable device from Table 6.5.3.1-2 in cubic feet per minute.

2.13 Amendments to Section 6.5.6.1 Exhaust Air Energy Recovery

6.5.6.1 Exhaust Air Energy Recovery.

Each fan *system* shall have an *energy* recovery *system* when the design supply fan airflow rate exceeds the value listed in Tables 6.5.6.1-1 and 6.5.6.1-2, based on the climate zone and percentage of *outdoor air* at design airflow conditions. Table 6.5.6.1-1 shall be used for all *ventilation systems* that operate less than 8,000 hours per year, and Table 6.5.6.1-2 shall be used for all ventilation systems that operate 8,000 or more hours per year.

Energy recovery *systems* required by this section shall result in an *enthalpy recovery ratio* of at least 50 percent. A 50 percent *enthalpy recovery ratio* shall mean a change in the enthalpy of the *outdoor air* supply equal to 50 percent of the difference between the *outdoor air* and entering exhaust air enthalpies at *design conditions*. Provision shall be made to bypass or *control* the *energy* recovery *system* to permit *air economizer* operation as required by Section 6.5.1.1.

Exceptions

1. Laboratory *systems* meeting Section 6.5.7.3.
2. *Systems* serving *spaces* that are not cooled and that are heated to less than 60°F.

3. Where more than 60 percent of the *outdoor air* heating *energy* is provided from *site-recovered energy* or *site-solar energy.*
4. Heating *energy* recovery in Climate Zones 0, 1, and 2.
5. Cooling *energy* recovery in Climate Zones 3C, 4C, 5B, 5C, 6B, 7, and 8.
6. Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design ventilation outdoor air flow rate, multiple exhaust fans or outlets located within a 30-foot radius from the outdoor air supply unit shall be considered a single exhaust location.
7. *Systems* requiring dehumidification that employ *energy* recovery in series with the cooling coil.
8. *Systems* expected to operate less than 20 hours per week at the *outdoor air* percentage covered by Table 6.5.6.1-1.

2.14 Addition of New Section 10.4.3.5 Power Conversion System

10.4.3.5 Power Conversion System

New traction elevators with a rise of 75 feet or more in new buildings shall have a power conversion system that complies with Sections 10.4.3.5.1 through 10.4.3.5.3.

10.4.3.5.1 Motor

Induction motors with a Class IE2 efficiency ratings, as defined by IEC EN 60034-30, or alternative technologies, such as permanent magnet synchronous motors that have equal or better efficiency, shall be used.

10.4.3.5.2 Transmission

Transmissions shall not reduce the efficiency of the combined motor/transmission for the Class IE2 motor for elevators with capacities below 4,000 lbs. Gearless machines shall be assumed to have a 100 percent transmission efficiency.

10.4.3.5.3 Drive

Potential energy released during motion shall be recovered with a regenerative drive that supplies electrical energy to the building electrical system.

2.15 Addition of New Section 10.4.6 Commercial Kitchen Equipment

10.4.6 Commercial Kitchen Equipment

Commercial kitchen equipment shall comply with the minimum efficiency requirements of Tables 10.4.6-1 through Table 10.4.6-5.

Table 10.4.6-1: Minimum Efficiency Requirements: Commercial Fryers

	Heavy-Load Cooking Energy Efficiency	Idle Energy Rate	Test Procedure
Standard Open Deep-Fat Gas Fryers	≥50%	≤ 9,000 Btu/hr	ASTM Standard F1361-17
Large Vat Open Deep-Fat Gas Fryers	≥ 50%	≤ 12,000 Btu/hr	
Standard Open Deep-Fat Electric Fryers	≥ 83%	≤ 800 watts	ASTM Standard F2144-17
Large Vat Open Deep-Fat Electric Fryers	≥ 80%	≤ 1,100 watts	

Table 10.4.6-2: Minimum Efficiency Requirements: Commercial Hot Food Holding Cabinets

Product Interior Volume (Cubic Feet)	Maximum Idle Energy Consumption Rate (Watts)	Test Procedure
0 < V < 13	≤ 21.5 V	ASTM Standard F2140-11
13 ≤ V < 28	≤ 2.0 V + 254.0	
28 ≤ V	≤ 3.8 V + 203.5	

Table 10.4.6-3: Minimum Efficiency Requirements: Commercial Steam Cookers

Fuel Type	Pan Capacity	Cooking Energy Efficiency[a]	Idle Rate	Test Procedure
Electric Steam	3-pan	50%	400 watts	ASTM Standard F1484-18
	4-pan	50%	530 watts	
	5-pan	50%	670 watts	
	6-pan and larger	50%	800 watts	
Gas Steam	3-pan	38%	6,250 Btu/h	
	4-pan	38%	8,350 Btu/h	
	5-pan	38%	10,400 Btu/h	
	6-pan and larger	38%	12,500 Btu/h	

a. Cooking Energy Efficiency is based on heavy load (potato) cooking capacity

Table 10.4.6-4: Minimum Efficiency Requirements: Commercial Dishwashers

Machine Type	High Temp Efficiency Requirements		Low Temp Efficiency Requirements		Test Procedure
	Idle Energy Rate[a]	Water Consumption[b]	Idle Energy Rate[a]	Water Consumption[b]	
Under Counter	≤ 0.50 kW	≤ 0.86 GPR	≤ 0.50 kW	≤ 1.19 GPR	ASTM Standard F1696-18 ASTM Standard F1920-15
Stationary Single Tank Door	≤ 0.70 kW	≤ 0.89 GPR	≤ 0.60 kW	≤ 1.18 GPR	
Pot, Pan, and Utensil	≤ 1.20 kW	≤ 0.58 GPSF	≤ 1.00 kW	≤ 0.58 GPSF	
Single Tank Conveyor	≤ 1.50 kW	≤ 0.70 GPR	≤ 1.50 kW	≤ 0.79 GPR	
Multiple Tank Conveyor	≤ 2.25 kW	≤ 0.54 GPR	≤ 2.00 kW	≤ 0.54 GPR	
Single Tank Flight Type	Reported	GPH ≤ 2.975x + 55.00	Reported	GPH ≤ 2.975x + 55.00	
Multiple Tank Flight Type	Reported	GPH ≤ 4.96x + 17.00	Reported	GPH ≤ 4.96x + 17.00	

a. Idle results shall be measured with the door closed and represent the total idle energy consumed by the machine including all tank heater(s) and controls. Booster heater (internal or external) energy consumption should not be part of this measurement unless it cannot be separately monitored per US EPA Energy Star Commercial Dishwasher Specification Version 2.0

b. GPR = gallons per rack; GPSF = gallons per square foot of rack; GPH = gallons per hour; x = sf of conveyor belt (i.e., W*L)/min (maximum conveyor speed).

Table 10.4.6-5: Minimum Efficiency Requirements: Commercial Ovens

Fuel Type	Classification	Idle Rate	Cooking-Energy Efficiency, %	Test Procedure
Convection Ovens				
Gas	Full-Size	≤ 12,000 Btu/h	≥ 46	ASTM F1496 - 13
Electric	Half-Size	≤ 1.0 Btu/h	≥ 71	
	Full-Size	≤ 1.60 Btu/h		
Combination Ovens				
Gas	Steam Mode	≤ 200P[a] +6,511 Btu/h	≥ 41	ASTM F2861 - 17
	Convection Mode	≤ 150P[a] +5,425 Btu/h	≥ 56	
Electric	Steam Mode	≤ 0.133P[a] +0.6400 kW	≥ 55	
	Convection Mode	≤ 0.080P[a] +0.4989 kW	≥ 76	
Rack Ovens				
Gas	Single	≤ 25,000 Btu/h	≥ 48	ASTM F2093 - 18
	Double	≤ 30,000 Btu/h	≥ 52	

a. P = Pan Capacity: The number of steam table pans the combination oven is able to accommodate as per the ASTM F – 1495 – 05 standard specification.

2.16 Addition of New Section 10.4.7 Electric Vehicle Charging Station Capable

10.4.7 Electric vehicle charging station capable**.**

New parking garages and new parking lots powered by the energy services for a building, and with 10 or more parking spaces, shall provide either:

1. Panel capacity and conduit for the future installation of minimum 208/240V 40-amp outlets for 5 percent of the total parking spaces and not less than two parking spaces; or
2. Minimum 208/240V 40-amp outlets for 5 percent of the total parking spaces and not less than two parking spaces.

2.17 Addition of New Section 10.4.8 Solar-Ready Zone

10.4.8 Solar-ready zone (Mandatory)

Comply with the provisions of Appendix CA of 2018 IECC (as amended).

2.18 Amendments to Section 11.2 Compliance

11.2 Compliance**.**

Compliance with Section 11 will be achieved if

a. All requirements of Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4, and Section C408 and Appendix CC (if mandated by local ordinance) of the 2018 IECC (as amended) are met;
b. The *design energy cost*, as calculated in Section 11.5, does not exceed the building *energy use budget,* as calculated by the *simulation program* described in Section 11.4, and
c. The *energy efficiency* level of components specified in the *building* design meet or exceed the *efficiency* levels used to calculate the design energy cost; and
d. In new buildings 50,000 square feet and greater, an envelope performance factor shall be calculated in accordance with 90.1 Appendix C, and buildings shall comply with one of the following:

    i. For multifamily, hotel/motel and dormitory building area types, the margin by which the *proposed envelope performance factor* exceeds the *base envelope performance factor* shall not be greater than 15 percent. For compliance with this requirement, the *base envelope performance factor* shall be calculated using metal framing operable windows. In buildings with window area accounting for 40 percent or more of the wall area, the SHGC of the *vertical fenestration* on east and west oriented façade may be reduced by the following multiplier to account for the permanent site shading from existing buildings or infrastructure.

$M_{West} = 0.18 + 0.33/WWR$
$M_{East} = 0.35 + 0.26/WWR$
Where:
M_{West} = SHGC multiplier for the West facade
M_{East} = SHGC multiplier for the East facade
WWR = the ratio of the proposed *vertical fenestration* area to the *gross wall area* in consistent units.

The multiplier may be applied to the rated SHGC of the *vertical fenestration* which has at least 50 percent of the area located directly opposite of the shading surfaces and no higher from the street level than the difference between the shading surface height and the shading surface distance from the façade. Orientation must be determined following Section 5.5.4.5.

ii. For all other buildings area types, the margin by which the proposed *envelope performance factor* exceeds the *base envelope performance factor* shall be not greater than 7 percent. For compliance with this requirement, the *base envelope performance factor* shall be calculated using metal framing fixed windows.

iii. For mixed-use buildings, the margin shall be calculated as the *gross wall area*-weighted average of options *a* and *b*.

2.19 Amendments to Section 11.4.3.2 Annual Energy Costs

11.4.3.2 Annual Energy Costs**.**

The *design energy cost* and *energy cost budget* shall be determined using rates for *purchased energy* (such as electricity, gas, oil, propane, steam, and chilled water) that are approved by the *adopting authority*. Where *on-site renewable energy* or *site-recovered energy* is used, the *budget building design* shall be based on the *energy* source used as the backup *energy* source, or electricity if no backup *energy* source has been specified. Where the proposed design includes electricity generated from sources other than *on-site renewable energy,* the baseline design shall include the same generation system.

2.20 Amendments to Table 11.5.1
Modeling Requirements for Calculating Design Energy Cost and Energy Cost Budget

Table 11.5.1 Modeling Requirements for Calculating Design Energy Cost and Energy Cost

Proposed Design **(Column A)** ***Design Energy Cost*** **(DEC)**	***Budget Building Design*** **(Column B)** ***Energy Cost Budget*** **(ECB)**
1. Design Model	
a. The simulation model of the *proposed design* shall be consistent with the design documents, including proper accounting of *fenestration* and *opaque* envelope types and area; interior lighting power and *controls*; *HVAC system* types, sizes, and *controls*; and *service water-heating systems* and *controls*. b. All *conditioned spaces* in the *proposed design* shall be simulated as being both heated and cooled, even if no cooling or heating *system* is being installed. Temperature and humidity *control set points* and schedules, as well as *temperature control throttling range*, shall be the same for *proposed design* and *baseline building design*. c. When the *Energy Cost Budget* Method is applied to *buildings* in which *energy*-related features have not yet been designed (e.g., a *lighting system*), those yet-to-be-designed features shall be described in the *proposed design* so that they minimally comply with applicable mandatory and prescriptive requirements from Sections 5 through 10. Where the *space* classification for a *building* is not known, the *building* shall be categorized as an office *building*.	The *budget building design* shall be developed by modifying the *proposed design* as described in this table. Except as specifically instructed in this table, all *building systems* and *equipment* shall be modeled identically in the *budget building design* and *proposed design*.
2. Additions and Alterations	
It is acceptable to demonstrate compliance using *building* models that exclude parts of the *existing building*, provided all of the following conditions are met: a. Work to be performed under the current permit application in excluded parts of the *building* shall meet the requirements of Sections 5 through 10. b. Excluded parts of the *building* are served by *HVAC systems* that are entirely separate from those serving parts of the *building* that are included in the *building* model. c. Design *space* temperature and *HVAC system* operating *set points* and schedules on either side of the boundary between included and excluded parts of the *building* are identical. d. If a declining block or similar utility rate is being used in the analysis and the excluded and included parts of the *building* are on the same utility meter, the rate shall reflect the utility block or rate for the *building* plus the addition.	Same as *proposed design*.

Table 11.5.1 Modeling Requirements for Calculating Design Energy Cost and Energy Cost *(Continued)*

Proposed Design **(Column A)** ***Design Energy Cost*** **(DEC)**	***Budget Building Design*** **(Column B)** ***Energy Cost Budget*** **(ECB)**
3. Space Use Classification	
The *building* area type or *space* type classifications shall be chosen in accordance with Section 9.5.1 or 9.6.1. The user or designer shall specify the *space* use classifications using either the *building* area type or *space* type categories but shall not combine the two types of categories within a single permit application. More than one *building* area type category may be used for a *building* if it is a mixed-use facility.	Same as *proposed design*.
4. Schedules	
The schedule types listed in Section 11.4.1.1(b) shall be required input. The schedules shall be typical of the *proposed design* as determined by the designer and approved by the *authority having jurisdiction*. Required schedules shall be identical for the *proposed design* and *budget building design*.	Same as *proposed design*.

Table 11.5.1 Modeling Requirements for Calculating Design Energy Cost and Energy Cost *(Continued)*

Proposed Design **(Column A)** ***Design Energy Cost*** **(DEC)**	***Budget Building Design*** **(Column B)** ***Energy Cost Budget*** **(ECB)**
5. Building Envelope	
All components of the *building envelope* in the *proposed design* shall be modeled as shown on architectural drawings or as installed for *existing building envelopes*. **Exceptions:** The following *building* elements are permitted to differ from architectural drawings. 1. Any *building envelope* assembly that covers less than 5 percent of the total area of that assembly type (e.g., exterior walls) need not be separately described. If not separately described, the area of a *building envelope* assembly must be added to the area of the adjacent assembly of that same type. When the total area of penetrations from mechanical equipment listed in Table 6.8.1-4 exceeds 1 percent of the *opaque* above-grade wall area, the mechanical equipment penetration area shall be calculated as a separate wall assembly with a default U-factor of 0.5. Where mechanical equipment has been tested in accordance with testing standards approved by the *authority having jurisdiction*, the mechanical equipment penetration area may be calculated as a separate wall assembly with the U-factor as determined by such test. 2. Exterior surfaces whose azimuth *orientation* and tilt differ by no more than 45 degrees and are otherwise the same may be described as either a single surface or by using multipliers. 3. The exterior *roof* surface shall be modeled using the aged solar *reflectance* and thermal *emittance* determined in accordance with Section 5.5.3.1.1(a). Where aged test data are unavailable, the *roof* surface shall be modeled with a solar *reflectance* of 0.30 and a thermal *emittance* of 0.90. 4. Manually operated *fenestration* shading devices, such as blinds or shades, shall not be modeled. Permanent shading devices, such as fins, overhangs, and lightshelves, shall be modeled.	The *budget building design* shall have identical *conditioned floor area* and identical exterior dimensions and orientations as the *proposed design*, except as follows: a. *Opaque* assemblies, such as *roof, floors, doors*, and *walls*, shall be modeled as having the same *heat capacity* as the *proposed design* but with the minimum *U-factor* required in Table C402.1.4 for new buildings or additions and Section C503.3 for alterations. *Opaque* assemblies in semi-heated spaces shall be modeled as having the same *heat capacity* as the *proposed design* but with the minimum *U-factor* required in Section 5.5. b. The exterior *roof* surfaces shall be modeled with a solar *reflectance* and thermal *emittance* as required in Section 5.5.3.1.1(a). All other *roofs*, including *roofs* exempted from the requirements in Section 5.5.3.1.1, shall be modeled the same as the *proposed design*. c. No shading projections are to be modeled; *fenestration* shall be assumed to be flush with the *wall* or *roof*. If the *fenestration area* for new *buildings* or additions exceeds the maximum allowed by Section 5.5.4.2, the area shall be reduced proportionally along each exposure until the limit set in Section 5.5.4.2 is met. If the *vertical fenestration* area facing west or east of the *proposed design* exceeds the area limit set in Section 5.5.4.5 then the *energy cost budget* shall be generated by simulating the *budget building design* with its actual *orientation* and again after rotating the entire *budget building design* 90, 180, and 270 degrees and then averaging the results. *Fenestration* U-factor shall be equal to the criteria from Table C402.4 for the appropriate climate, and the *SHGC* shall be equal to the criteria from C402.4 for the appropriate climate. For portions of those tables where there are no *SHGC* requirements, the *SHGC* shall be equal to that determined in accordance with Section C3.6(c). The *VT* shall be equal to that determined in accordance with Section C3.6(c). The *fenestration* model for *building envelope alterations* shall reflect the limitations on area, *U-factor*, and *SHGC* as described in Section 5.1.3. **Exceptions:** When trade-offs are made between an addition and an *existing building*, as described in the exception to Section 4.2.1.2, the *building envelope* assumptions for the *existing building* in the *budget building design* shall reflect existing conditions prior to any revisions that are part of this permit.

Table 11.5.1 Modeling Requirements for Calculating Design Energy Cost and Energy Cost *(Continued)*

Proposed Design **(Column A)** ***Design Energy Cost*** **(DEC)**	***Budget Building Design*** **(Column B)** ***Energy Cost Budget*** **(ECB)**
6. Lighting	
Lighting power in the *proposed design* shall be determined as follows: a. Where a complete *lighting system* exists, the actual lighting power for each *thermal* block shall be used in the model. b. Where a *lighting system* has been designed, lighting power shall be determined in accordance with Sections 9.1.3 and 9.1.4. c. Where no lighting exists or is specified, lighting power shall be determined in accordance with the *Building* Area Method for the appropriate *building area type*. d. *Lighting system* power shall include all *lighting system* components shown or provided for on plans (including *lamps*, *ballasts*, task *fixtures*, and furniture-mounted *fixtures*). e. The lighting schedules in the *proposed design* shall reflect the mandatory *automatic* lighting *control* requirements in Section 9.4.1 (e.g., programmable *controls* or occupancy sensors) **Exception:** *Automatic* daylighting controls required by Section 9.4.1 shall be modeled directly in the proposed design or through schedule adjustments determined by a daylighting analysis approved by the building official. f. *Automatic* lighting *controls* included in the *proposed design* but not required by Section 9.4.1 may be modeled directly in the *building* simulation or be modeled in the building simulation through schedule adjustments determined by a separate analysis approved by the *authority having jurisdiction*. As an alternative to modeling such lighting controls, the *proposed design* lighting power may be reduced for each *luminaire* under *control* by dividing the rated lighting power of the *luminaire* by the factor (1 + ΣCF), where ΣCF indicates the sum of all applicable *control* factors (CF) per Section 9.6.3 and Table 9.6.3.	a. Lighting power in the *budget building design* shall be determined using the same categorization procedure (*Building* Area Method or Space-by-Space Method) and categories as the *proposed design* with lighting power set equal to the maximum allowed for the corresponding method and category in Tables C405.3.2(1) and C405.3.2(2). Additional interior lighting power for nonmandatory *controls* allowed under Section 9.6.3 shall not be included in the *budget building design*. b. Power for *fixtures* not included in the lighting power calculation shall be modeled identically in the *proposed design* and *budget building design*. c. Mandatory *automatic* lighting *controls* required by Section 9.4.1 shall be modeled the same as the *proposed design*.
7. Thermal Blocks – HVAC Zones Designed	
Where *HVAC zones* are defined on HVAC design drawings, each *HVAC zone* shall be modeled as a separate *thermal block*. **Exceptions:** Different *HVAC zones* may be combined to create a single *thermal block* or identical *thermal blocks* to which multipliers are applied, provided all of the following conditions are met: 1. The *space*-use classification is the same throughout the *thermal block*. 2. All *HVAC zones* in the *thermal* block that are adjacent to glazed *exterior walls* and glazed *semiexterior walls* face the same *orientation* or their orientations are within 45 degrees of each other. 3. All of the zones are served by the same *HVAC system* or by the same kind of *HVAC system*.	Same as *proposed design*.

Table 11.5.1 Modeling Requirements for Calculating Design Energy Cost and Energy Cost *(Continued)*

Proposed Design **(Column A)** ***Design Energy Cost*** **(DEC)**	***Budget Building Design*** **(Column B)** ***Energy Cost Budget*** **(ECB)**
8. Thermal Blocks – HVAC Zones Not Designed	
Where the *HVAC zones* and *systems* have not yet been designed, *thermal blocks* shall be defined based on similar internal load densities, occupancy, lighting, thermal and space temperature schedules, and in combination with the following: a. Separate *thermal blocks* shall be assumed for interior and perimeter *spaces*. Interior *spaces* shall be those located more than 15 ft from an *exterior wall* or *semiexterior* wall. Perimeter *spaces* shall be those located closer than 15 ft from an *exterior wall* or *semiexterior wall*. A separate thermal zone does not need to be modeled for areas adjacent to *semiexterior walls* that separate *semiheated space* from *conditioned space*. b. Separate *thermal blocks* shall be assumed for *spaces* adjacent to glazed *exterior walls* or glazed *semiexterior walls*; a separate zone shall be provided for each *orientation*, except that orientations that differ by no more than 45 degrees may be considered to be the same *orientation*. Each zone shall include all *floor* area that is 15 ft or less from a glazed perimeter *wall*, except that *floor* area within 15 ft of glazed perimeter *walls* having more than one *orientation* shall be divided proportionately between zones. c. Separate *thermal blocks* shall be assumed for *spaces* having *floors* that are in contact with the ground or exposed to ambient conditions from zones that do not share these features. d. Separate *thermal* blocks shall be assumed for *spaces* having *roof* assemblies from zones that do not share these features.	Same as *proposed design*.
9. Thermal Blocks – Multifamily *Residential Buildings*	
Residential spaces shall be modeled using one *thermal block* per *space* except that those facing the same orientations may be combined into one *thermal block*. Corner units and units with *roof* or *floor* loads shall only be combined with units sharing these features.	Same as *proposed design*.

Table 11.5.1 Modeling Requirements for Calculating Design Energy Cost and Energy Cost *(Continued)*

***Proposed Design* (Column A)** ***Design Energy Cost* (DEC)**	***Budget Building Design* (Column B)** ***Energy Cost Budget* (ECB)**
10. HVAC Systems	
The *HVAC system* type and all related performance parameters, such as *equipment* capacities and efficiencies, in *the proposed design* shall be determined as follows: a. Where a complete *HVAC system* exists, the model shall reflect the actual *system* type using actual component capacities and efficiencies. b. Where an *HVAC system* has been designed, the HVAC model shall be consistent with design documents. Mechanical *equipment* efficiencies shall be adjusted from actual *design conditions* to the standard rating conditions specified in Section 6.4.1 if required by the simulation model. Where *efficiency* ratings include supply fan energy, the *efficiency* rating shall be adjusted to remove the supply fan *energy* from the *efficiency* rating in the *budget building design*. The equations in Section 11.5.2 shall not be used in the *proposed design*. The *proposed design HVAC system* shall be modeled using *manufacturers'* full- and part- load data for the *HVAC system* without fan power. c. Where no heating *system* exists, or no heating *system* has been specified, the heating *system* shall be modeled as *fossil fuel*. The *system* characteristics shall be identical to the *system* modeled in the *budget building design*. *d.* Where no cooling *system* exists, or no cooling *system* has been specified, the cooling *system* shall be modeled as an air-cooled *single-zone system*, one unit per *thermal block*. The *system* characteristics shall be identical to the *system* modeled in the *budget building design.*	The *HVAC system* type and related performance parameters for the *budget building design* shall be determined from Figure 11.5.2, the *system* descriptions in Table 11.5.2-1 and accompanying notes, and in accord with rules specified in Section 11.5.2(a) through 11.5.2(k).

Table 11.5.1 Modeling Requirements for Calculating Design Energy Cost and Energy Cost *(Continued)*

Proposed Design **(Column A)** ***Design Energy Cost*** **(DEC)**	***Budget Building Design*** **(Column B)** ***Energy Cost Budget*** **(ECB)**
11. Service Water-Heating Systems	
The *service water-heating system* type and all related performance parameters, such as *equipment* capacities and *efficiencies*, in the *proposed design* shall be determined as follows: a. Where a complete *service water-heating system exists*, the model shall reflect the actual *system* type using actual component capacities and efficiencies. b. Where a *service water-heating system* has been designed, the *service water-heating model* shall be consistent with design documents. c. Where no *service water-heating system* exists or is specified, no *service water heating* shall be modeled.	The *service water-heating system* type in the *budget building design* shall be identical to the *proposed design*. The *service water-heating system* performance of the *budget building design* shall meet the requirements of Section C404.2, and where applicable the requirements of C404.2.1 and C404.2.2, without exception. **Exceptions:** 1. If the *service water heating system* type is not listed in Table C404.2, it shall be identical to the *proposed design*. 2. Where Section 7.5.1 or 7.5.2 applies, the *boiler* shall be split into a separate *space*-heating *boiler* and *hot-water heater*. 3. For 24-hour facilities that meet the prescriptive criteria for use of condenser heat recovery *systems* described in Section 6.5.6.2, a *system* meeting the requirements of that section shall be included in the *baseline building design*, regardless of the exceptions to Section 6.5.6.2. If a condenser heat recovery *system* meeting the requirements described in Section 6.5.6.2 cannot be modeled, the requirement for including such a *system* in the actual *building* shall be met as a prescriptive requirement in accordance with Section 6.5.6.2 and no heat recovery *system* shall be included in the *proposed design* or *budget building design*.
12. Miscellaneous Loads	
Receptacle, motor, and *process loads* shall be modeled and estimated based on the *building area type* or *space* type category and shall be assumed to be identical in the *proposed* and *budget building designs*. These loads shall be included in simulations of the *building* and shall be included when calculating the *energy cost budget* and *design energy cost*. All end-use load components within and associated with the *building* shall be modeled, unless specifically excluded by Sections 13 and 14 of Table 11.5.1, including exhaust fans, parking garage *ventilation* fans, exterior *building* lighting, swimming *pool* heaters and pumps, elevators and escalators, refrigeration *equipment*, and cooking *equipment*.	Receptacle, motor, and *process loads* shall be modeled and estimated based on the *building area type* or *space* type category and shall be assumed to be identical in the *proposed design* and *budget building design*. These loads shall be included in simulations of the *building* and shall be included when calculating the *energy cost budget* and *design energy cost*. All end-use load components within and associated with the *building* shall be modeled, unless specifically excluded by Sections 13 and 14 of Table 11.5.1, including exhaust fans, parking garage *ventilation* fans, exterior *building* lighting, swimming *pool* heaters and pumps, elevators and escalators, refrigeration *equipment*, and cooking *equipment*.

Table 11.5.1 Modeling Requirements for Calculating Design Energy Cost and Energy Cost *(Continued)*

Proposed Design **(Column A)** ***Design Energy Cost*** **(DEC)**	***Budget Building Design*** **(Column B)** ***Energy Cost Budget*** **(ECB)**
13. Modeling Exceptions	
All elements of the *proposed design building envelope*, HVAC, *service water heating*, lighting, and electrical *systems* shall be modeled in the *proposed design* in accordance with the requirements of Sections 1 through 12 of Table 11.5.1. **Exceptions:** Components and *systems* in the *proposed design* may be excluded from the simulation model provided that 1. component *energy* use does not affect the *energy* use of *systems* and components that are being considered for trade-off and 2. the applicable prescriptive requirements of Sections 5.5, 6.5, 7.5, and either 9.5 or 9.6 applying to the excluded components are met.	None
14. Modeling Limitations to the *Simulation Program*	
If the *simulation program* cannot model a component or *system* included in the *proposed design*, one of the following methods shall be used with the approval of the *authority having jurisdiction*: a. Ignore the component if the *energy* impact on the trade-offs being considered is not significant. b. Model the component substituting a thermodynamically similar component model. c. Model the *HVAC system* components or *systems* using the *budget building design*'s *HVAC system* in accordance with Section 10 of Table 11.5.1. Whichever method is selected, the component shall be modeled identically for both the *proposed design* and *budget building design*.	Same as *proposed design*.

2.21 Amendments to Section G1.2.1 Mandatory Provisions

G1.2.1 Mandatory Provisions.

This *performance rating method* requires conformance with the following provisions:

1. All requirements of Sections 5.4, 6.4, 7.4, 8.4, 9.4, 10.4, and Sections C408 and Appendix CC (if mandated by local ordinance) of the 2018 IECC (as amended) shall be met. These sections contain the mandatory provisions of the standard and are prerequisites for this rating method.
2. The interior lighting power shall not exceed the *interior lighting power allowance* determined using either Tables G3.7 or G3.8 and the methodology described in Sections 9.5.1 and 9.6.1.

2.22 Amendments to Section G1.2.2 Performance Rating Calculation

G1.2.2 Performance Rating Calculation**.**

The performance of the *proposed design* is calculated by either the provisions of G1.2.2.1 Performance Cost Index or G1.2.2.2 Performance Source Energy Index.

2.23 Addition of New Section G1.2.2.1 Performance Cost Index

G1.2.2.1 Performance Cost Index**.**

The performance of the proposed design is calculated in accordance with provisions of this appendix using the following formula:

Performance Cost Index =
Proposed building performance / *Baseline building performance*

Both the *proposed building performance* and the *baseline building performance* shall include all end-use load components within and associated with the building when calculating the Performance Cost Index.

2.24 Addition of New Section G1.2.2.2 Performance Source Energy Index

G1.2.2.2 Performance Source Energy Index**.**

The performance of the proposed design is calculated in accordance with provisions of this appendix using the following formula:

Performance Source Energy Index =
Proposed building source energy / *Baseline building source energy*

Both the *proposed building source energy* and the *baseline building source energy* shall include all end-use load components within and associated with the building when calculating the Performance Source Energy Index.

2.25 Amendments to Section G2.4.1 On-site Renewable Energy and Site-Recovered Energy

G2.4.1 On-site Renewable Energy and Site-Recovered Energy**.**

Site-recovered energy shall not be considered *purchased energy* and shall be subtracted from the *proposed design energy* consumption prior to calculating the *proposed building performance*. *On-site renewable energy* generated by *systems* included on the *building* permit used by the *building* shall be subtracted from the *proposed design energy* consumption prior to calculating the *proposed building performance* or *proposed building source energy*. The reduction in *proposed*

building performance or *proposed building source energy* associated with *on-site renewable energy* systems shall not exceed 5 percent of the calculated *baseline building performance* or *baseline building source energy*, respectively.

2.26 Amendments to Section G2.4.2 Annual Energy Costs

G2.4.2 Annual Energy Costs.

The *design energy cost* and baseline *energy* cost shall be determined using either actual rates for *purchased energy* or State average *energy* prices published by DOE's Energy Information Administration (EIA) for commercial *building* customers, but rates from different sources may not be mixed in the same project. Where *on-site renewable energy* or *site-recovered energy* is used, the *baseline building design* shall be based on the *energy* source used as the backup *energy* source, or the baseline *system energy* source in that category if no backup *energy* source has been specified. Where the proposed design includes electricity generated from sources other than *on-site renewable energy,* the baseline design shall include the same generation system.

2.27 Amendments to Table G3.1 Modeling Requirements for Calculating Proposed and Baseline Building Performance (No. 5 Building Envelope)

Table G3.1 Modeling Requirements for Calculating Proposed and *Baseline Building Performance*

No.	Proposed Building Performance	Baseline Building Performance
5. Building Envelope		
a.	All components of the *building envelope* in the *proposed design* shall be modeled as shown on architectural drawings or as built for *existing building envelopes*. **Exceptions:** The following *building* elements are permitted to differ from architectural drawings: 1. All uninsulated assemblies (e.g., projecting balconies, perimeter edges of intermediate *floor* stabs, concrete *floor* beams over parking garages, *roof* parapet) shall be separately modeled using either of the following techniques: a. Separate model of each of these assemblies within the *energy* simulation model. b. Separate calculation of the *U-factor* for each of these assemblies. The *U-factors* of these assemblies are then averaged with larger adjacent surfaces using an area-weighted average method. This average *U-factor* is modeled within the *energy* simulation model. Any other *building envelope* assembly that covers less than 5% of the total area of that assembly type (e.g., *exterior walls*) need not be separately described,	Equivalent dimensions shall be assumed for each *building envelope* component type as in the *proposed design*; i.e., the total gross area of *walls* shall be the same in the *proposed design* and *baseline building design*. The same shall be true for the areas of roofs, *floors,* and *doors,* and the exposed perimeters of concretes slabs on *grade* shall also be the same in the *proposed design* and *baseline building design*. The following additional requirements shall apply to the modeling of the *baseline building design*. a. ***Orientation.*** The *baseline building performance* shall be generated by simulating the *building* with its actual *orientation* and again after rotating the entire *building* 90, 180, and 270 degrees, then averaging the results. The *building* shall be modeled so that it does not shade itself. **Exceptions:** 1. If it can be demonstrated to the satisfaction of the *rating authority* that the *building orientation* is dictated by site considerations. 2. *Buildings* where the *vertical fenestration area* on each *orientation* varies by less than 5

provided that it is similar to an assembly being modeled. If not separately described, the area of a *building envelope* assembly shall be added to the area of an assembly of that same type with the same *orientation* and thermal properties. When the total area of penetrations from mechanical equipment listed in Table 6.8.1-4 exceeds 1% of the *opaque above-grade wall* area, the mechanical equipment penetration area shall be calculated as a separate wall assembly with a default *U-factor* of 0.5. Where mechanical equipment has been tested in accordance with testing standards approved by the *authority having jurisdiction*, the mechanical equipment penetration area may be calculated as a separate *wall* assembly with the *U-factor* as determined by such test.

2. Exterior surfaces whose azimuth *orientation* and tilt differ by less than 45 degrees and are otherwise the same may be described as either a single surface or by using multipliers.
3. The exterior *roof* surface shall be modeled using the aged solar *reflectance* and thermal *emittance* determined in accordance with Section 5.5.3.1.1(a). Where aged test data are unavailable, the *roof* surface may be modeled with a reflectance of 0.30 and a thermal *emittance* of 0.90.
4. *Manual fenestration* shading devices, such as blinds or shades, shall be modeled or not modeled the same as in the *baseline building design*. Automatically controlled *fenestration* shades or blinds shall be modeled. Permanent shading devices, such as fins, overhangs, and light shelves shall be modeled.
5. Automatically controlled *dynamic glazing* may be modeled. Manually controlled *dynamic glazing* shall use the average of the minimum and maximum *SHGC* and *VT*.

b. *Infiltration* shall be modeled using the same methodology, air leakage rate, and adjustments for weather and *building* operation in both the *proposed design* and the *baseline building design*. These adjustments shall be made for each simulation time step and must account for but not be limited to weather conditions and *HVAC system* operation, including strategies that are intended to positively pressurize the *building*. The air leakage rate of the *building envelope* (I_{75Pa}) at a *fixed building* pressure differential of 0.3 in. of water shall be 0.4 cfm/ft^2. The air leakage rate of the *building envelope* shall be converted to appropriate units for the *simulation program* using one of the methods in Section G3.1.1.4.

Exceptions: When whole-*building* air leakage testing, in accordance with ASTM E779, is specified during design and completed after *construction*, the *proposed design* air percent.

b. ***Opaque* Assemblies**. *Opaque* assemblies used for new *buildings, existing buildings, or* additions shall conform with assemblies detailed in Appendix A and shall match the appropriate assembly maximum *U-factors* in Tables G3.4-1 through G3.4-8:

- Roofs--Insulation entirely above deck (A2.2).
- *Above-grade walls*--Steel-*framed* (A3.3).
- *Below-grade walls*--Concrete block (A4).
- *Floors*--*Steel-joist* (A5.3).
- *Slab-on-grade floors* shall match the *F-factor* for unheated slabs from the same tables (A6).
- *Opaque door* types shall be of the same type of *constructions* as the *proposed design* and conform to the *U-factor* requirements from the same tables (A7).

c. ***Vertical Fenestration Areas.*** For *building* area types included in Table G3.1.1-1, *vertical fenestration areas* for new *buildings* and additions shall equal that in Table G3.1.1-1 based on the area of gross *above-grade walls* that separate *conditioned spaces* and *semiheated spaces* from the exterior. Where a *building* has multiple *building* area types, each type shall use the values in the table. The *vertical fenestration* shall be distributed on each face of the *building* in the same proportion as in the *proposed design*. For *building* areas not shown in Table G3.1.1-1, *vertical fenestration area* for new *buildings* and additions shall equal that in the *proposed design* or 40% of gross *above-grade wall* area, whichever is smaller, and shall be distributed on each face of the *building* in the same proportions in the *proposed design*. The *fenestration area* for an *existing building* shall equal the existing *fenestration area* prior to the proposed work and shall be distributed on each face of the *building* in the same proportions as the *existing building*. For portions of those tables where there are no *SHGC* requirements, the *SHGC* shall be equal to that determined in accordance with Section C3.6(c).

d. ***Vertical Fenestration* Assemblies.** *Fenestration* for new *buildings, existing buildings,* and additions shall comply with the following:

- *Fenestration U-factors* shall match the appropriate requirements in Tables G3.4-1 through G3.4-8 for the applicable glazing percentage for $\mathbf{U}_{all}$.
- *Fenestration SHGCs* shall match the appropriate requirements in Tables G3.4-1 through G3.4-8 using the value for $SHGC_{all}$ for the applicable

leakage rate of the *building envelope* shall be as measured.	vertical glazing percentage. • All *vertical fenestration* shall be assumed to be flush with the *exterior* wall, and no shading projections shall be modeled. • *Manual* window shading devices such as blinds or shades are not required to be modeled. e. ***Skylights* and Glazed Smoke Vents.** *Skylight* area shall be equal to that in the *proposed design* or #%, whichever is smaller. If the *skylight* area of the *proposed design* is greater than 3%, baseline *skylight* area shall be decreased by an identical percentage in all *roof* components in which *skylights* are located to reach 3%. *Skylight orientation* and tilt shall be the same as in the *proposed design*. *Skylight U-factor* and *SHGC* properties shall match the appropriate requirements in Tables G3.4-1 through G3.4-8 using the value and the applicable *skylight* percentage. f. ***Roof* Solar *Reflectance* and Thermal *Emittance.*** The exterior *roof* surfaces shall be modeled using a solar *reflectance* of 0.30 and a thermal *emittance* of 0.90. g. ***Roof* Albedo.** All *roof* surfaces shall be modeled with a reflectivity of 0.30.

PART 3

3 Amendments to 2018 International Energy Conservation Construction Code Residential Provisions

3.1 Amendments to Section 401.2

R401.2 Compliance**.** Projects shall comply with one of the following:

1. The provisions of Sections R401 through R404.
2. The provisions of Sections R401 through R404 and the provisions of Section R408 (passive house).
3. The provisions of Section R406 (ERI).
4. For *Group* R-2*, Group* R-3 *and Group* R-4 *buildings*, the provisions of Section R405 (simulated performance) and the provisions of Sections R401 through R404 labeled "Mandatory." The building energy cost shall be equal to or less than 80 percent of the standard reference design building.

3.2 Amendments to Table R402.1.2 Insulation and fenestration requirements by component

Table R402.1.2
Insulation and Fenestration Requirements by Component[a]

Climate Zone	Fenestration U-factor[h]	Skylight U-factor[h]	Glazed fenestration SHGC[h]	Ceiling R-Value	Wood Frame Wall[b,c] R-Value	Mass Wall[d] R-Value	Floor R-Value	Basement Wall[e] R-Value	Slab[f] R-Value and Depth	Crawl Space Wall[e] R-Value
4	0.27	0.50	0.4	49	21 int. or 20+5 or 13+10	15/20	30[g]	15/19	10,4 ft	15/19
5	0.27	0.50	NR	49	21 int. or 20+5 or 13+10	15/20	30[g]	15/19	10,4 ft	15/19
6	0.27	0.50	NR	49	20+5 or 13+10	15/20	30[g]	15/19	10,4 ft	15/19

NR = Not Required
For SI: 1 foot = 304.8 mm.

a. R-values are minimums. U-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed R-value of the insulation shall be not less than the R-value specified in the table.
b. Int. (intermediate framings) denotes standard framing 16 inches on center. Headers shall be insulated with a minimum of R-10 insulation.
c. The first value is cavity insulation, the second value is continuous insulation. Therefore, as an example, "13+10" means R-13 cavity insulation plus R-10 continuous insulation.
d. Mass walls shall be in accordance with Section R402.2.5. The second R-value applies when more than half the insulation is on the interior of the mass wall.
e. 15/19 means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall.
f. R-10 continuous insulation shall be provided under the full slab area of a heated slab in addition to the required slab edge insulation R-value for slabs as indicated in the table. The slab edge insulation for heated slabs shall not be required to extend below the slab.
g. Alternatively, insulation sufficient to fill the framing cavity and providing not less than an *R*-value of R-19.
h. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

3.3 Amendments to Table R402.1.4 Equivalent U-factors

Table R402.1.4
Equivalent U-factors[a]

Climate Zone	Fenestration U-factor	Skylight U-factor	Ceiling U-factor	Frame Wall U-factor	Mass Wall U-factor[b]	Floor U-factor	Basement Wall U-factor	Crawl Space Wall U-factor
4	0.27	0.50	0.026	0.045	0.056	0.033	0.050	0.042
5	0.27	0.50	0.026	0.045	0.056	0.033	0.050	0.042
6	0.27	0.50	0.026	0.045	0.056	0.033	0.050	0.042

a. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.
b. Mass wall shall be in accordance with Section R402.2.5. Where more than half the insulation is on the interior, the mass wall U-factor shall not exceed 0.056.

3.4 Amendments to Section R402.2.2 Ceilings without attic spaces

R402.2.2 Ceiling without attic spaces. Where Section R402.1.2 requires insulation R-values greater than R-38 in the ceiling and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation R-value for such roof/ceiling assemblies shall be R-38. Insulation shall extend over the top of the wall plate to the outer edge of such plate and shall not be compressed. This reduction of insulation from the requirements of Section R402.1.2 shall be limited to 500 square feet (46 m^2) or 20 percent of the total insulated ceiling area, whichever is less. This reduction shall not apply to the U-factor alternative approach in Section R402.1.4 and the Total UA alternative in Section R402.1.5.

3.5 Amendments to Section R402.4.1.1 Installation

R402.4.1.1 Installation. The components of the *building thermal envelope* as indicated in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instruction and the criteria indicated in Table R402.4.1.1 as applicable to the method of construction. An approved agency shall inspect all components and verify compliance. The inspection shall include an open wall visual inspection of all components included in Table R402.4.1.1 and shall be installed so that the insulation material uniformly fills each cavity side-to-side and top-to-bottom, without substantial gaps or voids around obstructions, and is split, installed, or fitted tightly around wiring and other penetrations in the cavity. No more than 2 percent of the total insulated area shall be compressed below the thickness required to attain the labeled R-value or contain gaps or voids in the insulation.

3.6 Amendments to Section R403.3 Ducts

R403.3 Ducts. All ducts and air handlers shall be installed in accordance with Section R403.3.1 through R403.3.8, where applicable. The duct system in new buildings and additions shall be located in a conditioned space in accordance with Sections R403.3.7 (1) and R403.3.7 (2).

3.7 Addition of New Section R403.3.8 Duct system sizing (Mandatory)

R403.3.8 Duct system sizing (Mandatory). Ducts shall be sized in accordance with ACCA Manual D based on calculations made in accordance with Sections R403.7 and R403.8.

3.8 Amendments to Section R403.5 Service hot water systems

R403.5 Service hot water systems. Energy conservation measures for service hot water systems shall be in accordance with Sections R403.5.1 through R403.5.5

3.9 Amendments to Section R403.5.4 Drain water heat recovery units

R403.5.4 Drain water heat recovery units. Drain water heat recovery units shall have a minimum efficiency of 40 percent if installed for equal flow or a minimum efficiency of 52 percent if installed for unequal flow. Vertical drain water heat recovery units shall comply with CSA B55.2 and be tested and labeled in accordance with CSA B55.1 or IAPMO 346. Sloped drain water heat recovery units shall comply with IAPMO PS 92 and be tested and labeled in accordance with IAPMO 346. Potable water-side pressure loss of drain water heat recovery units shall be less than 3 psi for individual units connected to one or two showers. Potable water-side pressure loss of drain water heat recovery units shall be less than 2 psi for individual units connected to three or more showers.

3.10 Addition of New Section R403.5.5 Supply of heated water

R403.5.5 Supply of heated water. In new *buildings*, heated water supply piping shall be in accordance with one of the following:

> **R403.5.5.1 Maximum allowable pipe length method.** The maximum allowable pipe length from the nearest source of heated water to the termination of the fixture supply pipe shall be in accordance with the maximum pipe length in Table R403.5.5.1. Where the length contains more than one size of pipe, the largest size shall be used for determining the maximum allowable length of the piping in Table R403.5.5.1.

R403.5.5.2 Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section R403.5.5.2.1. The maximum volume of hot or tempered water in the piping to public lavatory faucets shall be 2 ounces. For fixtures other than public lavatory faucets, the maximum volume shall be 64 ounces for hot or tempered water from a water heater or boiler; and 24 ounces for hot or tempered water from a circulation loop pipe or an electrically heat-traced pipe. The water volume in the piping shall be calculated in accordance with Section R403.5.5.2.1.

R403.5.5.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the source of hot water and the termination of the fixture supply pipe. The volume shall be determined from the "Volume" column of Table R403.5.5.1. The volume contained within fixture shutoff valves, flexible water supply connectors to a fixture fitting, or within a fixture fitting shall not be included in the water volume determination. Where hot or tempered water is supplied by a circulation loop pipe or a heat-traced pipe, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

Table R403.5.5.1
Pipe Volume and Maximum Piping Lengths

Nominal Pipe or Tube Size (inch)	VOLUME (Liquid Ounces Per Foot Length)	Maximum Pipe or Tube Length		
		System without a circulation loop or heat-traced line (feet)	System with a circulation loop or heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering (feet)
1/4[a]	0.33	50	16	6
5/16[a]	0.5	50	16	4
3/8[a]	0.75	50	16	3
1/2	1.5	43	16	2
5/8	2	32	12	1
3/4	3	21	8	0.5
7/8	4	16	6	0.5
1	5	13	5	0.5
1 1/4	8	8	3	0.5
1 1/2	11	6	2	0.5
2 or larger	18	4	1	0.5

a. The flow rate for ¼-inch size pipe or tube is limited to 0.5 gallons per minute; for 5/16-inch size, it is limited to 1 gpm; for 3/8-inch size, it is limited to 1.5 gpm.

R403.5.5.3 Drain water heat recovery units. New buildings shall include a drain water heat recovery unit that captures heat from at least one shower, and such drain water heat recovery unit must have a minimum efficiency of 40 percent if installed for equal flow or a minimum efficiency of 52 percent if installed for unequal flow. Vertical drain water heat recovery units shall comply with CSA B55.2 and be tested and labeled in accordance with CSA B55.1 or IAPMO 346. Sloped drain water heat recovery units shall comply with IAPMO PS 92 and be tested and labeled in accordance with IAPMO 346. Potable water-side pressure loss of drain water heat recovery units shall be less than 3 psi for individual units connected to one or two showers.

Potable water-side pressure loss of drain water heat recovery units shall be less than 2 psi for individual units connected to three or more showers.

R403.5.5.4 Recirculation Systems. Projects shall include a recirculation system with no more than 0.5-gallon (1.9 liter) storage. The storage limit shall be measured from the point where the branch feeding the fixture branches off the recirculation loop to the fixture. Recirculation systems must be based on an occupant-controlled switch or an occupancy sensor, installed in each bathroom, which is located beyond a 0.5-gallon stored-volume range from the water heater.

3.11 Addition of New Section R403.6.2 Balanced and HRV/ERV systems (Mandatory)

R403.6.2 Balanced and HRV/ERV systems (Mandatory). In new buildings, every dwelling unit shall be served by a heat recovery ventilator (HRV) or energy recovery ventilator (ERV) installed per manufacturer's instructions. The HRV/ERV must be sized adequately for the specific application, which will include the building's conditioned area, and number of occupants.

Exception: In Climate Zone 4, a balanced *ventilation* system designed and installed according to the requirements of Section M1507.3 of the 2015 International Residential Code (IRC) that uses the return side of the building's heating and/or cooling system air handler to supply outdoor air, shall be permitted to comply with this section. When the outdoor air supply is ducted to the heating and/or cooling system air handler, the mixed air temperature shall not be less than that permitted by the heating equipment manufacturer's installation instructions. Heating and/or cooling system air handlers used to distribute outdoor air shall be field-verified to not exceed an efficacy of 45 W/CFM if using furnaces for heating and 58 W/CFM if using other forms of heating. In the balanced system design, an equivalent exhaust air flow rate shall be provided simultaneously by one or more exhaust fans, located remotely from the source of supply air. The balanced system's exhaust and supply fans shall be interlocked for operation, sized to provide equivalent air flow at a rate greater than or equal to that determined by IRC Table M1507.3.3(1) and shall have their fan capacities adjusted for intermittent run time per Table M1507.3.3(2). Continuous operation of the balanced *ventilation* system shall not be permitted.

3.12 Addition of New Section R403.6.3 Verification

R403.6.3 Verification. Installed performance of the mechanical *ventilation* system shall be tested and verified by an *approved agency* and measured using a flow hood, flow grid, or other airflow measuring device in accordance with Air Conditioning Contractors of America (ACCA) HVAC Quality Installation Verification Protocols – ANSI/ACCA 9QIvp-2016.

3.13 Amendments to Section R404.1 Lighting equipment (Mandatory)

R404.1 Lighting equipment (Mandatory). Not less than 90 percent of the permanently installed lighting fixtures shall use lamps with an efficacy of at least 65 lumens per watt or have a total luminaire efficacy of at least 45 lumens per watt.

R404.1.1 Lighting equipment (Mandatory). Fuel gas lighting systems shall not have continuously burning pilot lights.

3.14 Addition of New Section R404.2 Electrical power packages (Mandatory)

R404.2 Electrical power packages (Mandatory). New buildings shall comply with the following:

1. Solar-ready zone. Detached one and two-family dwellings and townhouses where the conditioned space is greater than 1,400 square feet shall comply with the requirements of Appendix RA.
2. Electrical Vehicle Service Equipment Capable. Detached one or two-family dwellings and townhouses with parking area provided on the *building site* shall provide a 208/240V 40-amp outlet for each dwelling unit or panel capacity and conduit for the future installation of such an outlet. Outlet or conduit termination shall be adjacent to the parking area. For residential occupancies where there is a common parking area, provide either:
   a. Panel capacity and conduit for the future installation of 208/240V 40-amp outlets for 5 percent of the total parking spaces, but not less than one outlet, or
   b. 208/240V 40-amp outlets for 5 percent of the total parking spaces, but not less than one outlet.

3.15 Amendments to Table R406.4 Maximum Energy Rating Index

Table R406.4
Maximum Energy Rating Index

Climate Zone	Energy Rating Index[a]
4	50
5	50
6	50

a. Where *on-site renewable energy* is included for compliance using the ERI analysis of Section R406.4, the building shall meet the mandatory requirements of Section R406.2, and the building thermal envelope shall be greater than or equal to the levels of efficiency and SHGC in Table R402.1.2 or R402.1.4 of the 2015 *International Energy Conservation Code.*

3.16 Addition of New Section R408 Passive House

Section R408
Passive House

R408.1 General**.** *Buildings* shall comply with either Section R408.1.1 or R408.1.2 and shall comply with Section R408.2.

R408.1.1. Passive House Institute US (PHIUS) Approved Software. PHIUS+. Passive Building Standard - North America, where Specific Space Heat Demand and (sensible only) Cooling Demand, as modeled and field-verified by a Certified Passive House Consultant, is less than or equal to 9kBTU/ft2/year. The *dwelling unit* shall also be tested with a blower door and found to exhibit no more than 0.05 CFM50/ft² or 0.08 CFM75/ft² of air leakage.

R408.1.2 Passive House Institute (PHI) Approved Software. Passive House Institute: Low Energy Building Standard, where Specific Space Heating and (sensible only) Cooling Demand is less than or equal to 9.5 kBTU/ft^2/year, as modeled and field-verified by a Certified Passive House Consultant. The *dwelling unit* shall also be tested with a blower door and found to exhibit an *infiltration* rate of no more than 1.0 air changes per hour under a pressure of 50 Pascals.

R408.2 Documentation

1. If using the PHIUS software:
    a. Prior to the issuance of a building permit, the following items must be provided to the *code official*:
        i. A list of compliance features; and
        ii. A statement that the estimated Specific Space Heat Demand is “based on plans.”
    b. Prior to the issuance of a certificate of occupancy, the following item must be provided to the *code official*:
        i. A copy of the final report submitted on a form that is approved to document compliance with PHIUS+ standards. Said report must indicate that the finished building achieves a Certified Passive House Consultant verified Specific Space Heat Demand of less than or equal to 9 kBTU/ft2/year.

2. If using the PHI software:

    a. Prior to the issuance of a building permit, the following items must be provided to the *code official*:

        i. A list of compliance features; and

        ii. A statement that the estimated Specific Space Heating and Cooling Demand is "based on plans."

    b. Prior to the issuance of a certificate of occupancy, the following item must be provided to the *code official*:

        i. A copy of the final report submitted on a form that is approved to document compliance with PHI standards. Said report must indicate that the finished building achieves a Certified Passive House Consultant verified Specific Space Heating or Cooling Demand is less than or equal to 9.5 kBTU/ft^2/year.

3.17 Amendments to "ACCA" in Chapter 6 Referenced Standards

Manual D—16: Residential Duct Systems

R403.3.8

Manual J—16: Residential Load Calculation Eighth Edition

R403.7

Manual S—14: Residential Equipment Selection

R403.7

3.18 Addition of a new entry for "IAPMO" to Chapter 6 Referenced Standards

IAPMO **International Association of Plumbing and Mechanical Officials**
4755 E. Philadelphia St.
Ontario, CA 91761

IAPMO IGC 346:2017 Test Method for Measuring the Performance of Drain Water Heat Recovery Units

R403.5.4.3

IAPMO PS 92-2013: Heat Exchangers and Indirect Water Heaters

R403.5.4.3

3.19 Addition of a new entry for "PHI" to Chapter 6 Referenced Standards

PHI **Passive House Institute**
Rheistrasse 44/46
64283 Darmstadt, Germany

PHI 2016: Low Energy Building Standard, Version 9f
R408.1

3.20 Addition of a New Entry for "PHIUS" to Chapter 6 Referenced Standards

PHIUS **Passive House Institute US**
116 West Illinois Street, Suite 5E
Chicago, IL 60654, USA

PHIUS+ 2015: Passive Building Standard – North America
R408.1

State of New York
Andrew M. Cuomo, Governor

New York State Energy Research and Development Authority
Richard L. Kauffman, Chair | Alicia Barton, President and CEO

NYStretch Energy Code–2020

Frequently Asked Questions

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GENERAL QUESTIONS

1. What is a stretch energy code?

A stretch energy code is simply an energy code that is more stringent than New York State's base energy code that can be adopted by local jurisdictions. Jurisdictions on Long Island, in the Hudson River valley, in the state of Massachusetts, and elsewhere, including New York City, have adopted stricter energy standards to ensure constituents enjoy reduced energy costs. Local adoption of a stretch energy code shows leadership by protecting the environment while creating healthier, more comfortable buildings with lower operating costs. In order to prevent a patchwork of stricter energy codes, the New York State Energy Research and Development Authority (NYSERDA) developed a model stretch energy code that is effective, flexible, and enforceable.

2. What is the NYStretch Energy Code–2020?

NYStretch Energy Code–2020 (NYStretch) is a model, voluntary, locally adoptable stretch code that saves more energy than the forthcoming 2020 Energy Conservation Construction Code of New York State (2020 ECCCNYS).

This fact allows NYStretch to be adopted by any jurisdiction in New York. NYStretch amends the 2020 ECCCNYS with a standard that is 10–12% more efficient, depending on climate zone and building type. Many of the changes are already being considered for the next national energy codes. To a large degree, NYStretch is an early look at New York State's next energy code.

3. Why did NYSERDA develop NYStretch?

NYSERDA and its team of stakeholder advisory groups and consultants developed NYStretch to provide a stretch code that is easily adoptable and enforceable, provides a consistent signal to the market, and delivers energy and greenhouse gas savings. NYStretch is a pivotal tool for New York jurisdictions to accelerate the savings obtained through their local building energy codes.

The 2020 ECCCNYS will be the minimum energy efficiency requirement for new buildings in New York State. However, technologies and strategies exist that are significantly more efficient than the state's minimum code requirements. NYStretch will be 10–12% more efficient than the 2020 ECCCNYS and will significantly reduce energy consumption, operating costs, utility costs, and greenhouse gas emissions.

Developers often build homes and buildings to meet the State's base energy code with lower initial capital costs than energy-efficient or green building designs. This approach passes higher utility costs to renters, tenants, and owners. While homes and buildings built to NYStretch may cost more initially, long-term energy and cost savings will be passed on to renters, tenants, and owners.

Adopting a stretch code also prepares design and construction firms for future state code requirements and can increase property values and overall community attractiveness as more homeowners are seeking green or energy-efficient homes. Multiple popular online real estate websites now have filters for prospective homeowners to search for green or energy-efficient homes. Similarly, more corporations are adopting sustainability plans and initiatives, which often include energy efficiency requirements for the buildings they operate.

4. How can communities benefit from adopting and enforcing a stretch energy code like NYStretch?

Voluntary stretch codes are permitted by law in New York State, as more restrictive local standards. Communities can benefit from adopting and enforcing a stretch energy code in many ways, including, but not limited to:

- Significant energy and utility cost savings for homeowners, tenants, renters, and building owners
- Reduced building operational costs
- Reduced environmental impact
- Increased occupant comfort and health

- Increased real estate value and community attractiveness
- Research and development stimulation and commercialization of products that improve energy efficiency performance
- Green job creation related to next-generation technologies, code enforcement, quality control, building commissioning, energy auditing and modeling, among others.

A more stringent energy code requires homes and commercial buildings to be more efficient, which reduces the amount of electricity, natural gas, and fuel oil used. While energy efficiency improvements often make sense to implement financially, these improvements may not be implemented for a variety of reasons. Adopting a stretch energy code is an effective way to implement energy efficiency and renewable energy measures, as it will be required by law for the communities that adopt it. In turn, communities that adopt a stretch energy code will reduce energy costs for current and future homeowners and renters and mitigate operating costs for small and large businesses located within the community.

5. What are the key changes in NYStretch compared to the 2020 ECCCNYS?

Changes from the 2020 ECCCNYS in NYStretch are highlighted by the sidebar markings to indicate the specific change in the code. The key changes include:

- Envelope: improved window performance, air-barrier commissioning, and air-leakage testing
- Lighting: reduced interior and exterior lighting power and lighting controls
- Electrical: whole-building energy monitoring
- Renewable and electric vehicle readiness
- Mandatory mechanical ventilation for residential buildings

SCOPE

6. Which building types are covered by NYStretch?

NYStretch covers the same building types as those covered by the ECCCNYS. For jurisdictions that adopt NYStretch as a local energy code, it will amend the base 2020 ECCCNYS and become the binding energy code language for building projects in that municipality.

7. Does NYStretch apply to major renovation projects as well as new construction?

Yes, in the same manner that the ECCCNYS is applicable to major renovation and new construction projects.

8. Does NYStretch apply to minor additions to existing buildings?

As it is with the ECCCNYS, additions to existing commercial and residential buildings that are large enough to require code compliance are treated as renovations. In both cases, these additions can follow the performance approach to code compliance or a simplified prescriptive path.

9. Are multifamily buildings considered residential or commercial buildings under NYStretch?

NYStretch does not modify the definitions of residential and commercial buildings. Therefore, multifamily buildings will be handled identically in the 2020 ECCCNYS and in NYStretch.

LOCAL ADOPTION AND ENFORCEMENT REQUIREMENTS

10. How do communities adopt NYStretch?

Local jurisdictions will follow their normal procedures for introducing an amendment to a local law. A NYSERDA representative may be available to present NYStretch to members of a committee or at public hearings and to answer questions.

NYSERDA has developed language for a resolution, amendment, or ordinance. It is included in a Step-By-Step Adoption Guide and Model NYStretch Adoption Bill to assist local municipalities with adopting NYStretch.

11. Does NYStretch need to be approved by the New York Secretary of State?

No, pursuant to Article 11, section 11-109 of the New York State Energy Law, and subject to the provisions and requirements of that section, any municipality has the power to promulgate a local energy conservation code that is more stringent than the 2020 ECCCNYS.

However, after a local law, revision, or amendment has been enacted, it must be filed and indexed by the Department of State.

12. When does the local law need to be filed with the New York Secretary of State?

Within 30 days of enactment. Instructions for filing a local energy conservation construction code can be found here: dos.ny.gov/DCEA/pdf/Energy/Filing-of-a-Local-Energy-Conservation-Construction-Code-11-109.pdf

13. How are interpretations of NYStretch handled?

A jurisdiction's local code official in the municipality is permitted to interpret provisions of NYStretch that are (1) in addition to the provisions of the 2020 ECCCNYS or (2) more stringent than the provisions of the 2020 ECCCNYS. NYSERDA plans to offer code officials interpretation assistance in the form of a hotline or a technical consultant.

14. How would NYStretch be implemented and enforced?

Implementation and enforcement will be handled by the same authority who handles implementation and enforcement of other building codes in a community.

15. Can a jurisdiction adopt just the residential or commercial portion of the NYStretch?

Yes. While a jurisdiction may adopt one or both of the Commercial and Residential provisions, it is NYSERDA's desire, but not a rule, that the NYStretch be adopted as written. Changes to or deletions of the provisions contained in NYStretch may affect energy savings, cost savings, and enforceability. Jurisdictions are encouraged to contact codes@nyserda.ny.gov before considering any changes to the NYStretch.

16. It seems like the NYStretch has efficiency requirements for HVAC equipment that exceed federally mandated levels of efficiency. How can local jurisdictions have the authority to mandate higher levels of efficiencies for HVAC equipment?

NYStretch does not mandate the use of HVAC or water-heating equipment measures that exceed federal energy efficiency levels.

RESIDENTIAL BUILDING QUESTIONS

17. How does a new home meet the residential requirements of NYStretch?

The compliance paths include the same paths as in the ECCCNYS, including versions of RESCheck™. NYStretch also allows for Passive House approaches.

18. For residential buildings, is additional testing equipment and verification required to meet the NYStretch compared to the 2020 ECCCNYS?

Yes. For example, a provision in NYStretch requires that a mechanical ventilation system be tested and verified to ensure it is working properly so as to deliver the expected performance and energy savings.

19. How much energy will each new home save if built to meet NYStretch?*

On average, residential buildings that meet NYStretch can save an estimated 19.7% in terms of energy cost compared to those built to the 2020 ECCCNYS. Likewise, a homeowner would see, on average, an estimated 19.7% reduction in their utility bill over the course of one year. The prescriptive residential provisions of NYStretch were modeled using whole building energy simulation software to quantify energy savings beyond what will be expected under the 2020 ECCCNYS.

**Note that these savings strictly reflect energy efficiency components and do not include any energy offset by renewable energy generation such as solar photovoltaic (PV) panels. Additional savings would be realized for projects that include renewable generation technologies.*

20. How much more does it cost to build a new home to meet NYStretch compared to the current 2020 ECCCNYS?

There are multiple ways to comply with NYStretch. Third-party incremental cost analyses show that incremental costs range from $300 to $370 per home for single family homes. Multifamily apartments will have incremental costs ranging from $1,488 to $1,750 per dwelling unit.

NYStretch–Average Residential Savings, Costs, and Payback

Building Type	Annual Energy Cost Savings ($/home)*	Incremental Cost of Construction ($/home)*	Simple Payback (years)*
Single Family Home	$348	$2,057	5.9
Multifamily Unit	$171	$1,591	9.3
Weighted Average NY State	**$278**	**$1,795**	**6.4**

*Results will vary depending on building and construction type and location in NY State.

Adoption of a more stringent standard for buildings may result in slightly higher costs for new construction, but costs will be offset by the energy cost savings associated with a home that meets NYStretch. In the case of single family homes, the costs will be offset within 4 to 8 years, depending on location. Similarly, the costs for a multifamily building can be paid back in 10 years or less. In addition, for existing homes undergoing significant renovation, there are numerous efficiency programs across the state that provide financial incentives. These programs can help reduce the up-front costs and allow for faster returns on the investment in energy-saving measures. Check with your local utility company about financial incentives or rebate programs that may be available.

COMMERCIAL BUILDING QUESTIONS

21. For commercial buildings, what other compliance paths are there in NYStretch aside from the prescriptive path?

Like the 2020 ECCCNYS, NYStretch allows commercial buildings to comply using the performance paths in ASHRAE. However, in NYStretch, the IECC performance path is not available for commercial buildings.

22. For commercial buildings, is additional testing and/or verification required to meet NYStretch?

Yes. For example, NYStretch includes a new section for air-barrier commissioning. This section requires design and construction checklists, field inspections, and a compilation of a final commissioning report, among other requirements not in the 2020 ECCCNYS.

23. How much energy and money will each new commercial building save if built to meet NYStretch?

The prescriptive commercial provisions of NYStretch were modeled using whole building energy simulation software to quantify energy savings beyond the 2020 ECCCNYS, following the ASHRAE prescriptive path. Depending on the building type, climate zone, and compliance path selected, commercial buildings that meet NYStretch will save an estimated 7.1% in terms of energy cost compared to those built to the 2020 ECCCNYS*.

**Note that these savings strictly reflect energy efficiency components and do not include any energy offset by renewable energy generation such as solar PV. Additional savings would be realized for projects that include renewable generation technologies.*

24. How much more does it cost to build a new commercial building to meet NYStretch compared to the 2020 ECCCNYS?

Adoption of a more efficient standard for buildings is likely to result in slightly higher initial costs for new construction, but lower energy bills. Initial costs will differ based on building type, the heating and cooling system included in the design, and the compliance path selected. Based on a NYStretch cost study of the prescriptive provisions for commercial buildings, the incremental costs and simple payback for the most cost-effective packages are as follows:

NYStretch – Average Commercial Savings, Costs, and Payback

Building Type	Percentage Savings*	Incremental Cost ($/sq ft)*	Simple Payback (years)*
Large Office	4.1%	$0.31	3.3
Stand-alone Retail	15.8%	$3.39	13.3
Secondary School	8.1%	$0.55	5.4
Large Hotel	8.7%	$1.64	8.8
Full-service Restaurant	12.1%	$4.29	4.6
Outpatient Healthcare	6.1%	$2.85	12.0
Warehouse	12.9%	$0.77	13.3
10-story High-rise Apartment	3.0	$0.43	11.5
20-story High-rise Apartment	3.4%	$0.47	13.5
Weighted Average NY State	**7.1%**	**$1.14**	**10.5**

*Results will vary depending on building type and location in NY State.

In addition, there are numerous efficiency programs across the state that provide financial incentives. These programs can help reduce the up-front cost of complying with NYStretch and allow for faster returns on investment in energy-saving measures. Check with your local utility about financial incentives or rebate programs that may be available.

25. How does NYStretch work with green building programs such as LEED® for New Construction?

Both NYStretch and LEED for New Construction have the option to use ASHRAE 90.1 Appendix G modeling protocols.

26. Does NYStretch require installation of solar panels for commercial buildings?

No, but Section C405.11 does require buildings to be solar-ready per the provisions of Appendix CA of the 2018 IECC. However, municipalities may decide to adopt Appendix CC which requires buildings to comply with at least one of five options, one of which is to add on-site renewable energy.

NYStretch Energy Code–2020

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Stringency Analysis Summary:
Local Energy Code (i.e. NYStretch 2020) vs. 2020 ECCC NYS

NYSERDA sponsored independent, third-party stringency and cost-effectiveness analyses of the provisions of NYStretch Energy Code 2020 (NYStretch) compared to the 2020 Energy Conservation Construction Code (ECCC NYS).

NYStretch is the basis for this Local Energy Code. A summary of the results of those analyses are provided as evidence that the prescriptive and mandatory provisions of this Local Energy Code are expected to yield positive energy savings compared to the baseline 2020 ECCC NYS.

NYStretch Energy Code–2020

Stringency Analysis Summary: Local Energy Code (i.e. NYStretch 2020) vs. 2020 ECCC NYS

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The commercial analysis (Table 1) was prepared by Vidaris, Inc.[1] and compares the ASHRAE compliance path of NYStretch to that in the 2020 ECCC NYS. The residential analysis (Table 2) was prepared by Resource Refocus, Inc.[2] and compares the IECC compliance path of NYStretch to that of the 2020 ECCC NYS.

Table 1. Statewide Average Annual Energy and Cost Savings — Commercial Provisions of NYStretch Compared to the 2020 ECCC NYS[1]

	Total Regulated Site Energy (kBtu/ft2/year)	Total Regulated Source Energy (kBtu/ft2/year)	Total Energy Costs ($/ft2)
Baseline	54.1	129.4	$1.52
2020 NYStretch	51.2	120.7	$1.41
Savings	5.4%	6.7%	7.1%

Table 2. Statewide Average Annual Energy and Cost Savings — Residential Provisions of NYStretch Compared to the 2020 ECCC NYS[2]

	Total Regulated Site Energy (kBtu/dwelling unit)	Total Regulated Source Energy (kBtu/dwelling unit)	Total Energy Costs ($/dwelling unit)
Baseline	59,926.4	91,545.1	1,514.9
2020 NYStretch	45,161.4	71,769.2	1,216.7
Savings	24.6%	21.6%	19.7%

Based on an analysis of Dodge data for new construction in New York State from 2009-2017, construction weights for residential and commercial new construction were developed to determine the weighted statewide average stringency of NYStretch compared to the 2020 ECCC NYS. The results show that NYStretch has a weighted average stringency of 11.3% over the 2020 ECCC NYS (Table 3).

Table 3. Weighted Average Efficiency of NYStretch Compared to the 2020 ECCC NYS

Construction Type	9-yr statewide construction average	Energy Cost Savings	Weighted average Efficiency
Residential	33.57%	19.7%	6.6%
Commercial	66.43%	7.1%	4.7%
Overall Weighted Average efficiency NYStretch compared to 2020 ECCC NYS			11.3%

[1] Report #19-34 2020 NYStretch Energy Code Commercial Cost Effectiveness Analysis

[2] Report #19-37 Energy Savings and Cost-Effectiveness Analysis of the 2020 NYStretch Energy Code Residential Provisions

For more information, visit nyserda.ny.gov/stretchenergy2020

2020 NYStretch Energy Code Commercial Cost Effectiveness Analysis

Final Report | Report Number 19-34 | July 2019

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NYSERDA's Promise to New Yorkers:

NYSERDA provides resources, expertise, and objective information so New Yorkers can make confident, informed energy decisions.

Mission Statement:

Advance innovative energy solutions in ways that improve New York's economy and environment.

Vision Statement:

Serve as a catalyst – advancing energy innovation, technology, and investment; transforming New York's economy; and empowering people to choose clean and efficient energy as part of their everyday lives.

2020 NYStretch Energy Code
Commercial Cost Effectiveness Analysis

Final Report

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New York State Energy Research and Development Authority

Albany, NY

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New York, NY

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Abstract

This report summarizes the energy savings and cost-effectiveness analysis of the commercial provisions of the 2020 NYStretch Energy Code of New York State. For this study, cost effectiveness means comparing the annual energy cost and first costs of complying with NYStretch versus the commercial provisions of the 2020 ECCC NYS to determine the incremental cost of design and construction as compared to the annual energy cost savings. NYStretch includes overlays of both the 2018 IECC and ASHRAE 90.1-2016. This analysis is limited to the overlay of ASHRAE 90.1-2016. The report includes the methodology used in the analysis, assumptions, and results at the applicable climate design zones for New York State.

Keywords

Energy code, stretch energy code, cost effectiveness, NYSERDA

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Definitions

Climate Zones: The three climate zones of New York State: 4A, 5A, and 6A. For purposes of these analyses, the weather files used are New York City (CZ 4A), Buffalo (CZ 5A), and Watertown (CZ 6A).

Prototypes: Prototypes developed by the Department of Energy for modeling purposes for the following building types: Large Office, Stand-alone Retail, Secondary School, Large Hotel, Full-Service Restaurant, Outpatient Healthcare, Warehouse, 10-Story High-Rise Apartment, and 20-Story High-Rise Apartment. The 10- and 20-Story High-Rise Apartment prototypes were developed by PNNL based on New York City building permit data for multifamily buildings for use in the NYStretch Code analysis.

2020 Energy Conservation Construction Code of New York State (2020 ECCC NYS): An energy code based on the *2018 International Energy Conservation Code*, published by the International Code Council and subsequently modified by New York State.

Summary

With guidance from a 25-member advisory group composed of public and private stakeholders, the New York State Energy Research and Development Authority (NYSERDA) developed the NYStretch Energy Code-2020 (draft dated January 2019) (NYStretch) as a voluntary, locally adoptable stretch energy code. It is intended that NYStretch will overlay the 2020 Energy Conservation Construction Code of New York State (2020 ECCC NYS) resulting in an energy code that is roughly 7% more efficient than the commercial provisions of ASHRAE 90.1-2016.

To assist communities in adopting NYStretch, NYSERDA contracted Vidaris to provide a cost-effectiveness analysis of the commercial provisions of NYStretch. For this study, cost effectiveness means comparing the annual energy cost and first costs of complying with NYStretch versus the 2020 ECCC NYS to determine the incremental cost of design and construction as compared to the annual energy cost savings. NYStretch includes overlays of both the 2018 IECC and ASHRAE 90.1-2016. The analysis presented in this report is limited to the overlay of ASHRAE 90.1-2016.

The NYStretch overlay for 90.1-2016 includes a new requirement for choosing an additional set of increased efficiency requirements. For this analysis, the option for reduced lighting power was included for all buildings. A summary of results is presented in Tables ES-1 through ES-6.

The differences between ASHRAE 90.1-2016 and NYStretch vary by building type and climate zone with site energy savings ranging from 2.3 to 14%, source energy savings ranging from 3.0 to 15.3%, and energy cost savings ranging from 3.0 to 16.4%. Incremental costs range from $0.28 to $5.59 per square foot and simple payback ranges from 3.0 to 18.4 years.

In aggregate, this analysis indicates that versus ASHRAE 90.1-2016, the NYStretch yields savings statewide for each building in each climate zone with site energy savings of 5.4%, source energy savings of 6.7%, and energy cost savings of 7.1%. These savings are achieved with an average additional cost of $1.14 per square foot with a 10.5-year simple payback.

Table ES-1. Aggregate Summary of Results

Prototype	Construction Weight [%]	Site Energy [kBtu/ft2/yr]			Source Energy [kBtu/ft2/yr]			Energy Cost [$/ft2]			Incremental First Cost	Simple Payback
		90.1-2016	NYStretch	% Savings	90.1-2016	NYStretch	% Savings	90.1-2016	NYStretch	% Savings	$/ft2	years
Large Office	8.8%	60.5	58.5	3.4%	179.5	172.4	4.0%	$ 2.26	$ 2.16	4.1%	$ 0.31	3.27
Standalone Retail	14.6%	46.2	40.9	11.6%	130.7	111.2	14.9%	$ 1.62	$ 1.36	15.8%	$ 3.39	13.25
Secondary School	9.8%	37.4	34.3	8.3%	102.7	94.3	8.2%	$ 1.26	$ 1.16	8.1%	$ 0.55	5.36
Large Hotel	7.8%	83.1	77.4	6.9%	185.6	170.4	8.2%	$ 2.13	$ 1.94	8.7%	$ 1.64	8.84
Full-Service Restaurant	0.5%	414.9	378.2	8.8%	741.0	659.6	11.0%	$ 7.65	$ 6.72	12.1%	$ 4.29	4.60
Outpatient Healthcare	5.4%	113.0	108.2	4.3%	313.2	295.2	5.7%	$ 3.86	$ 3.62	6.1%	$ 2.85	12.03
Warehouse	7.5%	21.5	18.6	13.7%	41.8	36.3	13.2%	$ 0.45	$ 0.39	12.9%	$ 0.77	13.26
10-Story High-Rise Apartment	21.9%	48.4	47.1	2.8%	96.0	93.1	3.0%	$ 1.04	$ 1.01	3.0%	$ 0.43	11.45
20-Story High-Rise Apartment	23.7%	48.5	47.4	2.4%	106.4	103.2	3.1%	$ 1.21	$ 1.17	3.4%	$ 0.47	13.50
Weighted Average	**100.0%**	**54.1**	**51.2**	**5.4%**	**129.4**	**120.7**	**6.7%**	**$ 1.52**	**$ 1.41**	**7.1%**	**$ 1.14**	**10.50**

Table ES-2. Summary of Results for Climate Zone 4A

Prototype	Construction Weight	Site Energy [kBtu/ft2/yr]			Source Energy [kBtu/ft2/yr]			Energy Cost [$/ft2]			Inc. First Cost	Simple Payback
		90.1-2016	NYStretch	% Savings	90.1-2016	NYStretch	% Savings	90.1-2016	NYStretch	% Savings	$/ft2	years
Large Office	7.5%	60.0	58.0	3.4%	179.3	172.2	3.9%	$ 2.26	$ 2.16	4.1%	$ 0.28	3.1
Standalone Retail	4.9%	44.5	39.1	12.1%	130.1	111.0	14.7%	$ 1.63	$ 1.38	15.4%	$ 3.89	15.6
Secondary School	5.0%	37.0	33.9	8.5%	104.0	95.6	8.1%	$ 1.29	$ 1.18	8.0%	$ 0.61	6.0
Large Hotel	3.5%	81.7	75.9	7.1%	187.4	172.2	8.1%	$ 2.17	$ 1.99	8.5%	$ 1.77	9.6
Full-Service Restaurant	0.1%	380.3	341.6	10.2%	717.1	629.0	12.3%	$ 7.62	$ 6.60	13.3%	$ 5.59	5.5
Outpatient Healthcare	2.0%	111.7	106.7	4.5%	314.6	296.5	5.8%	$ 3.90	$ 3.66	6.2%	$ 3.10	12.9
Warehouse	2.5%	17.7	15.2	14.0%	37.4	32.4	13.5%	$ 0.42	$ 0.36	13.3%	$ 1.03	18.4
10-Story High-Rise Apartment	21.9%	48.4	47.1	2.8%	96.0	93.1	3.0%	$ 1.04	$ 1.01	3.0%	$ 0.43	13.5
20-Story High-Rise Apartment	23.5%	48.4	47.3	2.4%	106.4	103.1	3.1%	$ 1.21	$ 1.17	3.4%	$ 0.47	11.5
Weighted Average (CLIMATE ZONE 4A)	**70.9%**	**51.4**	**49.2**	**4.2%**	**120.6**	**114.5**	**5.1%**	**$ 1.41**	**$ 1.33**	**5.5%**	**$ 0.85**	**11.0**

Table ES-3. Summary of Results for Climate Zone 5A

Prototype	Construction Weight	Site Energy [kBtu/ft2/yr]			Source Energy [kBtu/ft2/yr]			Energy Cost			Inc. First Cost	Simple Payback
		90.1-2016	NYStretch	% Savings	90.1-2016	NYStretch	% Savings	90.1-2016	NYStretch	% Savings	$/ft2	years
Large Office	1.0%	63.4	61.2	3.4%	180.6	173.1	4.1%	$ 2.24	$ 2.15	4.3%	$ 0.47	4.8
Standalone Retail	7.1%	46.5	41.2	11.6%	129.9	110.0	15.3%	$ 1.60	$ 1.34	16.4%	$ 3.08	11.7
Secondary School	3.7%	37.7	34.6	8.1%	101.2	92.9	8.2%	$ 1.24	$ 1.13	8.3%	$ 0.43	4.3
Large Hotel	2.5%	83.3	77.7	6.8%	183.4	168.1	8.4%	$ 2.09	$ 1.90	9.0%	$ 1.55	8.3
Full-Service Restaurant	0.3%	418.0	381.9	8.6%	741.4	661.8	10.7%	$ 7.63	$ 6.72	11.9%	$ 3.90	4.3
Outpatient Healthcare	2.4%	112.9	108.2	4.2%	310.6	292.8	5.7%	$ 3.82	$ 3.58	6.2%	$ 2.70	11.5
Warehouse	3.8%	23.9	20.6	13.8%	43.9	38.2	13.0%	$ 0.46	$ 0.40	12.6%	$ 0.60	10.4
10-Story High-Rise Apartment	0.0%	54.5	52.5	3.6%	99.8	96.3	3.5%	$ 1.04	$ 1.01	3.5%	$ 0.38	10.5
20-Story High-Rise Apartment	0.1%	54.4	53.2	2.3%	112.2	103.1	8.1%	$ 1.24	$ 1.17	6.0%	$ 0.43	10.3
Weighted Average (CLIMATE ZONE 5A)	**20.9%**	**59.1**	**54.2**	**8.2%**	**147.5**	**132.8**	**10.0%**	**$ 1.76**	**$ 1.57**	**10.5%**	**$ 1.81**	**9.8**

Table ES-4. Summary of Results for Climate Zone 6A

Prototype	Construction Weight	Site Energy [kBtu/ft2/yr]			Source Energy [kBtu/ft2/yr]			Energy Cost			Inc. First Cost	Simple Payback
		90.1-2016	NYStretch*	% Savings	90.1-2016	NYStretch*	% Savings	90.1-2016	NYStretch*	% Savings	$/ft2	years
Large Office	0.3%	64.4	62.1	3.5%	181.7	174.1	4.2%	$ 2.25	$ 2.15	4.4%	$ 0.30	3.0
Standalone Retail	2.6%	48.6	43.4	10.7%	133.9	115.0	14.1%	$ 1.65	$ 1.40	15.1%	$ 3.27	13.2
Secondary School	1.1%	38.2	35.0	8.3%	101.8	93.3	8.3%	$ 1.24	$ 1.14	8.3%	$ 0.65	6.3
Large Hotel	1.8%	85.4	79.9	6.5%	185.1	170.0	8.2%	$ 2.09	$ 1.91	8.8%	$ 1.49	8.1
Full-Service Restaurant	0.1%	439.9	403.5	8.3%	763.7	683.6	10.5%	$ 7.76	$ 6.85	11.7%	$ 4.18	4.6
Outpatient Healthcare	1.0%	116.0	111.3	4.0%	316.4	298.6	5.6%	$ 3.88	$ 3.64	6.1%	$ 2.71	11.5
Warehouse	1.2%	22.0	19.1	13.2%	44.2	38.3	13.4%	$ 0.48	$ 0.42	13.5%	$ 0.75	11.6
10-Story High-Rise Apartment	0.0%	54.5	52.6	3.6%	99.8	96.2	3.5%	$ 1.04	$ 1.01	3.5%	$ 0.42	11.6
20-Story High-Rise Apartment	0.1%	55.1	53.3	3.3%	113.0	108.7	3.8%	$ 1.25	$ 1.20	4.0%	$ 0.40	8.1
Weighted Average (CLIMATE ZONE 6A)	**8.2%**	**65.0**	**60.2**	**7.4%**	**159.1**	**144.3**	**9.3%**	**$ 1.88**	**$ 1.70**	**9.9%**	**$ 1.96**	**10.5**

Life-cycle cost savings were calculated based on a 10- and 30-year period. The results for these analyses are in Tables ES-5 and ES- 6. Over the 10-year period, the present value of the energy savings are more than the incremental costs of $0.85/sq.ft., $1.81/ sq.ft., and $1.96/ sq.ft. for climate zones 4A, 5A, and 6A, respectively. Net energy savings over 10 years are $0.18/sf in aggregate statewide.

Over the 30-year period, the net present value of the energy savings also accounts for replacement and residual value, and yields savings of $0.52/sq.ft., $1.57/ sq.ft., and $1.38/ sq.ft. for climate zones 4A, 5A, and 6A, respectively. Net energy savings over 30 years are $0.81/sf in aggregate statewide.

Table ES-5. Summary of 10-year Life-Cycle Cost Analysis

Prototype	Construction Weight [%]	Annual Energy Cost		10 Year Life Cycle Energy Cost			Incremental First Cost	Residual Value at 10yrs	Net Savings over 10 Years	
		90.1-2016	NYStretch	90.1-2016	NYStretch	Savings			Total	$/sf
4A Totals	70.9%	$ 253,616	$ 242,215	$ 2,365,240	$ 2,259,659	$ 105,581	$ 83,955	$ 25,162	$ 46,788	$ 0.11
5A Totals	20.9%	$ 167,142	$ 154,337	$ 1,556,783	$ 1,438,147	$ 118,636	$ 1,558,123	$ 24,902	$ 781,498.62	$ 0.37
6A Totals	8.2%	$ 170,912	$ 157,469	$ 1,595,414	$ 1,470,838	$ 124,576	$ 1,252,578	$ 30,782	$ 617,704	$ 0.30
AGGREGATE VALUES	100.0%	$ 228,761	216,899	$ 2,133,146	$ 2,023,280	$ 109,867	$ 88,326	$ 25,568	$ 47,109	$ 0.18

Table ES-6. Summary of 30-year Life-Cycle Cost Analysis

Prototype	Construction Weights	CZ	First Cost	Replacement Costs	Maintenance	Residual Value	Energy Cost Savings	30 Year Net Present Value of Savings	
								$	$/sf
4A Totals	70.9%	4A	$83,955	$40,133	$0	$1,671	$260,157	$137,741	$0.52
5A Totals	20.9%	5A	$94,765	$41,112	$0	($107)	$292,323	$156,339	$1.57
6A Totals	8.2%	6A	$109,714	$50,027	$0	$1,211	$305,970	$147,441	$1.38
AGGREGATE VALUES			**$88,326**	**$41,149**	**$0**	**$1,262**	**$270,636**	**$142,423**	**$0.81**

1 Cost Effectiveness Study

1.1 Background

The PNNL report *Final Energy Savings Analysis of the Proposed NYStretch-Energy Code 2018*, February 2019 (*PNNL-ACT-10073 Rev. 1*) presents the energy and energy cost savings for nine prototype buildings, which represent more than 73% of the projected new construction by floor-space accounted for in the full suite of 16 DOE prototypes. *PNNL-ACT-10073 Rev. 1* identifies 15 Energy Efficiency Measures (EEMS) required by the NYStretch. The PNNL analysis and report compare the provisions of the NYStretch against ASHRAE Standard 90.1-2013 to determine savings.

To determine the cost effectiveness of NYStretch relative to ASHRAE 90.1-2016, Vidaris quantified the difference in annual energy performance between NYStretch and ASHRAE 90.1-2016 using Energy Plus models for nine prototype buildings in three New York cities representing the climates zones shown in Table 1.

Table 1. Prototypes and New York Climate Zones

DOE Prototype	Climate Zone: City (Weather file)
Large Office Building	**CZ 4A: New York** (USA_NY_New.York-J.F.Kennedy.Intl.AP.744860_TMY3.epw) **CZ 5A: Buffalo** (USA_NY_Buffalo-Greater.Buffalo.Intl.AP.725280_TMY3.epw) **CZ 6A: Watertown** (USA_NY_Watertown.AP.726227_TMY3.epw)
Stand-alone Retail	
Secondary School	
Large Hotel	
Full-service Restaurant	
Outpatient Healthcare	
Warehouse	
10-Story High-rise Apartment	
20-Story High-rise Apartment	

The cities selected for CZs 4A and 5A are the same cities used by PNNL in its most recent national analysis of ASHRAE 90.1-2016: Energy Savings Analysis: ANSI/ASHRAE/IES Standard 90.1-2016, October 2017 (PNNL 2017); namely, New York City and Buffalo, NY.

Changes to the climate zone map in ASHRAE 90.1-2016 reclassified some cities in CZ 6A to CZ 5A, including Buffalo, NY. Consequently, for CZ 5A Buffalo supplanted Albany, which had been used in previous State-specific analyses for CZ 5A. Moving Buffalo meant selecting another city for CZ 6A as PNNL 2017 used Rochester, MN to represent CZ 6A in the national analysis. Based on consultation with NYSERDA, Watertown, NY was selected to represent CZ 6A for this analysis. Weather files were downloaded directly from the DOE's EERE website for this analysis.[1]

Note that the cities used for this analysis are the same cities used in support of the New York State Department of State rulemaking process for adopting the 2020 ECCC NYS.

1.2 Energy Analysis Results

PNNL developed the EnergyPlus prototype models specifically for the NYStretch analysis done for NYSERDA. NYSERDA provided PNNL's nine prototype building types to be used by Vidaris in this analysis. Vidaris started with the NYStretch models and modified them as necessary to create the ASHRAE 90.1-2016 baseline models for each prototype appropriate to each climate zone. A list of the differences between the NYStretch and 90.1-2016 models is provided in Appendix A.

To determine the statewide savings that the NYStretch offers beyond ASHREA 90.1-2016, weighting factors for each result were applied to determine the aggregate savings. The weighting factors used in this analysis were developed by PNNL based on construction volume by building type and climate zone and are presented in *PNNL-ACT-10073 Rev. 1*.

Vidaris used the same energy prices used for the 2020 ECCC NYS cost-effectiveness and are shown in Table 4. These rates are based on commercial energy price information available from the U.S. Energy Information Administration (EIA) for the 2017 calendar year.[2]

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1 www.energycodes.gov/development/commercial/90.1_models

2 The year 2017 was the most current year for which complete data for electricity and natural gas rates and heat content for natural gas was available as of January 2019 when the 2020 NYS ECC cost-effectiveness analysis was started.

Vidaris used EnergyPlus v8.0.0 and generated the results for each prototype under both codes and for each climate zone. Based on the prototype buildings, 2020 NYStretch has been shown to be 7.1% more efficient than ASHRAE 90.1-2016 on a cost per square foot basis. With respect to site and source energy, NYStretch yields savings of 5.4% and 6.7%, respectively. The aggregated results by code and by climate zone are presented in Table 2 (See Appendix B for more detailed results by building type.)

Table 2. Aggregated Differences in Annual Energy Use and Annual Energy Cost between ASHRAE 90.1-2016 and 2020 NYStretch

		Total (kBtu)		NYS Energy Cost			Energy Cost	EUI (kBtu/sf)		ECI	Weighting Factors
		Site	Source	Electricity	Gas	Total		Site	Source	$/sf	
Aggregate Values	ASHRAE 90.1-2016	65,273,116	156,127,787	$ 1,655,039	$ 179,661	$ 1,834,701		54.2	129.6	$ 1.52	
	NYStretch	61,721,089	145,682,605	$ 1,528,231	$ 175,543	$ 1,703,773		51.2	120.9	$ 1.41	
	Savings	**3,552,026**	**10,445,183**	**$ 126,809**	**$ 4,118**	**$ 130,927**		**2.9**	**8.7**	**$ 0.11**	
		5.44%	**6.69%**	**7.66%**	**2.29%**	**7.14%**		**5.44%**	**6.69%**	**7.14%**	
Savings by CZ	4A	2,618,314	7,452,920	$ 88,826	$ 3,752	$ 92,578		2.2	6.2	$ 0.0768	70.8%
	5A	5,815,539	17,673,722	$ 218,408	$ 5,081	$ 223,490		4.8	14.7	$ 0.1855	21.0%
	6A	5,828,422	17,805,195	$ 220,633	$ 4,824	$ 225,457		4.8	14.8	$ 0.1871	8.2%
	Combined	**3,552,026**	**10,445,183**	**$ 126,809**	**$ 4,118**	**$ 130,927**		**2.9**	**8.7**	**$ 0.11**	100.0%

1.3 Cost-Effectiveness Analysis

As part of its analysis, Vidaris included statewide-average utility rates available from the EIA. Additionally, Vidaris modified the cost data to reflect city-specific cost factors from RS Means. For consistency, the EIA rate data and RS Means cost factors were selected from 2017, the most recent year for which complete annual average utility data was available from the EIA.

Cost-effectiveness analysis was not included in *PNNL-ACT-10073 Rev. 1*. Consequently, Vidaris developed incremental cost data based predominantly on the following sources:

- 2018 Building Construction Costs with RSMeans Data (RSMeans 2018),
- *2018 Mechanical Costs with RSMeans Data (RSMeans 2018)*, and
- cost data used by PNNL in their national cost-effectiveness analysis of ASHRAE 90.1-2016

Where these sources were insufficient, Vidaris obtained estimates based on data from the internet (e.g., electric vehicle charging stations), or its own experience supplemented as needed with conversations with other practitioners (e.g., infiltration testing, lighting).

The life of energy efficiency measures was determined from NYSERDA's *Whole Building Incentive Calculator* and are summarized in Table 3. Detailed cost estimates by building type and climate zone are included in Appendix D.

Table 3. Measure Life Assumptions

Measure Description	Life (years)
Energy Star Kitchen Equipment	7
Lighting System	15
Motor/drives	15
Gas fired DHW	15
HVAC- Air handlers	15
Building Shell/Glazing-Windows	20
HVAC - Electric chillers	20
HVAC - Boilers	20
Building Shell/Roof, Wall, Slab	30

Regarding the life-cycle costing, PNNL's latest analysis of ASHRAE 90.1-2016 is based upon Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis published by the National Institute of Standards and Technology (NIST). NIST data for 2017 was selected to be consistent with the other cost data being used. NIST identifies the real discount rate for non-energy related expenses (i.e., maintenance and replacement costs) and delineates Uniform Present Value Factors (UPV Factors) to be used for life-cycle periods from one to 30 years, by energy type, for Census Region 1 (which includes New York State) and based on a real DOE discount rate of 3.0%. The UPV Factor is multiplied by the annual energy cost to determine the life-cycle value of energy cost over the life-cycle period. The city cost factors, utility cost data, and life-cycle parameters used in the analysis are presented in Table 4.

Table 4. Life-Cycle Cost Analysis Parameters

		Value		Source
NYS Energy - 2017	Electricity	0.1475	$/kWh	U.S. Energy Information Administration
	Natural Gas	6.87	$/1000 cf	
	Heat Content of Natural Gas	1,032	Btu/cf	
Energy Price Escalation	Uniform Present Value Factors: Commercial			Table Ba.1: Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis – 2017, (Lavappa, et.al.)
		10 yr	30 yr	
	Electricity	9.22	22.72	
	Natural Gas	10.57	26.00	
Discount Rate (Real)		3.00%		Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis – 2017, (Lavappa, et.al.)
City Code Index	4A. New York	1.346		RS Means Building Construction Cost Data (2017)
	5A.Buffalo	1.057		
	6A. Watertown	0.995		

The life of a measure does not necessarily equal the life-cycle study period. Measures may have longer or shorter lives than the 10- and 30-year periods used for this analysis, as detailed in Table 3. Consequently, a residual value of the measures was included in the analysis to account for the value of the measure associated with the remaining life of the materials installed as part of the measure. The residual values used are based on straight line depreciation of the present value of the measure over the life of the measure. For example, if a measure has a 20-year life, then at the end of 10 years it has a residual value equal to 50% of the first cost to install the measure.

Economic analysis results based on annual energy savings and simple payback are presented in Tables 5 and 6. The payback period varies from 3.0 years for Large Office in CZ6A to 18.4 years for Warehouse in CZ4A. In aggregate, the statewide area weighted payback period is 10.5 years.

Table 5. Energy Savings and Simple Payback for By Building Type and Climate Zone

Prototype	CZ	Construction Weight [%]	Site Energy [kBtu/ft2/yr]			Source Energy [kBtu/ft2/yr]			Energy Cost			Incremental First Cost	Simple Payback
			90.1-2016	NYStretch	% Savings	90.1-2016	NYStretch	% Savings	90.1-2016	NYStretch	% Savings	$/ft2	years
Large Office	4A	7.5%	60.0	58.0	3.4%	179.3	172.2	3.9%	$ 2.26	$ 2.16	4.1%	$ 0.28	3.1
	5A	1.0%	63.4	61.2	3.4%	180.6	173.1	4.1%	$ 2.24	$ 2.15	4.3%	$ 0.47	4.8
	6A	0.3%	64.4	62.1	3.5%	181.7	174.1	4.2%	$ 2.25	$ 2.15	4.4%	$ 0.30	3.0
Standalone Retail	4A	4.9%	44.5	39.1	12.1%	130.1	111.0	14.7%	$ 1.63	$ 1.38	15.4%	$ 3.89	15.6
	5A	7.1%	46.5	41.2	11.6%	129.9	110.0	15.3%	$ 1.60	$ 1.34	16.4%	$ 3.08	11.7
	6A	2.6%	48.6	43.4	10.7%	133.9	115.0	14.1%	$ 1.65	$ 1.40	15.1%	$ 3.27	13.2
Secondary School	4A	5.0%	37.0	33.9	8.5%	104.0	95.6	8.1%	$ 1.29	$ 1.18	8.0%	$ 0.61	6.0
	5A	3.7%	37.7	34.6	8.1%	101.2	92.9	8.2%	$ 1.24	$ 1.13	8.3%	$ 0.43	4.3
	6A	1.1%	38.2	35.0	8.3%	101.8	93.3	8.3%	$ 1.24	$ 1.14	8.3%	$ 0.65	6.3
Large Hotel	4A	3.5%	81.7	75.9	7.1%	187.4	172.2	8.1%	$ 2.17	$ 1.99	8.5%	$ 1.77	9.6
	5A	2.5%	83.3	77.7	6.8%	183.4	168.1	8.4%	$ 2.09	$ 1.90	9.0%	$ 1.55	8.3
	6A	1.8%	85.4	79.9	6.5%	185.1	170.0	8.2%	$ 2.09	$ 1.91	8.8%	$ 1.49	8.1
Full-Service Restaurant	4A	0.1%	380.3	341.6	10.2%	717.1	629.0	12.3%	$ 7.62	$ 6.60	13.3%	$ 5.59	5.5
	5A	0.3%	418.0	381.9	8.6%	741.4	661.8	10.7%	$ 7.63	$ 6.72	11.9%	$ 3.90	4.3
	6A	0.1%	439.9	403.5	8.3%	763.7	683.6	10.5%	$ 7.76	$ 6.85	11.7%	$ 4.18	4.6
Outpatient Healthcare	4A	2.0%	111.7	106.7	4.5%	314.6	296.5	5.8%	$ 3.90	$ 3.66	6.2%	$ 3.10	12.9
	5A	2.4%	112.9	108.2	4.2%	310.6	292.8	5.7%	$ 3.82	$ 3.58	6.2%	$ 2.70	11.5
	6A	1.0%	116.0	111.3	4.0%	316.4	298.6	5.6%	$ 3.88	$ 3.64	6.1%	$ 2.71	11.5
Warehouse	4A	2.5%	17.7	15.2	14.0%	37.4	32.4	13.5%	$ 0.42	$ 0.36	13.3%	$ 1.03	18.4
	5A	3.8%	23.9	20.6	13.8%	43.9	38.2	13.0%	$ 0.46	$ 0.40	12.6%	$ 0.60	10.4
	6A	1.2%	22.0	19.1	13.2%	44.2	38.3	13.4%	$ 0.48	$ 0.42	13.5%	$ 0.75	11.6
10-Story High-Rise Apartment	4A	21.9%	48.4	47.1	2.8%	96.0	93.1	3.0%	$ 1.04	$ 1.01	3.0%	$ 0.43	13.5
	5A	0.0%	54.5	52.5	3.6%	99.8	96.3	3.5%	$ 1.04	$ 1.01	3.5%	$ 0.38	10.5
	6A	0.0%	54.5	52.6	3.6%	99.8	96.2	3.5%	$ 1.04	$ 1.01	3.5%	$ 0.42	11.6
20-Story High-Rise Apartment	4A	23.5%	48.4	47.3	2.4%	106.4	103.1	3.1%	$ 1.21	$ 1.17	3.4%	$ 0.47	11.5
	5A	0.1%	54.4	53.2	2.3%	112.2	103.1	8.1%	$ 1.24	$ 1.17	6.0%	$ 0.43	10.3
	6A	0.1%	55.1	53.3	3.3%	113.0	108.7	3.8%	$ 1.25	$ 1.20	4.0%	$ 0.40	8.1
4A Totals	4A	70.9%	51.4	49.2	4.2%	120.6	114.5	5.1%	$ 1.41	$ 1.33	5.5%	$ 0.85	11.0
5A Totals	5A	20.9%	59.1	54.2	8.2%	147.5	132.8	10.0%	$ 1.76	$ 1.57	10.5%	$ 1.81	9.8
6A Totals	6A	8.2%	65.0	60.2	7.4%	159.1	144.3	9.3%	$ 1.88	$ 1.70	9.9%	$ 1.96	10.5
AGGREGATE VALUES		**100.0%**	**54.1**	**51.2**	**5.4%**	**129.4**	**120.7**	**6.7%**	**$ 1.52**	**$ 1.41**	**7.1%**	**$ 1.14**	**10.5**

Table 6. Energy Savings and Simple Payback by Building Type

Prototype	Construction Weight [%]	Site Energy [kBtu/ft2/yr]			Source Energy [kBtu/ft2/yr]			Energy Cost [$/ft2]			Incremental First Cost	Simple Payback
		90.1-2016	NYStretch	% Savings	90.1-2016	NYStretch	% Savings	90.1-2016	NYStretch	% Savings	$/ft2	years
Large Office	8.8%	60.5	58.5	3.4%	179.5	172.4	4.0%	$ 2.26	$ 2.16	4.1%	$ 0.31	3.27
Standalone Retail	14.6%	46.2	40.9	11.6%	130.7	111.2	14.9%	$ 1.62	$ 1.36	15.8%	$ 3.39	13.25
Secondary School	9.8%	37.4	34.3	8.3%	102.7	94.3	8.2%	$ 1.26	$ 1.16	8.1%	$ 0.55	5.36
Large Hotel	7.8%	83.1	77.4	6.9%	185.6	170.4	8.2%	$ 2.13	$ 1.94	8.7%	$ 1.64	8.84
Full-Service Restaurant	0.5%	414.9	378.2	8.8%	741.0	659.6	11.0%	$ 7.65	$ 6.72	12.1%	$ 4.29	4.60
Outpatient Healthcare	5.4%	113.0	108.2	4.3%	313.2	295.2	5.7%	$ 3.86	$ 3.62	6.1%	$ 2.85	12.03
Warehouse	7.5%	21.5	18.6	13.7%	41.8	36.3	13.2%	$ 0.45	$ 0.39	12.9%	$ 0.77	13.26
10-Story High-Rise Apartment	21.9%	48.4	47.1	2.8%	96.0	93.1	3.0%	$ 1.04	$ 1.01	3.0%	$ 0.43	11.45
20-Story High-Rise Apartment	23.7%	48.5	47.4	2.4%	106.4	103.2	3.1%	$ 1.21	$ 1.17	3.4%	$ 0.47	13.50
Weighted Average	**100.0%**	**54.1**	**51.2**	**5.4%**	**129.4**	**120.7**	**6.7%**	**$ 1.52**	**$ 1.41**	**7.1%**	**$ 1.14**	**10.50**

Additionally, the results of the 10- and 30-year life-cycle analyses are presented in Tables 7 and 8, respectively. The results show that the 10-year present value of energy savings between NYStretch and ASHRAE 90.1-2016 is greater than the installed cost of materials for most building types in each of the climate zones examined with the exception of Standalone Retail, Outpatient Healthcare and Warehouse in CZ4A. The net savings are aggregated based on the floor space-based weighting factors. The resulting aggregated energy cost savings, for all climate zones and prototypes, is greater than the installed cost of materials to achieve the savings of $0.18/sf over the 10-year period.

Table 7. 10-Year Present Values of Energy Cost Savings between ASHRAE 90.1-2016 and NYStretch

Prototype	Area	CZ	Construction Weight [%]	Annual Energy Cost		10 Year Life Cycle Energy Cost			Incremental First Cost	Residual Value at 10 years	Net Savings over 10 Years	
				90.1-2016	NYStretch	90.1-2016	NYStretch	Savings			Total	$/sf
Large Office	497,337	**4A**	7.5%	$ 1,122,721	$ 1,076,703	$ 10,392,669	$ 9,968,956	$ 423,714	$ 141,187	$ 37,036	$319,563	$0.64
		5A	1.0%	$ 1,115,954	$ 1,067,460	$ 10,349,779	$ 9,903,163	$ 446,616	$ 234,656	$ 40,924	$252,884	$0.51
		6A	0.3%	$ 1,119,808	$ 1,070,785	$ 10,389,609	$ 9,937,763	$ 451,846	$ 148,621	$ 23,746	$326,971	$0.66
Standalone Retail	24,630	**4A**	4.9%	$ 40,095	$ 33,936	$ 371,457	$ 314,777	$ 56,679	$ 95,821	$ 25,882	($13,259)	($0.54)
		5A	7.1%	$ 39,525	$ 33,042	$ 366,882	$ 307,296	$ 59,586	$ 75,788	$ 18,591	$2,389	$0.10
		6A	2.6%	$ 40,555	$ 34,425	$ 376,676	$ 320,293	$ 56,383	$ 80,645	$ 21,594	($2,668)	($0.11)
Secondary School	210,357	**4A**	5.0%	$ 270,675	$ 249,133	$ 2,511,847	$ 2,311,520	$ 200,327	$ 128,629	$ 54,590	$126,288	$0.60
		5A	3.7%	$ 260,020	$ 238,559	$ 2,417,702	$ 2,218,244	$ 199,458	$ 91,266	$ 35,287	$143,479	$0.68
		6A	1.1%	$ 260,845	$ 239,071	$ 2,426,145	$ 2,223,689	$ 202,456	$ 137,223	$ 55,849	$121,082	$0.58
Large Hotel	121,813	**4A**	3.5%	$ 264,267	$ 241,853	$ 2,477,276	$ 2,268,602	$ 208,673	$ 215,819	$ 58,057	$50,912	$0.42
		5A	2.5%	$ 254,323	$ 231,509	$ 2,390,220	$ 2,178,138	$ 212,083	$ 189,061	$ 46,283	$69,305	$0.57
		6A	1.8%	$ 255,157	$ 232,605	$ 2,400,350	$ 2,190,813	$ 209,537	$ 182,079	$ 45,577	$73,035	$0.60
Full-Service Restaurant	5,488	**4A**	0.1%	$ 41,811	$ 36,233	$ 397,393	$ 345,075	$ 52,318	$ 30,670	$ 9,805	$31,453	$5.73
		5A	0.3%	$ 41,857	$ 36,882	$ 400,005	$ 353,253	$ 46,751	$ 21,387	$ 7,721	$33,085	$6.03
		6A	0.1%	$ 42,607	$ 37,601	$ 408,012	$ 360,965	$ 47,046	$ 22,967	$ 8,675	$32,754	$5.97
Outpatient Healthcare	40,843	**4A**	2.0%	$ 159,158	$ 149,351	$ 1,476,791	$ 1,386,620	$ 90,171	$ 126,695	$ 30,589	($5,934)	($0.15)
		5A	2.4%	$ 155,998	$ 146,402	$ 1,448,966	$ 1,360,775	$ 88,191	$ 110,444	$ 24,158	$1,905	$0.05
		6A	1.0%	$ 158,498	$ 148,849	$ 1,472,744	$ 1,384,110	$ 88,634	$ 110,741	$ 25,228	$3,121	$0.08
Warehouse	51,914	**4A**	2.5%	$ 21,760	$ 18,870	$ 205,049	$ 177,741	$ 27,308	$ 53,254	$ 14,315	($11,631)	($0.22)
		5A	3.8%	$ 23,926	$ 20,919	$ 227,895	$ 199,092	$ 28,803	$ 31,272	$ 10,203	$7,734	$0.15
		6A	1.2%	$ 25,092	$ 21,707	$ 237,340	$ 205,358	$ 31,982	$ 39,118	$ 14,592	$7,455	$0.14
10-Story High-Rise Apartment	84,140	**4A**	21.9%	$ 87,838	$ 85,168	$ 831,581	$ 806,423	$ 25,157	$ 36,040	$ 12,192	$1,310	$0.02
		5A	0.0%	$ 87,886	$ 84,824	$ 837,400	$ 808,170	$ 29,230	$ 32,095	$ 11,372	$8,507	$0.10
		6A	0.0%	$ 87,795	$ 84,762	$ 836,627	$ 807,645	$ 28,982	$ 35,330	$ 13,443	$7,094	$0.08
20-Story High-Rise Apartment	168,279	**4A**	23.5%	$ 203,645	$ 196,793	$ 1,914,173	$ 1,850,628	$ 63,545	$ 78,578	$ 22,905	$7,872	$0.05
		5A	0.1%	$ 209,293	$ 202,329	$ 1,975,537	$ 1,910,836	$ 64,701	$ 71,908	$ 21,836	$14,629	$0.09
		6A	0.1%	$ 210,112	$ 201,789	$ 1,984,121	$ 1,906,196	$ 77,926	$ 67,193	$ 20,681	$31,414	$0.19
4A Totals		**4A**	70.9%	$ 253,616	$ 242,215	$ 2,365,240	$ 2,259,659	$ 105,581	$ 83,955	$ 25,162	$46,788	$0.11
5A Totals		**5A**	20.9%	$ 167,142	$ 154,337	$ 1,556,783	$ 1,438,147	$ 118,636	$ 1,558,123	$ 24,902	$781,499	$0.37
6A Totals		**6A**	8.2%	$ 170,912	$ 157,469	$ 1,595,414	$ 1,470,838	$ 124,576	$ 1,252,578	$ 30,782	$617,704	$0.30
AGGREGATE VALUES			**100.0%**	**$ 228,761**	**216,899**	**$ 2,133,146**	**$ 2,023,280**	**$ 109,867**	**$ 88,326**	**$ 25,568**	**$47,109**	**$0.18**

Table 8 shows that over 30 years, the present value of the energy savings is worth more than the first, maintenance and replacement costs for each of the buildings in each of the climate zones examined, with the exception of Standalone Retail in CZ4A. The resulting aggregated energy cost savings, for all climate zones and prototypes, is greater than the installed cost of materials to achieve the savings of $0.81/sf over the 30-year period.

Table 8. 30-Year Present Values of Energy Cost Savings between ASHRAE 90.1-2016 and NYStretch

Prototype	CZ	Construction Weights	Incremental First Cost	Replacement Costs	Maintenance Costs	Residual Value	Energy Cost Savings	30 Year Net Present Value of Savings	
								Total	$/sf
Large Office	4A	7.5%	$141,187	$72,568	$0	($5,456)	$1,044,138	$824,927	$1.66
	5A	1.0%	$234,656	$90,142	$0	($6,118)	$1,100,573	$769,657	$1.55
	6A	0.3%	$148,621	$35,951	$0	($3,995)	$1,113,447	$924,879	$1.86
Standalone Retail	4A	4.9%	$95,821	$49,532	$0	($458)	$139,674	($6,138)	($0.25)
	5A	7.1%	$75,788	$36,331	$0	($1,298)	$146,839	$33,422	$1.36
	6A	2.6%	$80,645	$38,657	$0	($420)	$138,944	$19,222	$0.78
Secondary School	4A	5.0%	$128,629	$54,294	$0	$6,911	$493,589	$317,577	$1.51
	5A	3.7%	$91,266	$31,305	$0	$1,169	$491,451	$370,049	$1.76
	6A	1.1%	$137,223	$44,735	$0	$6,162	$491,451	$315,656	$1.50
Large Hotel	4A	3.5%	$215,819	$135,226	$0	$2,880	$514,145	$165,980	$1.36
	5A	2.5%	$189,061	$107,301	$0	$2,495	$522,556	$228,690	$1.88
	6A	1.8%	$182,079	$107,446	$0	$2,407	$516,287	$229,169	$1.88
Full Service Restaurant	4A	0.1%	$30,670	$31,248	$0	$3,649	$128,892	$70,624	$12.87
	5A	0.3%	$21,387	$24,554	$0	$2,871	$115,174	$72,105	$13.14
	6A	0.1%	$22,967	$24,552	$0	$2,703	$115,901	$71,084	$12.95
Outpatient Healthcare	4A	2.0%	$126,695	$62,998	$0	$519	$222,209	$33,035	$0.81
	5A	2.4%	$110,444	$49,572	$0	$452	$217,331	$57,766	$1.41
	6A	1.0%	$110,741	$51,869	$0	$395	$218,424	$56,209	$1.38
Warehouse	4A	2.5%	$53,254	($2,443)	$0	$28	$67,271	$16,487	$0.32
	5A	3.8%	$31,272	($781)	$0	$22	$70,939	$40,470	$0.78
	6A	1.2%	$39,118	($1,274)	$0	$21	$78,783	$40,960	$0.79
10 Story Highrise Apartment	4A	21.9%	$36,040	$11,036	$0	$1,015	$61,974	$15,914	$0.19
	5A	0.0%	$32,095	$9,033	$0	$937	$71,995	$31,805	$0.38
	6A	0.0%	$35,330	$8,116	$0	$551	$71,382	$28,488	$0.34
20 Story Highrise Apartment	4A	23.5%	$78,578	$40,382	$0	$3,972	$156,575	$41,587	$0.25
	5A	0.1%	$71,908	$36,963	$0	$5,132	$159,420	$55,681	$0.33
	6A	0.1%	$67,193	$35,250	$0	$4,213	$191,984	$93,754	$0.56
4A Totals	4A	70.9%	$83,955	$40,133	$0	$1,671	$260,157	$137,741	$0.52
5A Totals	5A	20.9%	$94,765	$41,112	$0	($107)	$292,323	$156,339	$1.57
6A Totals	6A	8.2%	$109,714	$50,027	$0	$1,211	$305,970	$147,441	$1.38
AGGREGATE VALUES			**$88,326**	**$41,149**	**$0**	**$1,262**	**$270,636**	**$142,423**	**$0.81**

Appendix A.

Differences between 2020 NYStretch Energy Code and ASHRAE 90.1-2016

by DOE Prototype and Climate Zone

Note: This appendix adopts the EEM numbering convention used in the PNNL report, Final Energy Savings Analysis of the Proposed NYStretch-Energy Code 2018, February 2019 (PNNL-ACT-10073, Rev. 1).

The following EEMs were not included in Vidaris' analysis as they are not considered stretch measures with respect to ASHRAE 90.1-2016:

- EEM 5 Occupancy Sensors and Automatic Lighting Controls
- EEM 6 Exterior Lighting Controls
- EEM 8 Hotel Guestroom HVAC Vacancy Control
- EEM 14 ERV for Apartment Makeup Air Units

The following EEMs were not included in the final version of the 2020 NYStretch Energy Code:

- EEM 9 High-efficiency SHW (Refer to Appendix C for further discussion)
- EEM 15 Demand-based Controls for Recirculated SHW systems

EEM 1 Enhanced Insulation for Roofs and Walls

This measure amends Table C402.1.4 with more stringent U-factors for opaque thermal envelope assemblies. The ASHRAE compliance path is required to comply with this revision per section C401.2.1.a of NYStretch.

Cost data for this measure was developed by determining an insulation cost per R-value from RSMeans and applying this to the additional insulation required to achieve the improved U-values specified in table C402.1.4. It was assumed that continuous mineral fiber would be used to meet the required thermal performance for walls; additional extruded polystyrene was used to meet the increased performance for roofs. This requirement applies to each of the building prototypes as follows.

OPAQUE THERMAL ENVELOPE (U-factor)	NYStretch	ASHRAE 90.1 -2016
Large office, Stand-alone retail		
CLIMATE ZONE 4		
Roofs: insulation entirely above deck	0.030	0.032
Walls, above grade: mass (non-res)	0.099	0.104
CLIMATE ZONE 5		
Roofs: insulation entirely above deck	0.030	0.032
Walls, above grade: mass (non-res)	0.086	0.090
CLIMATE ZONE 6		
Roofs: insulation entirely above deck	0.029	0.032
Walls, above grade: mass (non-res)	0.076	0.080
Full-Service Restaurant[3]		
CLIMATE ZONE 4		
Roofs: attic and other	0.020	0.021
Walls, above grade: steel framed (non-res)	0.061	0.064
CLIMATE ZONE 5		
Roofs: attic and other	0.020	0.021
Walls, above grade: steel framed (non-res)	0.052	0.055
CLIMATE ZONE 6		
Roofs: attic and other	0.019	0.021
Walls, above grade: steel framed (non-res)	0.047	0.049
Secondary School, Outpatient Healthcare		
CLIMATE ZONE 4		
Roofs: insulation entirely above deck	0.030	0.032
Walls, above grade: steel framed (non-res)	0.061	0.064
CLIMATE ZONE 5		
Roofs: insulation entirely above deck	0.030	0.032
Walls, above grade: steel framed (non-res)	0.052	0.055
CLIMATE ZONE 6		
Roofs: insulation entirely above deck	0.029	0.032
Walls, above grade: steel framed (non-res)	0.047	0.049

[3] U-factor for attic roof in the NYStretch model was revised to reflect updated draft requirements

OPAQUE THERMAL ENVELOPE (U-factor)	NYStretch	ASHRAE 90.1 -2016
Large Hotel		
CLIMATE ZONE 4		
Roofs: insulation entirely above deck	0.030	0.032
Walls, above grade: mass (residential)	0.086	0.090
CLIMATE ZONE 5		
Roofs: insulation entirely above deck	0.030	0.032
Walls, above grade: mass (residential)	0.076	0.080
CLIMATE ZONE 6		
Roofs: insulation entirely above deck	0.029	0.032
Walls, above grade: mass (residential)	0.067	0.071
Warehouse [4]		
CLIMATE ZONE 4		
Roofs: metal building	0.035	0.037
Walls, above grade: metal building	0.048	0.060
CLIMATE ZONE 5		
Roofs: metal building	0.035	0.037
Walls, above grade: metal building	0.048	0.050
CLIMATE ZONE 6		
Roofs: metal building	0.028	0.031
Walls, above grade: metal building	0.048	0.050
10-Story Apartment, 20-Story Apartment		
CLIMATE ZONE 4		
Roofs: insulation entirely above deck	0.030	0.032
Walls, above grade: steel framed (residential)	0.061	0.064
CLIMATE ZONE 5		
Roofs: insulation entirely above deck	0.030	0.032
Walls, above grade: steel framed (residential)	0.052	0.055
CLIMATE ZONE 6		
Roofs: insulation entirely above deck	0.029	0.032
Walls, above grade: steel framed (residential)	0.044	0.049

[4] U-factor for metal building walls and roof in the NYStretch model were revised to reflect updated 2020 NYStretch requirements.

EEM 2 Enhanced Fenestration

This measure amends Table C402.2.4 with more stringent U-factors and SHGCs for building envelope fenestration assemblies. The ASHRAE compliance path is required to comply with this revision per section C401.2.1.b of NYStretch. Currently under the 2020 NYS ECCC, there is a proposed revision to 2018 IECC such that north-facing vertical fenestration will be required to meet the SHGC requirements applicable to south, east and west facing fenestration. Consequently, this analysis assumes all orientations will meet the SHGC requirements for the south, east, and west orientations. Window performance in the energy models is based on weighting factors provided by PNNL for fixed, operable, and non-metal framing for each of the building prototypes. This requirement applies to all the building prototypes. Vidaris revised the U-factors in the PNNL NYStretch models to reflect the current NYStretch requirements.

Cost data for this measure was developed based on the incremental costs between windows with respect to decreased U-factor in PNNL's national cost effectiveness analysis.

VERTICAL FENESTRATION (U-Factor)	**NYStretch**	**ASHRAE 90.1-2016**
Large Office, Stand-alone Retail, Secondary School, Large Hotel, Full-Service Restaurant, Outpatient Healthcare, Warehouse, 10-Story High-Rise Apartment, and 20-Story High-Rise Apartment		
CLIMATE ZONE 4		
Fixed fenestration (metal)	0.36	0.38
Operable fenestration (metal)	0.43	0.46
Non-metal	0.30	0.31
SHGC	0.36	0.36
Skylight U	0.48	0.50
Skylight SHGC	0.38	0.40
CLIMATE ZONE 5		
Fixed fenestration (metal)	0.36	0.38
Operable fenestration (metal)	0.43	0.46
Non-metal	0.27	0.31
SHGC	0.38	0.38
Skylight U	0.48	0.50
Skylight SHGC	0.38	0.40
CLIMATE ZONE 6		
Fixed fenestration (metal)	0.34	0.36
Operable fenestration (metal)	0.41	0.45
Non-metal	0.27	0.30
SHGC	0.40	0.40
Skylight U	0.48	0.50
Skylight SHGC	0.38	0.40

EEM 3 Air Leakage Testing for Mid-sized Buildings

This measure amends section 5.4.3.1.3 to add a requirement for buildings 25,000 to 50,000 square feet and less than or equal to 75 feet in height to comply with whole building pressurization testing and air barrier requirements. Previously, testing was not required.

For this analysis, the new testing requirement applied only to the Outpatient Healthcare and Warehouse prototypes. The difference between 90.1-2016 and NYStretch are as follows:

AIR LEAKAGE [cfm/sf]	NYStretch	90.1-2016
Outpatient Healthcare	0.40	1.00
Warehouse	0.40	1.00

Infiltration testing was assumed to be done once to confirm compliance. Any additional testing would be optional since it would not necessarily be required for compliance but would be an aid during construction. Costing for this measure was based on Vidaris experience with this work and feedback from industry professionals. For CZ 5A and 6A the size of the Outpatient Healthcare allows for a cost of $3,200, and $8,500 for climate CZ 4A due to complexity related testing in locations like New York City.

The Warehouse was considered more complex due to the volume and height of a typical warehouse with greater cost of testing equipment and more effort to do the work. Ultimately, the cost was judged to be twice that of the Outpatient Healthcare, or about $17,000 for CZ 4A and $6,400 for CZs 5A and 6A.

EEM 4 Reduced LPD for Interior Lighting

This measure amends Tables C405.3.2(1) and C405.3.2(2) with reduced lighting power densities (LPD). The ASHRAE compliance path is required to comply with this revision per section C401.2.1.c of NYStretch. The ASHRAE compliance path is also directed to follow the requirements of section C406—Additional Efficiency Package Options. Per direction from NYSERDA, the analysis is based on Option 2—reduced lighting power in accordance with section C406.3, which specifies an additional 10% reduction in connected lighting power. This requirement applies to all the building prototypes.

Previous cost estimates from PNNL associate a lower first cost for buildings with lower LPD; based on feedback from lighting design professionals, it is anticipated there will be no cost associated with this measure. LPDs are based on the space-by-space method unless indicated otherwise.

INTERIOR LIGHTING POWER DENSITY (W/ft^2)	NYStretch	NYStretch less 10%	90.1-2016
Large Office			
Office (building area method)	0.69	0.62	0.79
Stand-Alone Retail			
BOH (area weighted average)	0.50	0.45	
Sales Area	1.06	0.95	1.22
Lobby[5]	0.90	0.81	1.00
Display lighting - type 1,2,3 (area weighted average)	0.32	0.29	
Secondary School			
Classroom	0.74	0.67	0.92
Corridor	0.58	0.52	0.66
Lobby[5]	0.90	0.81	1.00
Mechanical[5]	0.39	0.35	0.43
Restroom	0.75	0.68	0.85
Office	0.85	0.77	0.93
Gymnasium/exercise area[5]	0.50	0.45	0.50
Kitchen/Food Preparation Area	0.92	0.83	1.06
Cafeteria/Dining	0.53	0.48	0.63
Library/reading area (Building Area Method)	0.78	0.70	0.82
Audience seating area – auditorium[5]	0.63	0.57	0.63
Large Hotel			
Office (Building Area Method)	0.69	0.62	0.79
Retail (Building Area Method)	0.91	0.82	1.06
Mechanical rooms[5]	0.39	0.35	0.43
Storage	0.43	0.39	0.46
Laundry Room	0.43	0.39	0.43
Dining Area - family dining[5]	0.54	0.49	0.71
Lobby – hotel	0.68	0.61	1.06
Guest rooms	0.75	0.68	0.77
Corridor	0.58	0.52	0.66
Kitchen/Food Preparation Area	0.92	0.83	1.06
10-story Apartment			
Office - enclosed[5]	0.85	0.77	0.93
Corridor	0.58	0.52	0.792
Stairwell	0.50	0.45	0.58
Mechanical rooms[5]	0.39	0.35	0.43

[5] LPDs in PNNL's NYStretch model were revised to reflect current NYStretch code requirements.

INTERIOR LIGHTING POWER DENSITY (W/ft2)	NYStretch	NYStretch less 10%	90.1-2016
20-story Apartment			
Office - enclosed[6]	0.85	0.77	0.93
Corridor	0.58	0.52	0.792
Stairwell	0.50	0.45	0.58
Mechanical rooms[7]	0.39	0.35	0.43
Sales Area[7]	1.06	0.954	1.22
Display lighting - retail type 3[7] (weighted average)	1.05	0.945	1.05
Display lighting - retail type 2[7] (weighted average)	0.45	0.405	0.45
Display lighting - retail type 1[7] (weighted average)	0.45	0.405	0.45
Additional retail allowance [Watts] [7]	1,000	900	1,000
Outpatient Healthcare			
Conference/Meeting/Multipurpose	0.93	0.84	1.07
Corridor	0.58	0.52	0.792
Dining Area - cafeteria/fast food	0.53	0.48	0.63
Healthcare Facility - nurse station	0.75	0.68	0.81
Healthcare Facility - patient room	0.45	0.41	0.62
Healthcare Facility - physical therapy	0.84	0.76	0.84
Healthcare Facility - recovery room	0.89	0.80	1.03
Healthcare Facility - exam/treatment	1.16	1.04	1.68
Healthcare Facility - imaging room	0.98	0.88	1.06
Healthcare Facility - operating room	1.87	1.68	2.17
Lobby - all other[7]	0.90	0.81	1.00
Lounge/breakroom – healthcare[7]	0.53	0.48	0.78
Office - enclosed >250 sf[7]	0.85	0.77	0.93
Restroom[7]	0.75	0.68	0.85
Storage room, 50-100 sf	0.43	0.39	0.46
Full-service Restaurant			
Dining Area - family dining	0.54	0.49	0.71
Kitchen/Food Preparation Area	0.92	0.83	1.06
Warehouse			
Office (Building Area Method)	0.69	0.62	0.79
Warehouse - storage- medium to bulky	0.27	0.24	0.35
Warehouse - storage - small hand carried items	0.65	0.59	0.69

[6] LPDs in PNNL's NYStretch model were revised to reflect current NYStretch draft code requirements

EEM 7 Reduced Fan Power Allowances

This measure found in Tables C403.8.1(1) and 6.5.3.1-1 limits the fan energy used by heating, ventilation, and air-conditioning (HVAC) equipment. It requires that variable air volume (VAV) systems use no more than 0.0010 bhp/cfm and constant air volume (CAV) systems use no more than 0.00088 bhp/cfm for fan power. These limits only apply to fan motors larger than 5 nameplate horsepower; smaller fan sizes are not regulated in either code. This requirement applies to the large office, standalone retail, secondary school, large hotel, and outpatient healthcare building prototypes. Vidaris revised the PNNL NYStretch models to reflect current NYStretch code requirements for these fan systems.

Costing for this measure was based on increased system capacities for larger air handling equipment that would result in increased cross-sectional areas of the unit and components (e.g., coils, filters, ducts, unit housings, etc.) that would reduce the static pressure, and thus the brake horsepower, for the affected systems. For constant volume fans, this required an increased capacity of 3.2%; variable volume systems required a 13.4% increase in capacity.

Fan Power Allowance	NYStretch	90.1-2016
Large Office, Standalone Retail, Secondary School, Large Hotel, and Outpatient Healthcare		
CV (bhp/cfm)	0.00088	0.00094
VAV (bhp/cfm)	0.00100	0.00130

EEM 10 High-efficiency Commercial Kitchen Equipment

EEM10 reduces plug load energy usage. This measure upgrades major commercial kitchen appliances to ENERGY STAR®.

Costing for this measure was based on equipment lists from previous projects and the incremental costs from the Savings Calculator for ENERGY STAR® Commercial Kitchen Equipment developed by the U.S. EPA and DOE.[7] To account for the variation of kitchen sizes in the affected prototypes, an incremental cost per square foot was used.

Affected prototypes: secondary school, full-service restaurant, and large hotel.

[7] The Savings Calculator for Energy Commercial Kitchen Equipment is available at https://www.energystar.gov/sites/.../commercial_kitchen_equipment_calculator.xlsx

EEM 11 Thermal Bridging Reduction

EEM11 addresses the mandatory provision in NYStretch to include a minimum R-3 thermal break at penetrations, including parapet walls and balcony projections. None of the prototypes include balconies. Each building with a flat roof is assumed to have a parapet that is 42 in. high and follows the perimeter of the roof.

This analysis assumes that each prototype meets prescriptive requirements of the code. This measure simply requires that elements of the envelope that are noncompliant have an R-value no less than R-3, which is itself less than code compliant. Consequently, the remainder of the envelope systems would have to be improved to reach overall code compliance.

Consequently, this measure does not result in any energy savings. Additional insulation is included in the lifecycle cost analysis to address the additional cost of meeting the prescriptive requirements for opaque envelope assemblies.

Costing for this measure was based on the assumption of additional mineral wool insulation at the parapet to eliminate thermal bridging. It was assumed that this will require 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck = 9 ft of total insulation of R-4.2/in for entire perimeter of roof.

Affected prototypes: large office, standalone retail, secondary school, large hotel, outpatient healthcare, 10-story high-rise apartment, and 20-story high-rise apartment.

EEM 12 Exterior Lighting Power Reduction

This measure modifies Table C405.4.2(2) with reduced exterior lighting power allowances. As allowances vary by lighting zone, the model uses an average of lighting zones for each protype building; these averages were developed by PNNL for the national analysis of ASHRAE 90.1-2016. Following the methodology used by PNNL's analysis of NYStretch, it is assumed there are no parking lots for prototypes in climate zone 4A. PNNL also excluded exterior lighting for 10-story and 20-story apartment prototypes as the majority of these buildings are in climate zone 4A and have no or limited exterior lighting.

At the time of this analysis, this measure is only included in the IECC overlay of the NYStretch draft. Vidaris included this measure in the analysis at NYSERDA's direction as the final version of the code is anticipated to include it in the ASHRAE path as well.

Based on an analysis of typical parking lot lighting, it was determined that standard metal halide lamps could be used to achieve the LPD limits for NYStretch. As there is only a minimal reduction in façade and entryway lighting, it was assumed there is no incremental cost for this measure.

	Façade W/sf]		Doors [W/lf]		Parking lot [W/sf] *	
Lighting Zone	NYStretch	90.1-2016	NYStretch	2016	NYStretch	2016
1	0.000	0.000	12.6	14.0	0.03	0.03
2	0.075	0.100	12.6	14.0	0.04	0.04
3	0.113	0.150	20.0	21.0	0.05	0.06
4	0.150	0.200	20.0	21.0	0.05	0.08

*Parking lot lighting is only included in climate zones 5A and 6A

Lighting Zone	Prototype	Façade W/sf]		Doors [W/lf]		Parking lot [W/sf] *	
		NYStretch	90.1-2016	NYStretch	2016	NYStretch	2016
4	Large Office	0.150	0.200	20.0	21.0	0.050	0.080
2,3	Stand-alone Retail	0.094	0.125	16.3	17.5	0.045	0.050
2,3	Secondary School	0.094	0.125	16.3	17.5	0.045	0.050
3,4	Large Hotel	0.132	0.175	20.0	21.0	0.050	0.070
2,3,4	Full-service Restaurant	0.113	0.150	17.5	18.7	0.050	0.060
2,3	Outpatient Healthcare	0.094	0.125	16.3	17.5	0.045	0.050
2,3	Warehouse	0.094	0.125	16.3	17.5	0.045	0.050
3,4	10 Story Mid-Rise Apt.	n/a		n/a		n/a	
3,4	20 Story High-Rise Apt.	n/a		n/a		n/a	

* Parking lot lighting is only included in climate zones 5A and 6A

EEM 13 Efficient Elevator, Regenerative Drives

This measure requires regenerative drives for elevator motors with a rise of 75 feet or greater. The PNNL NYStretch models included this as a 5% power reduction for the elevator motors.

Costing for this measure was based on data from previous projects.

Prototype Building	NYStretch [W, total]	90.1-2016 [W, total]
LARGE OFFICE – (12) 30hp motors	232,222	244,444
10-STORY APARTMENT – (1) 30hp motor	19,352	20,371
20-STORY APARTMENT – (2) 30hp motors	19,352	20,371

Appendix B

Differences in Energy Performance, and Annual Energy Cost between 2020 NYStretch Energy Code and ASHRAE 90.1-2016

by Climate Zone and Building Type

TABLE B1: Differences in Energy Performance, and Annual Energy Cost between ASHRAE 90.1-2016 and 2020 NYStretch by Climate Zone and Building Type (Part A)

		Energy Usage		Total (kBtu)		Energy Cost			EUI (kBtu/sf)		ECI ($/sf)			Weighting Factors
		kWh	therms	Site	Source	Electricity	Gas	Total	Site	Source	Electricity	Gas	Total	
Large Office		497,337	square feet											
4A	ASHRAE 90.1-2016	7,404,873	45,821	29,847,478	89,183,930	1,092,219	30,503	1,122,721	60.01	179.32	2.196	0.061	$ 2.26	
4A	NYStretch	7,090,011	46,458	28,836,870	85,662,437	1,045,777	30,927	1,076,703	57.98	172.24	2.103	0.062	$ 2.16	
4A	Savings	314,861	(637)	1,010,608	3,521,492	46,442	(424)	46,018	2.03	7.08	0.093	(0.001)	$ 0.09	7.5%
5A	ASHRAE 90.1-2016	7,261,025	67,527	31,527,310	89,817,293	1,071,001	44,953	1,115,954	63.39	180.60	2.153	0.090	$ 2.24	
5A	NYStretch	6,929,778	68,076	30,452,005	86,099,862	1,022,142	45,318	1,067,460	61.23	173.12	2.055	0.091	$ 2.15	
5A	Savings	331,247	(549)	1,075,306	3,717,431	48,859	(366)	48,493	2.16	7.47	0.098	(0.001)	$ 0.10	1.0%
6A	ASHRAE 90.1-2016	7,265,584	72,306	32,020,810	90,369,650	1,071,674	48,134	1,119,808	64.38	181.71	2.155	0.097	$ 2.25	
6A	NYStretch	6,932,525	72,462	30,900,009	86,590,416	1,022,547	48,238	1,070,785	62.13	174.11	2.056	0.097	$ 2.15	
6A	Savings	333,059	(156)	1,120,801	3,779,234	49,126	(104)	49,022	2.25	7.60	0.099	(0.000)	$ 0.10	0.3%
Standalone Retail		24,630	square feet											
4A	ASHRAE 90.1-2016	262,889	1,981	1,095,100	3,203,339	38,776	1,319	40,095	44.46	130.06	1.574	0.054	$ 1.63	
4A	NYStretch	220,589	2,102	962,803	2,733,881	32,537	1,399	33,936	39.09	111.00	1.321	0.057	$ 1.38	
4A	Savings	42,300	(120)	132,297	469,458	6,239	(80)	6,159	5.37	19.06	0.253	(0.003)	$ 0.25	4.9%
5A	ASHRAE 90.1-2016	255,586	2,742	1,146,310	3,199,822	37,699	1,826	39,525	46.54	129.91	1.531	0.074	$ 1.60	
5A	NYStretch	210,720	2,946	1,013,551	2,709,799	31,081	1,961	33,042	41.15	110.02	1.262	0.080	$ 1.34	
5A	Savings	44,867	(203)	132,759	490,023	6,618	(135)	6,483	5.39	19.90	0.269	(0.005)	$ 0.26	7.1%
6A	ASHRAE 90.1-2016	261,103	3,068	1,197,708	3,296,796	38,513	2,043	40,555	48.63	133.85	1.564	0.083	$ 1.65	
6A	NYStretch	218,834	3,225	1,069,137	2,831,477	32,278	2,147	34,425	43.41	114.96	1.310	0.087	$ 1.40	
6A	Savings	42,269	(157)	128,571	465,319	6,235	(104)	6,131	5.22	18.89	0.253	(0.004)	$ 0.25	2.6%
Secondary School		210,357	square feet											
4A	ASHRAE 90.1-2016	1,753,599	18,055	7,788,751	21,874,479	258,656	12,019	270,675	37.03	103.99	1.230	0.057	$ 1.29	
4A	NYStretch	1,616,146	16,151	7,129,347	20,108,691	238,381	10,751	249,133	33.89	95.59	1.133	0.051	$ 1.18	
4A	Savings	137,453	1,904	659,404	1,765,788	20,274	1,268	21,542	3.13	8.39	0.096	0.006	$ 0.10	5.0%
5A	ASHRAE 90.1-2016	1,660,790	22,612	7,927,850	21,294,010	244,967	15,053	260,020	37.69	101.23	1.165	0.072	$ 1.24	
5A	NYStretch	1,523,268	20,845	7,281,909	19,541,774	224,682	13,877	238,559	34.62	92.90	1.068	0.066	$ 1.13	
5A	Savings	137,522	1,767	645,941	1,752,236	20,285	1,176	21,461	3.07	8.33	0.096	0.006	$ 0.10	3.7%
6A	ASHRAE 90.1-2016	1,662,210	23,538	8,025,261	21,407,104	245,176	15,669	260,845	38.15	101.77	1.166	0.074	$ 1.24	
6A	NYStretch	1,523,135	21,645	7,361,422	19,623,981	224,662	14,409	239,071	34.99	93.29	1.068	0.068	$ 1.14	
6A	Savings	139,075	1,893	663,839	1,783,124	20,514	1,260	21,774	3.16	8.48	0.098	0.006	$ 0.10	1.1%

* **Negative Savings** indicate that NYStretch results in higher energy use or cost relative to ASHRAE 90.1 - 2016

TABLE B1: Differences in Energy Performance, and Annual Energy Cost between ASHRAE 90.1-2016 and 2020 NYStretch by Climate Zone and Building Type (Part B)

		Energy Usage		Total (kBtu)		Energy Cost			EUI (kBtu/sf)		ECI ($/sf)			Weighting Factors
		kWh	therms	Site	Source	Electricity	Gas	Total	Site	Source	Electricity	Gas	Total	
Large Hotel		121,813	square feet											
4A	ASHRAE 90.1-2016	1,587,057	45,330	9,947,992	22,832,229	234,091	30,176	264,267	81.67	187.44	1.922	0.248	$ 2.17	
4A	NYStretch	1,445,229	43,085	9,239,607	20,980,929	213,171	28,681	241,853	75.85	172.24	1.750	0.235	$ 1.99	
4A	Savings	141,828	2,245	708,385	1,851,300	20,920	1,494	22,414	5.82	15.20	0.172	0.012	$ 0.18	3.5%
5A	ASHRAE 90.1-2016	1,496,437	50,472	10,153,016	22,337,909	220,725	33,599	254,323	83.35	183.38	1.812	0.276	$ 2.09	
5A	NYStretch	1,350,487	48,539	9,461,786	20,472,318	199,197	32,312	231,509	77.67	168.06	1.635	0.265	$ 1.90	
5A	Savings	145,950	1,932	691,231	1,865,591	21,528	1,286	22,814	5.67	15.32	0.177	0.011	$ 0.19	2.5%
6A	ASHRAE 90.1-2016	1,489,832	53,188	10,402,112	22,547,031	219,750	35,407	255,157	85.39	185.10	1.804	0.291	$ 2.09	
6A	NYStretch	1,345,009	51,399	9,729,110	20,709,350	198,389	34,216	232,605	79.87	170.01	1.629	0.281	$ 1.91	
6A	Savings	144,822	1,789	673,001	1,837,681	21,361	1,191	22,552	5.52	15.09	0.175	0.010	$ 0.19	1.8%
Full Service Restaurant		5,488	square feet											
4A	ASHRAE 90.1-2016	223,706	13,240	2,087,321	3,935,635	32,997	8,814	41,811	380.33	717.11	6.012	1.606	$ 7.62	
4A	NYStretch	190,350	12,252	1,874,650	3,452,004	28,077	8,156	36,233	341.58	628.99	5.116	1.486	$ 6.60	
4A	Savings	33,356	989	212,671	483,631	4,920	658	5,578	38.75	88.12	0.896	0.120	$ 1.02	0.1%
5A	ASHRAE 90.1-2016	213,031	15,675	2,294,327	4,068,852	31,422	10,435	41,857	418.05	741.39	5.725	1.901	$ 7.63	
5A	NYStretch	183,745	14,691	2,096,005	3,632,083	27,102	9,780	36,882	381.91	661.80	4.938	1.782	$ 6.72	
5A	Savings	29,286	984	198,322	436,769	4,320	655	4,975	36.14	79.58	0.787	0.119	$ 0.91	0.3%
6A	ASHRAE 90.1-2016	212,659	16,885	2,414,046	4,191,286	31,367	11,240	42,607	439.86	763.70	5.715	2.048	$ 7.76	
6A	NYStretch	183,195	15,893	2,214,359	3,751,697	27,021	10,580	37,601	403.48	683.60	4.924	1.928	$ 6.85	
6A	Savings	29,464	992	199,687	439,589	4,346	660	5,006	36.38	80.10	0.792	0.120	$ 0.91	0.1%
Outpatient Healthcare		40,843	square feet											
4A	ASHRAE 90.1-2016	1,032,065	10,408	4,562,204	12,851,209	152,230	6,929	159,158	111.70	314.65	3.727	0.170	$ 3.90	
4A	NYStretch	964,334	10,684	4,358,667	12,108,201	142,239	7,112	149,351	106.72	296.46	3.483	0.174	$ 3.66	
4A	Savings	67,731	(276)	203,537	743,009	9,990	(183)	9,807	4.98	18.19	0.245	(0.004)	$ 0.24	2.0%
5A	ASHRAE 90.1-2016	1,004,067	11,865	4,612,345	12,684,663	148,100	7,898	155,998	112.93	310.57	3.626	0.193	$ 3.82	
5A	NYStretch	937,570	12,183	4,417,320	11,960,217	138,292	8,110	146,402	108.15	292.83	3.386	0.199	$ 3.58	
5A	Savings	66,497	(319)	195,025	724,447	9,808	(212)	9,596	4.77	17.74	0.240	(0.005)	$ 0.23	2.5%
6A	ASHRAE 90.1-2016	1,017,373	12,672	4,738,507	12,920,854	150,063	8,436	158,498	116.02	316.35	3.674	0.207	$ 3.88	
6A	NYStretch	950,276	13,044	4,546,734	12,195,118	140,166	8,683	148,849	111.32	298.58	3.432	0.213	$ 3.64	
6A	Savings	67,097	(372)	191,773	725,736	9,897	(247)	9,649	4.70	17.77	0.242	(0.006)	$ 0.24	1.0%

* **Negative Savings** indicate that NYStretch results in higher energy use or cost relative to ASHRAE 90.1 - 2016

TABLE B1: Differences in Energy Performance, and Annual Energy Cost between ASHRAE 90.1-2016 and 2020 NYStretch by Climate Zone and Building Type (Part C)

		Energy Usage		Total (kBtu)		Energy Cost			EUI (kBtu/sf)		ECI ($/sf)			Weighting Factors
		kWh	therms	Site	Source	Electricity	Gas	Total	Site	Source	Electricity	Gas	Total	
Warehouse		51,914	square feet											
4A	ASHRAE 90.1-2016	125,317	4,921	919,663	1,943,329	18,484	3,276	21,760	17.72	37.43	0.356	0.063	$ 0.42	
4A	NYStretch	109,025	4,189	790,848	1,681,000	16,081	2,788	18,870	15.23	32.38	0.310	0.054	$ 0.36	
4A	Savings	16,292	732	128,814	262,330	2,403	487	2,890	2.48	5.05	0.046	0.009	$ 0.06	2.5%
5A	ASHRAE 90.1-2016	125,589	8,115	1,240,006	2,280,859	18,524	5,402	23,926	23.89	43.94	0.357	0.104	$ 0.46	
5A	NYStretch	110,586	6,921	1,069,439	1,984,898	16,311	4,607	20,919	20.60	38.23	0.314	0.089	$ 0.40	
5A	Savings	15,003	1,194	170,567	295,961	2,213	795	3,008	3.29	5.70	0.043	0.015	$ 0.06	3.8%
6A	ASHRAE 90.1-2016	140,039	6,664	1,144,259	2,293,664	20,656	4,437	25,092	22.04	44.18	0.398	0.085	$ 0.48	
6A	NYStretch	120,967	5,805	993,282	1,986,376	17,843	3,865	21,707	19.13	38.26	0.344	0.074	$ 0.42	
6A	Savings	19,072	859	150,977	307,288	2,813	572	3,385	2.91	5.92	0.054	0.011	$ 0.07	1.2%
10 Story Highrise Apt.		84,140	square feet											
4A	ASHRAE 90.1-2016	486,453	24,164	4,076,188	8,073,640	71,752	16,086	87,838	48.45	95.96	0.853	0.191	$ 1.04	
4A	NYStretch	471,098	23,557	3,963,044	7,835,041	69,487	15,682	85,168	47.10	93.12	0.826	0.186	$ 1.01	
4A	Savings	15,356	608	113,144	238,599	2,265	404	2,669	1.34	2.84	0.027	0.005	$ 0.03	21.9%
5A	ASHRAE 90.1-2016	459,795	30,143	4,583,161	8,395,873	67,820	20,066	87,886	54.47	99.79	0.806	0.238	$ 1.04	
5A	NYStretch	444,061	29,030	4,418,150	8,100,014	65,499	19,325	84,824	52.51	96.27	0.778	0.230	$ 1.01	
5A	Savings	15,733	1,113	165,011	295,860	2,321	741	3,062	1.96	3.52	0.028	0.009	$ 0.04	0.0%
6A	ASHRAE 90.1-2016	458,814	30,223	4,587,788	8,393,046	67,675	20,119	87,795	54.53	99.75	0.804	0.239	$ 1.04	
6A	NYStretch	443,359	29,091	4,421,886	8,098,427	65,395	19,366	84,762	52.55	96.25	0.777	0.230	$ 1.01	
6A	Savings	15,456	1,132	165,902	294,620	2,280	753	3,033	1.97	3.50	0.027	0.009	$ 0.04	0.0%
20 Story Highrise Apt		168,279	square feet											
4A	ASHRAE 90.1-2016	1,197,004	40,689	8,153,111	17,901,324	176,558	27,087	203,645	48.45	106.38	1.049	0.161	$ 1.21	
4A	NYStretch	1,152,409	40,277	7,959,762	17,349,994	169,980	26,813	196,793	47.30	103.10	1.010	0.159	$ 1.17	
4A	Savings	44,594	412	193,349	551,331	6,578	274	6,852	1.15	3.28	0.039	0.002	$ 0.04	23.5%
5A	ASHRAE 90.1-2016	1,188,626	51,029	9,158,537	18,888,461	175,322	33,970	209,293	54.42	112.24	1.042	0.202	$ 1.24	
5A	NYStretch	1,143,904	50,478	8,950,788	18,321,053	168,726	33,603	202,329	53.19	108.87	1.003	0.200	$ 1.20	
5A	Savings	44,722	552	207,749	567,408	6,597	367	6,964	1.23	3.37	0.039	0.002	$ 0.04	0.1%
6A	ASHRAE 90.1-2016	1,188,990	52,179	9,274,748	19,012,980	175,376	34,736	210,112	55.12	112.98	1.042	0.206	$ 1.25	
6A	NYStretch	1,138,529	50,857	8,970,389	18,299,523	167,933	33,856	201,789	53.31	108.75	0.998	0.201	$ 1.20	
6A	Savings	50,461	1,322	304,359	713,458	7,443	880	8,323	1.81	4.24	0.044	0.005	$ 0.05	0.1%

* **Negative Savings** indicate that NYStretch results in higher energy use or cost relative to ASHRAE 90.1 - 2016

TABLE B2: Payback Period of Incremental First Cost between ASHRAE 90.1-2016 and 2020 NYStretch by CZ and Building Type (Part A)

Climate Zone	ASHRAE Standard	Energy Usage		Annual NYS Energy Cost			Annual Savings		Incremental First Cost		Payback Period	Weighting Factors
		kWh	therms	Electricity	Gas	Total	Total	($/sf)	Total	($/sf)	(Years)	
Large Office		497,337 square feet										
4A	90.1-2016	7,404,873	45,821	$ 1,092,219	$ 30,503	$ 1,122,721						
4A	NYStretch	7,090,011	46,458	$ 1,045,777	$ 30,927	$ 1,076,703	$ 46,018	$ 0.093	$ 141,187	$ 0.284	3.1	7.5%
5A	90.1-2016	7,261,025	67,527	$ 1,071,001	$ 44,953	$ 1,115,954						
5A	NYStretch	6,929,778	68,076	$ 1,022,142	$ 45,318	$ 1,067,460	$ 48,493	$ 0.098	$ 234,656	$ 0.472	4.8	1.0%
6A	90.1-2016	7,265,584	72,306	$ 1,071,674	$ 48,134	$ 1,119,808						
6A	NYStretch	6,932,525	72,462	$ 1,022,547	$ 48,238	$ 1,070,785	$ 49,022	$ 0.099	$ 148,621	$ 0.299	3.0	0.3%
Standalone Retail		24,630 square feet										
4A	90.1-2016	262,889	1,981	$ 38,776	$ 1,319	$ 40,095						
4A	NYStretch	220,589	2,102	$ 32,537	$ 1,399	$ 33,936	$ 6,159	$ 0.250	$ 95,821	$ 3.890	15.6	4.9%
5A	90.1-2016	255,586	2,742	$ 37,699	$ 1,826	$ 39,525						
5A	NYStretch	210,720	2,946	$ 31,081	$ 1,961	$ 33,042	$ 6,483	$ 0.263	$ 75,788	$ 3.077	11.7	7.1%
6A	90.1-2016	261,103	3,068	$ 38,513	$ 2,043	$ 40,555						
6A	NYStretch	218,834	3,225	$ 32,278	$ 2,147	$ 34,425	$ 6,131	$ 0.249	$ 80,645	$ 3.274	13.2	2.6%
Secondary School		210,357 square feet										
4A	90.1-2016	1,753,599	18,055	$ 258,656	$ 12,019	$ 270,675						
4A	NYStretch	1,616,146	16,151	$ 238,381	$ 10,751	$ 249,133	$ 21,542	$ 0.102	$ 128,629	$ 0.611	6.0	5.0%
5A	90.1-2016	1,660,790	22,612	$ 244,967	$ 15,053	$ 260,020						
5A	NYStretch	1,523,268	20,845	$ 224,682	$ 13,877	$ 238,559	$ 21,461	$ 0.102	$ 91,266	$ 0.434	4.3	3.7%
6A	90.1-2016	1,662,210	23,538	$ 245,176	$ 15,669	$ 260,845						
6A	NYStretch	1,523,135	21,645	$ 224,662	$ 14,409	$ 239,071	$ 21,774	$ 0.104	$ 137,223	$ 0.652	6.3	1.1%
Large Hotel		121,813 square feet										
4A	90.1-2016	1,587,057	45,330	$ 234,091	$ 30,176	$ 264,267						
4A	NYStretch	1,445,229	43,085	$ 213,171	$ 28,681	$ 241,853	$ 22,414	$ 0.184	$ 215,819	$ 1.772	9.6	3.5%
5A	90.1-2016	1,496,437	50,472	$ 220,725	$ 33,599	$ 254,323						
5A	NYStretch	1,350,487	48,539	$ 199,197	$ 32,312	$ 231,509	$ 22,814	$ 0.187	$ 189,061	$ 1.552	8.3	2.5%
6A	90.1-2016	1,489,832	53,188	$ 219,750	$ 35,407	$ 255,157						
6A	NYStretch	1,345,009	51,399	$ 198,389	$ 34,216	$ 232,605	$ 22,552	$ 0.185	$ 182,079	$ 1.495	8.1	1.8%
Full Service Restaurant		5,488 square feet										
4A	90.1-2016	223,706	13,240	$ 32,997	$ 8,814	$ 41,811						
4A	NYStretch	190,350	12,252	$ 28,077	$ 8,156	$ 36,233	$ 5,578	$ 1.016	$ 30,670	$ 5.588	5.5	0.1%
5A	90.1-2016	213,031	15,675	$ 31,422	$ 10,435	$ 41,857						
5A	NYStretch	183,745	14,691	$ 27,102	$ 9,780	$ 36,882	$ 4,975	$ 0.906	$ 21,387	$ 3.897	4.3	0.3%
6A	90.1-2016	212,659	16,885	$ 31,367	$ 11,240	$ 42,607						
6A	NYStretch	183,195	15,893	$ 27,021	$ 10,580	$ 37,601	$ 5,006	$ 0.912	$ 22,967	$ 4.185	4.6	0.1%

TABLE B2: Payback Period of Incremental First Cost between ASHRAE 90.1-2016 and 2020 NYStretch by CZ and Building Type (Part B)

Climate Zone	ASHRAE Standard	Energy Usage kWh	Energy Usage therms	Annual NYS Energy Cost Electricity	Annual NYS Energy Cost Gas	Annual NYS Energy Cost Total	Annual Savings Total	Annual Savings ($/sf)	Incremental First Cost Total	Incremental First Cost ($/sf)	Payback Period (Years)	Weighting Factors
Outpatient Healthcare		40,843 square feet										
4A	90.1-2016	1,032,065	10,408	$ 152,230	$ 6,929	$ 159,158						
4A	NYStretch	964,334	10,684	$ 142,239	$ 7,112	$ 149,351	$ 9,807	$ 0.240	$ 126,695	$ 3.102	12.9	2.0%
5A	90.1-2016	1,004,067	11,865	$ 148,100	$ 7,898	$ 155,998						
5A	NYStretch	937,570	12,183	$ 138,292	$ 8,110	$ 146,402	$ 9,596	$ 0.235	$ 110,444	$ 2.704	11.5	2.4%
6A	90.1-2016	1,017,373	12,672	$ 150,063	$ 8,436	$ 158,498						
6A	NYStretch	950,276	13,044	$ 140,166	$ 8,683	$ 148,849	$ 9,649	$ 0.236	$ 110,741	$ 2.711	11.5	1.0%
Warehouse		51,914 square feet										
4A	90.1-2016	125,317	4,921	$ 18,484	$ 3,276	$ 21,760						
4A	NYStretch	109,025	4,189	$ 16,081	$ 2,788	$ 18,870	$ 2,890	$ 0.056	$ 53,254	$ 1.026	18.4	2.5%
5A	90.1-2016	125,589	8,115	$ 18,524	$ 5,402	$ 23,926						
5A	NYStretch	110,586	6,921	$ 16,311	$ 4,607	$ 20,919	$ 3,008	$ 0.058	$ 31,272	$ 0.602	10.4	3.8%
6A	90.1-2016	140,039	6,664	$ 20,656	$ 4,437	$ 25,092						
6A	NYStretch	120,967	5,805	$ 17,843	$ 3,865	$ 21,707	$ 3,385	$ 0.065	$ 39,118	$ 0.754	11.6	1.2%
10 Story Highrise Apt.		84,140 square feet										
4A	90.1-2016	486,453	24,164	$ 71,752	$ 16,086	$ 87,838						
4A	NYStretch	471,098	23,557	$ 69,487	$ 15,682	$ 85,168	$ 2,669	$ 0.032	$ 36,040	$ 0.428	13.5	21.9%
5A	90.1-2016	459,795	30,143	$ 67,820	$ 20,066	$ 87,886						
5A	NYStretch	444,061	29,030	$ 65,499	$ 19,325	$ 84,824	$ 3,062	$ 0.036	$ 32,095	$ 0.381	10.5	0.0%
6A	90.1-2016	458,814	30,223	$ 67,675	$ 20,119	$ 87,795						
6A	NYStretch	443,359	29,091	$ 65,395	$ 19,366	$ 84,762	$ 3,033	$ 0.036	$ 35,330	$ 0.420	11.6	0.0%
20 Story Highrise Apt		168,279 square feet										
4A	90.1-2016	1,197,004	40,689	$ 176,558	$ 27,087	$ 203,645						
4A	NYStretch	1,152,409	40,277	$ 169,980	$ 26,813	$ 196,793	$ 6,852	$ 0.041	$ 78,578	$ 0.467	11.5	23.5%
5A	90.1-2016	1,188,626	51,029	$ 175,322	$ 33,970	$ 209,293						
5A	NYStretch	1,143,904	50,478	$ 168,726	$ 33,603	$ 202,329	$ 6,964	$ 0.041	$ 71,908	$ 0.427	10.3	0.1%
6A	90.1-2016	1,188,990	52,179	$ 175,376	$ 34,736	$ 210,112						
6A	NYStretch	1,138,529	50,857	$ 167,933	$ 33,856	$ 201,789	$ 8,323	$ 0.049	$ 67,193	$ 0.399	8.1	0.1%
Weighted Averages by Climate Zone							**4A**	**$ 0.077**		**$ 0.848**	**11.04**	**70.9%**
							5A	**$ 0.185**		**$ 1.808**	**9.76**	**20.9%**
							6A	**$ 0.187**		**$ 1.962**	**10.48**	**8.2%**
							Combined	**$ 0.109**		**$ 1.140**	**10.50**	**100.0%**

TABLE B3: 10 Year Present value of differences in Annual Energy Performance, Energy Cost and First Cost between ASHRAE 90.1-2016 and 2020 NYStretch by CZ and Building Type (Part A)

Climate Zone	ASHRAE Standard	Energy Usage		Energy Cost	10 yr Life Cycle Energy Cost				Incremental First Cost	Residual Value At 10 Years	Net Savings over 10 yr		Weighting Factors
		kWh	therms	Total	Electricity	Gas	Total	Savings			Total	Cost Index ($/sf)	
Large Office		497,337 square feet											
4A	90.1-2016	7,404,873	45,821	$ 1,122,721	$ 10,070,256	$ 322,413	$ 10,392,669						
4A	NYStretch	7,090,011	46,458	$ 1,076,703	$ 9,642,061	$ 326,895	$ 9,968,956	$ 423,714	$ 141,187	$ 37,036	$319,563	$0.64	7.5%
5A	90.1-2016	7,261,025	67,527	$ 1,115,954	$ 9,874,631	$ 475,148	$ 10,349,779						
5A	NYStretch	6,929,778	68,076	$ 1,067,460	$ 9,424,151	$ 479,012	$ 9,903,163	$ 446,616	$ 234,656	$ 40,924	$252,884	$0.51	1.0%
6A	90.1-2016	7,265,584	72,306	$ 1,119,808	$ 9,880,830	$ 508,778	$ 10,389,609						
6A	NYStretch	6,932,525	72,462	$ 1,070,785	$ 9,427,887	$ 509,876	$ 9,937,763	$ 451,846	$ 148,621	$ 23,746	$326,971	$0.66	0.3%
Standalone Retail		24,630 square feet											
4A	90.1-2016	262,889	1,981	$ 40,095	$ 357,516	$ 13,941	$ 371,457						
4A	NYStretch	220,589	2,102	$ 33,936	$ 299,990	$ 14,787	$ 314,777	$ 56,679	$ 95,821	$ 25,882	($13,259)	($0.54)	4.9%
5A	90.1-2016	255,586	2,742	$ 39,525	$ 347,585	$ 19,297	$ 366,882						
5A	NYStretch	210,720	2,946	$ 33,042	$ 286,568	$ 20,728	$ 307,296	$ 59,586	$ 75,788	$ 18,591	$2,389	$0.10	7.1%
6A	90.1-2016	261,103	3,068	$ 40,555	$ 355,087	$ 21,589	$ 376,676						
6A	NYStretch	218,834	3,225	$ 34,425	$ 297,603	$ 22,691	$ 320,293	$ 56,383	$ 80,645	$ 21,594	($2,668)	($0.11)	2.6%
Secondary School		210,357 square feet											
4A	90.1-2016	1,753,599	18,055	$ 270,675	$ 2,384,806	$ 127,041	$ 2,511,847						
4A	NYStretch	1,616,146	16,151	$ 249,133	$ 2,197,877	$ 113,642	$ 2,311,520	$ 200,327	$ 128,629	$ 54,590	$126,288	$0.60	5.0%
5A	90.1-2016	1,660,790	22,612	$ 260,020	$ 2,258,592	$ 159,110	$ 2,417,702						
5A	NYStretch	1,523,268	20,845	$ 238,559	$ 2,071,568	$ 146,676	$ 2,218,244	$ 199,458	$ 91,266	$ 35,287	$143,479	$0.68	3.7%
6A	90.1-2016	1,662,210	23,538	$ 260,845	$ 2,260,522	$ 165,623	$ 2,426,145						
6A	NYStretch	1,523,135	21,645	$ 239,071	$ 2,071,387	$ 152,302	$ 2,223,689	$ 202,456	$ 137,223	$ 55,849	$121,082	$0.58	1.1%
Large Hotel		121,813 square feet											
4A	90.1-2016	1,587,057	45,330	$ 264,267	$ 2,158,318	$ 318,958	$ 2,477,276						
4A	NYStretch	1,445,229	43,085	$ 241,853	$ 1,965,439	$ 303,163	$ 2,268,602	$ 208,673	$ 215,819	$ 58,057	$50,912	$0.42	3.5%
5A	90.1-2016	1,496,437	50,472	$ 254,323	$ 2,035,080	$ 355,140	$ 2,390,220						
5A	NYStretch	1,350,487	48,539	$ 231,509	$ 1,836,595	$ 341,543	$ 2,178,138	$ 212,083	$ 189,061	$ 46,283	$69,305	$0.57	2.5%
6A	90.1-2016	1,489,832	53,188	$ 255,157	$ 2,026,097	$ 374,254	$ 2,400,350						
6A	NYStretch	1,345,009	51,399	$ 232,605	$ 1,829,146	$ 361,668	$ 2,190,813	$ 209,537	$ 182,079	$ 45,577	$73,035	$0.60	1.8%
Full Service Restaurant		5,488 square feet											
4A	90.1-2016	223,706	13,240	$ 41,811	$ 304,229	$ 93,165	$ 397,393						
4A	NYStretch	190,350	12,252	$ 36,233	$ 258,867	$ 86,209	$ 345,075	$ 52,318	$ 30,670	$ 9,805	$31,453	$5.73	0.1%
5A	90.1-2016	213,031	15,675	$ 41,857	$ 289,711	$ 110,294	$ 400,005						
5A	NYStretch	183,745	14,691	$ 36,882	$ 249,883	$ 103,370	$ 353,253	$ 46,751	$ 21,387	$ 7,721	$33,085	$6.03	0.3%
6A	90.1-2016	212,659	16,885	$ 42,607	$ 289,205	$ 118,807	$ 408,012						
6A	NYStretch	183,195	15,893	$ 37,601	$ 249,135	$ 111,830	$ 360,965	$ 47,046	$ 22,967	$ 8,675	$32,754	$5.97	0.1%

* **Negative Savings** indicate that NYStretch results in higher energy use or cost relative to ASHRAE 90.1-2016

TABLE B3: 10 Year Present value of differences in Annual Energy Performance, Energy Cost and First Cost between ASHRAE 90.1-2016 and 2020 NYStretch by CZ and Building Type (Part B)

Climate Zone	ASHRAE Standard	Energy Usage kWh	Energy Usage therms	Energy Cost Total	10 yr Life Cycle Energy Cost Electricity	10 yr Life Cycle Energy Cost Gas	10 yr Life Cycle Energy Cost Total	10 yr Life Cycle Energy Cost Savings	Incremental First Cost	Residual Value At 10 Years	Net Savings over 10 yr Total	Net Savings over 10 yr Cost Index ($/sf)	Weighting Factors*
Outpatient Healthcare		40,843 square feet											
4A	90.1-2016	1,032,065	10,408	$ 159,158	$ 1,403,556	$ 73,235	$ 1,476,791						
4A	NYStretch	964,334	10,684	$ 149,351	$ 1,311,446	$ 75,174	$ 1,386,620	$ 90,171	$ 126,695	$ 30,589	($5,934)	($0.15)	2.0%
5A	90.1-2016	1,004,067	11,865	$ 155,998	$ 1,365,482	$ 83,485	$ 1,448,966						
5A	NYStretch	937,570	12,183	$ 146,402	$ 1,275,049	$ 85,727	$ 1,360,775	$ 88,191	$ 110,444	$ 24,158	$1,905	$0.05	2.4%
6A	90.1-2016	1,017,373	12,672	$ 158,498	$ 1,383,576	$ 89,168	$ 1,472,744						
6A	NYStretch	950,276	13,044	$ 148,849	$ 1,292,328	$ 91,783	$ 1,384,110	$ 88,634	$ 110,741	$ 25,228	$3,121	$0.08	1.0%
Warehouse		51,914 square feet											
4A	90.1-2016	125,317	4,921	$ 21,760	$ 170,425	$ 34,625	$ 205,049						
4A	NYStretch	109,025	4,189	$ 18,870	$ 148,269	$ 29,472	$ 177,741	$ 27,308	$ 53,254	$ 14,315	($11,631)	($0.22)	2.5%
5A	90.1-2016	125,589	8,115	$ 23,926	$ 170,795	$ 57,100	$ 227,895						
5A	NYStretch	110,586	6,921	$ 20,919	$ 150,392	$ 48,700	$ 199,092	$ 28,803	$ 31,272	$ 10,203	$7,734	$0.15	3.8%
6A	90.1-2016	140,039	6,664	$ 25,092	$ 190,446	$ 46,894	$ 237,340						
6A	NYStretch	120,967	5,805	$ 21,707	$ 164,509	$ 40,850	$ 205,358	$ 31,982	$ 39,118	$ 14,592	$7,455	$0.14	1.2%
10 Story Highrise Apt.		84,140 square feet											
4A	90.1-2016	486,453	24,164	$ 87,838	$ 661,552	$ 170,029	$ 831,581						
4A	NYStretch	471,098	23,557	$ 85,168	$ 640,669	$ 165,754	$ 806,423	$ 25,157	$ 36,040	$ 12,192	$1,310	$0.02	21.9%
5A	90.1-2016	459,795	30,143	$ 87,886	$ 625,298	$ 212,102	$ 837,400						
5A	NYStretch	444,061	29,030	$ 84,824	$ 603,901	$ 204,268	$ 808,170	$ 29,230	$ 32,095	$ 11,372	$8,507	$0.10	0.0%
6A	90.1-2016	458,814	30,223	$ 87,795	$ 623,964	$ 212,663	$ 836,627						
6A	NYStretch	443,359	29,091	$ 84,762	$ 602,946	$ 204,700	$ 807,645	$ 28,982	$ 35,330	$ 13,443	$7,094	$0.08	0.0%
20 Story Highrise Apt		168,279 square feet											
4A	90.1-2016	1,197,004	40,689	$ 203,645	$ 1,627,865	$ 286,307	$ 1,914,173						
4A	NYStretch	1,152,409	40,277	$ 196,793	$ 1,567,219	$ 283,409	$ 1,850,628	$ 63,545	$ 78,578	$ 22,905	$7,872	$0.05	23.5%
5A	90.1-2016	1,188,626	51,029	$ 209,293	$ 1,616,472	$ 359,065	$ 1,975,537						
5A	NYStretch	1,143,904	50,478	$ 202,329	$ 1,555,652	$ 355,184	$ 1,910,836	$ 64,701	$ 71,908	$ 21,836	$14,629	$0.09	0.1%
6A	90.1-2016	1,188,990	52,179	$ 210,112	$ 1,616,967	$ 367,155	$ 1,984,121						
6A	NYStretch	1,138,529	50,857	$ 201,789	$ 1,548,342	$ 357,853	$ 1,906,196	$ 77,926	$ 67,193	$ 20,681	$31,414	$0.19	0.1%
											4A	$0.11	70.9%
											5A	$0.37	20.9%
											6A	$0.30	8.2%
											Combined	**$0.18**	**100.0%**

Weighted Average Savings by Climate Zone

* **Negative Savings** indicate that NYStretch results in higher energy use or cost relative to ASHRAE 90.1-2016

Appendix C

EEM 9 High-efficiency SHW

Based on concerns over possible preemption of this measure, the requirement was subsequently removed from NYStretch. The analysis of the impact of the measure is included to memorialize the findings.

This measure required a high-efficiency service water heating (SWH) system. A service water heating system with large input size for either individual water heater or aggregate capacity of all water heaters would be required to have minimum thermal efficiency (Et) of 94%. This requirement only applied to buildings with water heating equipment with an individual or aggregate input rating of 1,000,000 Btu/h or greater.

PNNL's analysis for this measure originally showed savings associated with the prototypes for large hotel, full-service restaurant, outpatient healthcare, 10-story apartments and 20-story apartments.

Upon review, Vidaris found only 20-story apartment building prototype had a SHW system meeting the 1,000,000 Btu/h threshold. Costing for this measure was based on the price differential for three 400 MBH boilers with the efficiencies in the following table.

	2020 NYStretch	ASHRAE 90.1-2016
20-Story Apartment	High efficiency hot water heaters with 94% Et 1,200 MBH total capacity	Hot water heaters with 90% Et 1,200 MBH total capacity

Based on Vidaris' analysis, savings and payback for this measure varies by climate zone as shown in the following table. Annual energy cost savings are between $563 and $633, and payback is between 8.58 and 5.65 years for CZs 4A and 6A, respectively.

20 Story Highrise Apt **168,279 square feet**

CZ	Description	Energy Usage kWh	Energy Usage therms	Annual NYS Energy Cost Electricity	Annual NYS Energy Cost Gas	Annual NYS Energy Cost Total	Annual Savings Total	Incremental First Cost Total	Payback Period (Years)
4A	SHW 90% Eff.	1,152,409	40,277	$169,980	$26,813	$196,793			
4A	SHW 94% Eff.	1,152,409	39,432	$169,980	$26,250	$196,230	**$563**	**$4,833**	**8.58**
5A	SHW 90% Eff.	1,143,904	50,478	$168,726	$33,603	$202,329			
5A	SHW 94% Eff.	1,143,904	49,577	$168,726	$33,003	$201,729	**$600**	**$3,795**	**6.33**
6A	SHW 90% Eff.	1,138,529	50,857	$167,933	$33,856	$201,789			
6A	SHW 94% Eff.	1,138,529	49,907	$167,933	$33,223	$201,156	**$633**	**$3,572**	**5.65**

Based on the limited savings for the measure and concerns regarding potential federal preemption of this section, NYSERDA elected not to include the SHW requirements in the final version of the 2020 NYStretch Energy Code.

Appendix D.

Cost Estimates

2020 NYStretch
LARGE OFFICE - 4A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 16,034**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		38,353	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential mass wall)* *4A: U-0.104; R-7.82*		74,849	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 4A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	38,353	Area	$ 0.3881	$ 14,884		
EEM	Enhanced wall insulation (nonresidential mass wall) 4A: U-0.099; R-8.30 (+ R-0.48)	RSMeans 07 21 13.10	74,849	Area	$ 0.0154	$ 1,150		
EEM 2	**Enhanced fenestration**						**$ 25,904**	
Standard	*Standard windows, U-0.38*		49,899	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.36	PNNL CE ANALYSIS	49,899	Area	$ 0.52	$ 25,904		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*		*392,896*	*watts*	$ 6.75	$ -		No cost assumed for this buidling type
EEM	Reduced LPDs, ~20% more efficient	HBL	308,846	watts	$ -	$ -		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-		$ -	$ -		
EEM	n/a - IECC only		-		$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-		$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-		$ -	$ -		
EEM 7	**Reduce fan power allowances (based on improved fan efficiencies)**						**$ 116,592**	
Standard	*CV fans: 0.00094 bhp/cfm*					$ -		
Standard	*VAV fans: 0.00130 bhp/cfm*					$ -		
EEM	CV fans: 0.00088 bhp/cfm	RSMeans 23 74 33.10	4.98	tons	$ 1,031	$ 5,137		Costed as increased system size for reduction in static pressure
EEM	VAV fans: 0.00100 bhp/cfm	RSMeans D3040 134	31,262	cfm	$ 3.565	$ 111,456		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	$ -		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ 2,448**	
Standard	*Standard wall insulation*		-		$ -	$ -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	7,200	Area	$ 0.3400	$ 2,448		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	RSMeans 26 51 13.55	*17,406*	*watts*	$ -	$ -		No cost; parking lot can be met with MH
EEM	Reduced LPDs, ~32% more efficient	RSMeans 26 51 13.55			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ 120,000**	
Standard	*Standard elevator motors, 30hp*		-	each		$ -		
EEM	Elevator motors with regenerative drives, 30 hp	Previous projects	12	each	$ 10,000	$ 120,000		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	$ -		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-		$ -	$ -		
EEM	n/a - applies to IECC path only		-		$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (32,749)**	
Standard	*Watercooled chiller, 701 tons*	*RSMeans 23 64 13.10*	*2*	*units*	$ 318,147	*$ 636,295*		
Standard	*Cooling tower, 1602 tons*	*RSMeans 23 65 13.10*	*2*	*units*	$ 184,539	*$ 369,079*		
EEM	Watercooled chiller, 676 tons	RSMeans 23 64 13.10	2	*units*	$ 308,568	$ 617,136		
EEM	Cooling tower, 1543 tons	RSMeans 23 65 13.10	2	*units*	$ 177,744	$ 355,488		
ACA 2	**Reduced capacity for heating equipment**						**$ (12,832)**	
Standard	*Hot water boiler, gas fired, 8877 MBH*	*RSMeans D3020 130*	*1*	*units*	$ 261,867	*$ 261,867*		
EEM	*Hot water boiler, gas fired, 8419 MBH*	RSMeans D3020 130	1	units	$ 249,034	$ 249,034		
ACA 3	**Reduced capacity for air handling equipment**						**$ (133,102)**	
Standard	*VAV with Reheat, 274885 cfm*	*RSMeans D3040 134*	*1*	*units*	$ 2,727,871	*$ 2,727,871*		
EEM	*VAV with Reheat, 261451 cfm*	RSMeans D3040 134	1	units	$ 2,594,768	$ 2,594,768		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 2,600**	
Standard	*No charging stations, 325,080sf parking lot, 300sf per parking spot*		-		$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	2	outlets	$ 1,300	$ 2,600		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-		$ -	$ -		No Cost
EEM			-		$ -	$ -		
						Total	***$ 104,894***	

2020 NYStretch
LARGE OFFICE - 5A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-19

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 16,130**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		38,353	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential mass wall) 5A: U-0.090; R-9.31*		74,849	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 5A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	38,353	Area	$ 0.3881	$ 14,884		
EEM	Enhanced wall insulation (nonresidential mass wall) 5A: U-0.086; R-9.83 (+ R-0.52)	RSMeans 07 21 13.10	74,849	Area	$ 0.0166	$ 1,245		
EEM 2	**Enhanced fenestration**						**$ 26,344**	
Standard	*Standard windows, U-0.38*		49,899	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.36	PNNL CE ANALYSIS	49,899	Area	$ 0.53	$ 26,344		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*		*392,896*	*watts*	$ 6.75	$ -		No cost assumed for this buidling type
EEM	Reduced LPDs, ~20% more efficient	HBL	308,846	watts	$ -	$ -		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-		$ -	$ -		
EEM	n/a - IECC only		-		$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-		$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-		$ -	$ -		
EEM 7	**Reduce fan power allowances (based on improved fan efficiencies)**						**$ 120,025**	
Standard	*CV fans: 0.00094 bhp/cfm*					$ -		
Standard	*VAV fans: 0.00130 bhp/cfm*					$ -		
EEM	CV fans: 0.00088 bhp/cfm	RSMeans 23 74 33.10	5.09	tons	$ 1,031	$ 5,250		Costed as increased system size for reduction in static pressure
EEM	VAV fans: 0.00100 bhp/cfm	RSMeans D3040 134	32,193	cfm	$ 3.565	$ 114,775		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	$ -		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ 2,448**	
Standard	*Standard wall insulation*		-		$ -	$ -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	7,200	Area	$ 0.3400	$ 2,448		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	RSMeans 26 51 13.55	*43,412*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~32% more efficient	RSMeans 26 51 13.55			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ 120,000**	
Standard	*Standard elevator motors, 30hp*		-	each	$ -	$ -		
EEM	Elevator motors with regenerative drives, 30 hp	Previous projects	12	each	$ 10,000	$ 120,000		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	$ -		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-		$ -	$ -		
EEM	n/a - applies to IECC path only		-		$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (10,238)**	
Standard	*Watercooled chiller, 683 tons*	RSMeans 23 64 13.10	*2*	*units*	$ 311,297	*$ 622,594*		
Standard	*Cooling tower, 1560 tons*	RSMeans 23 65 13.10	*2*	*units*	$ 179,680	*$ 359,360*		
EEM	Watercooled chiller, 675 tons	RSMeans 23 64 13.10	2	*units*	$ 308,303	$ 616,605		
EEM	Cooling tower, 1542 tons	RSMeans 23 65 13.10	2	*units*	$ 177,556	$ 355,112		
ACA 2	**Reduced capacity for heating equipment**						**$ (44,204)**	
Standard	*Hot water boiler, gas fired, 9963 MBH*	RSMeans D3020 130	*1*	*units*	$ 292,309	*$ 292,309*		
EEM	*Hot water boiler, gas fired, 8386 MBH*	RSMeans D3020 130	1	units	$ 248,105	$ 248,105		
ACA 3	**Reduced capacity for air handling equipment**						**$ (78,938)**	
Standard	*VAV with Reheat, 276750 cfm*	RSMeans D3040 134	*1*	*units*	$ 2,746,345	*$ 2,746,345*		
EEM	*VAV with Reheat, 268782 cfm*	RSMeans D3040 134	1	units	$ 2,667,408	$ 2,667,408		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*			*units*		$ -		
EEM	n/a - does not apply to this building type			units		$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 70,434**	
Standard	*No charging stations, 325,080sf parking lot, 300sf per parking spot*		-		$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	54	outlets	$ 1,300	$ 70,434		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-		$ -	$ -		
EEM			-		$ -	$ -		
						Total	***$ 222,002***	

2020 NYStretch
LARGE OFFICE - 6A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-19

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 24,583**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		38,353	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential mass wall) 6A: U-0.080; R-10.70*		74,849	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 6A: U-0.029; R-33.4 (+ R-3.4)	RSMeans 07 22 16.10	38,353	Area	$ 0.5998	$ 23,003		
EEM	Enhanced wall insulation (nonresidential mass wall) 6A: U-0.076; R-11.36 (+ R-0.66)	RSMeans 07 21 13.10	74,849	Area	$ 0.0211	$ 1,581		
EEM 2	**Enhanced fenestration**						**$ 26,137**	
Standard	*Standard windows, U-0.36*		49,899	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.34	PNNL CE ANALYSIS	49,899	Area	$ 0.52	$ 26,137		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling unit**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*		*392,896*	*watts*	$ -	*$ -*		
EEM	Reduced LPDs, ~20% more efficient	HBL	308,846	watts	$ -	$ -		No cost assumed for this buidling type
EEM 5	**Occupancy sensors and automatic lighting controls including egress lightin**						**$ -**	
Standard	*n/a - IECC only*		-		$ -	*$ -*		
EEM	n/a - IECC only		-		$ -	$ -		
EEM 6	**Exterior lighting contro**						**$ -**	
Standard	*n/a*		-		$ -	*$ -*		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-		$ -	$ -		
EEM 7	**Reduce fan power allowances (based on improved fan efficiencies)**						**$ 115,148**	
Standard	*CV fans: 0.00094 bhp/cfm*					*$* -		
Standard	*VAV fans: 0.00130 bhp/cfm*					*$* -		
EEM	CV fans: 0.00088 bhp/cfm	RSMeans 23 74 33.10	4.95	tons	$ 1,031	$ 5,107		Costed as increased system size for reduction in static pressure
EEM	VAV fans: 0.00100 bhp/cfm	RSMeans D3040 134	30,865	cfm	$ 3.565	$ 110,041		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	*$ -*		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	*$ -*		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	*$ -*		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ 2,448**	
Standard	*Standard wall insulation*		-		$ -	*$ -*		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	7,200	Area	$ 0.3400	$ 2,448		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	RSMeans 26 51 13.55	*43,412*	*watts*	$ -	*$ -*		
EEM	Reduced LPDs, ~11% more efficient	RSMeans 26 51 13.55	-		$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ 120,000**	
Standard	*Standard elevator motors, 30hp*		-	each	$ -	*$ -*		
EEM	Elevator motors with regenerative drives, 30 hp	Previous projects	12	each	$ 10,000	$ 120,000		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	*$ -*		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-		$ -	*$ -*		
EEM	n/a - applies to IECC path only		-		$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (31,001)**	
Standard	*Watercooled chiller, 633 tons*	RSMeans 23 64 13.10	*2*	*units*	$ 292,639	*$ 585,278*		
Standard	*Cooling tower, 1445 tons*	RSMeans 23 65 13.10	*2*	*units*	$ 166,445	*$ 332,890*		
EEM	Watercooled chiller, 607 tons	RSMeans 23 64 13.10	2	*units*	$ 283,243	$ 566,486		
EEM	Cooling tower, 1392 tons	RSMeans 23 65 13.10	2	*units*	$ 160,340	$ 320,680		
ACA 2	**Reduced capacity for heating equipment**						**$ (14,628)**	
Standard	*Hot water boiler, gas fired, 9870 MBH*	RSMeans D3020 130	*1*	*units*	$ 289,692	*$ 289,692*		
EEM	*Hot water boiler, gas fired, 9348 MBH*	RSMeans D3020 130	1	units	$ 275,064	$ 275,064		
ACA 3	**Reduced capacity for air handling equipment**						**$ (163,754)**	
Standard	*VAV with Reheat, 275076 cfm*	RSMeans D3040 134	*1*	*units*	$ 2,729,760	*$ 2,729,760*		
EEM	*VAV with Reheat, 258548 cfm*	RSMeans D3040 134	1	units	$ 2,566,006	$ 2,566,006		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirement**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	*$ -*		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 70,434**	
Standard	*No charging stations, 325,080sf parking lot, 300sf per parking spot*		-		$ -	*$ -*		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	54	outlets	$ 1,300	$ 70,434		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-		$ -	*$ -*		
EEM			-		$ -	$ -		
						Total	***$ 149,368***	

2020 NYStretch
STANDALONE RETAIL - 4A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 9,763**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck;*		24,692	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential mass wall) 4A: U-0.104; R-7.82*		11,766	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 4A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	24,692	Area	$ 0.3881	$ 9,583		
EEM	Enhanced wall insulation (nonresidential mass wall) 4A: U-0.099; R-8.30 (+ R-0.48)	RSMeans 07 21 13.10	11,766	Area	$ 0.0154	$ 181		
EEM 2	**Enhanced fenestration**						**$ 447**	
Standard	*Standard windows, U-0.37*		904	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.35	PNNL CE ANALYSIS	904	Area	$ 0.50	$ 447		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 59,518**	
Standard	*Lighting per ASHRAE 90.1-2016*		*35,787*	*watts*	$ 6.75	*$ 241,565*		Cost assumed to be proportional to increased efficiency
EEM	Reduced LPDs, ~25% more efficient	HBL	26,970	watts	$ -	$ 301,083.28		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ 960**	
Standard	*CV fans: 0.00094 bhp/cfm*			tons		$ -		
EEM	CV fans: 0.00088 bhp/cfm	RSMeans 23 74 33.10	0.93	tons	$ 1,031	$ 960		Costed as increased system size for reduction in static pressure
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	Area	$ 0	$ -		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*1,702*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~11% more efficient	*RSMeans 26 51 13.55*			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (2,100)**	
Standard	*Packaged single-zone AC, 56 tons*	*RSMeans 23 74 33.10*	*1*	units	$ 72,373	*$ 72,373*		
EEM	Packaged single-zone AC, 53 tons	RSMeans 23 74 33.10	1	units	$ 70,273	$ 70,273		
ACA 2	**Reduced capacity for heating equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	units	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 3	**Reduced capacity for air handling equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	*units*	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 2,600**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	2	outlets	$ 1,300	$ 2,600		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 71,189***	

2020 NYStretch
STANDALONE RETAIL - 5A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 9,778**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck,*		24,692	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential mass wall) 5A: U-0.090; R-9.31*		11,766	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 5A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	24,692	Area	$ 0.3881	$ 9,583		
EEM	Enhanced wall insulation (nonresidential mass wall) 5A: U-0.086; R-9.83 (+ R-0.52)	RSMeans 07 21 13.10	11,766	Area	$ 0.0166	$ 196		
EEM 2	**Enhanced fenestration**						**$ 517**	
Standard	*Standard windows, U-0.37*		904	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.35	PNNL CE ANALYSIS	904	Area	$ 0.57	$ 517		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 59,518**	
Standard	*Lighting per ASHRAE 90.1-2016*		*35,787*	*watts*	$ 6.75	*$ 241,565*		Cost assumed to be proportional to increased efficiency
EEM	Reduced LPDs, ~20% more efficient	HBL	26,970	watts	$ -	$ 301,083		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ 780**	
Standard	*CV fans: 0.00094 bhp/cfm*			tons		$ -		Costed as increased system size for reduction in static pressure
EEM	CV fans: 0.00088 bhp/cfm	RSMeans 23 74 33.10	0.76	tons	$ 1,031	$ 780		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	Area	$ 0	$ -		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*3,453*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~11% more efficient	*RSMeans 26 51 13.55*			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (6,479)**	
Standard	*Packaged single-zone AC, 53 tons*	*RSMeans 23 74 33.10*	*1*	units	$ 69,354	*$ 69,354*		
EEM	Packaged single-zone AC, 46 tons	RSMeans 23 74 33.10	1	units	$ 62,875	$ 62,875		
ACA 2	**Reduced capacity for heating equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	units	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 3	**Reduced capacity for air handling equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	*units*	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 7,586**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	6	outlets	$ 1,300	$ 7,586		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 71,701***	

2020 NYStretch
STANDALONE RETAIL - 6A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 15,058**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		24,692	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential mass wall) 6A: U-0.080; R-10.70*		11,766	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 6A: U-0.029; R-33.4 (+ R-3.4)	RSMeans 07 22 16.10	24,692	Area	$ 0.5998	$ 14,809		
EEM	Enhanced wall insulation (nonresidential mass wall) 6A: U-0.076; R-11.36 (+ R-0.66)	RSMeans 07 21 13.10	11,766	Area	$ 0.0211	$ 248		
EEM 2	**Enhanced fenestration**						**$ 496**	
Standard	*Standard windows, U-0.35*		904	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.33	PNNL CE ANALYSIS	904	Area	$ 0.55	$ 496		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 59,518**	
Standard	*Lighting per ASHRAE 90.1-2016*		*35,787*	watts	$ 6.75	*$ 241,565*		Cost assumed to be proportional to increased efficiency
EEM	Reduced LPDs, ~20% more efficient	HBL	26,970	watts	$ -	$ 301,083		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ 936**	
Standard	*CV fans: 0.00094 bhp/cfm*			tons		$ -		Costed as increased system size for reduction in static pressure
EEM	CV fans: 0.00088 bhp/cfm	RSMeans 23 74 33.10	0.91	tons	$ 1,031	$ 936		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	Area	$ 0	$ -		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*3,453*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~11% more efficient	*RSMeans 26 51 13.55*			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (2,543)**	
Standard	*Packaged single-zone AC, 50 tons*	*RSMeans 23 74 33.10*	*1*	units	$ 66,677	*$ 66,677*		
EEM	Packaged single-zone AC, 48 tons	RSMeans 23 74 33.10	1	units	$ 64,134	$ 64,134		
ACA 2	**Reduced capacity for heating equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	units	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 3	**Reduced capacity for air handling equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	*units*	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 7,586**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	6	outlets	$ 1,300	$ 7,586		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 81,051***	

2020 NYStretch
SECONDARY SCHOOL - 4A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 50,747**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		128,112	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential steel-frame wall) 4A: U-0.064; R-13.4*		41,755	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 4A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	128,112	Area	$ 0.3881	$ 49,718		
EEM	Enhanced wall insulation (nonresidential steel-frame wall) 4A: U-0.061; R-14.2 (+ R-0.77)	RSMeans 07 21 13.10	41,755	Area	$ 0.0246	$ 1,029		
EEM 2	**Enhanced fenestration**						**$ 12,004**	
Standard	*Standard windows, U-0.39*		22,484	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.37	PNNL CE ANALYSIS	22,484	Area	$ 0.53	$ 12,004		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*		*157,768*	watts	$ 6.75	$ -		No cost assumed for this buidling type
EEM	Reduced LPDs, ~20% more efficient	HBL	127,266	watts	$ -	$ -		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances (based on improved fan efficiencies)**						**$ 36,643**	
Standard	*CV fans: 0.00094 bhp/cfm*					$ -		
Standard	*VAV fans: 0.00130 bhp/cfm*					$ -		
EEM	CV fans: 0.00088 bhp/cfm	RSMeans 23 74 33.10	1.97	tons	$ 1,031	$ 2,032		Costed as increased system size for reduction in static pressure
EEM	VAV fans: 0.00100 bhp/cfm	RSMeans D3040 134	9,708	cfm	$ 3.565	$ 34,611		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ 14,280**	
Standard	*Standard efficiency fryers, dishwashers, ovens, and holding cabinets*		-	0	$ -	$ -		
EEM	Enegy Star fryers, dishwashers, ovens, and holding cabinets	Energy Star Savings Calculator	2,319	Area	$ 6.16	$ 14,280		
EEM 11	**Thermal bridging reduction**						**$ 7,344**	
Standard	*Standard wall insulation*		-		$ -	$ -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	21,600	Area	$ 0.3400	$ 7,344		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*3,549*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~10% more efficient	RSMeans 26 51 13.55			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (5,166)**	
Standard	*Air-cooled chiller, 308 tons*	*RSMeans 23 64 19.10*	*1*	units	$ 206,960	$ *206,960*		
EEM	Air-cooled chiller, 300 tons	RSMeans 23 64 19.10	1	units	$ 201,794	$ 201,794		
ACA 2	**Reduced capacity for heating equipment**						**$ (2,314)**	
Standard	*Hot water boiler, gas fired, 3237 MBH*	RSMeans D3020 130	*1*	units	$ 103,770	$ *103,770*		
EEM	Hot water boiler, gas fired, 3155 MBH	RSMeans D3020 130	1	units	$ 101,456	$ 101,456		
ACA 3	**Reduced capacity for air handling equipment**						**$ (20,574)**	
Standard	*VAV with Reheat, 64817 cfm*	RSMeans D3040 134	*1*	*units*	$ 646,519	$ *646,519*		
EEM	*VAV with Reheat, 62741 cfm*	RSMeans D3040 134	1	units	$ 625,945	$ 625,945		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 2,600**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	2	outlets	$ 1,300	$ 2,600		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 95,564***	

2020 NYStretch
SECONDARY SCHOOL - 5A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 51,121**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		128,112	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential steel-frame wall) 5A: U-0.055; R-16.0*		41,755	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 5A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	128,112	Area	$ 0.3881	$ 49,718		
EEM	Enhanced wall insulation (nonresidential steel-frame wall) 5A: U-0.052; R-17.1 (+ R-1.05)	RSMeans 07 21 13.10	41,755	Area	$ 0.0336	$ 1,403		
EEM 2	**Enhanced fenestration**						**$ 15,786**	
Standard	*Standard windows, U-0.39*		22,484	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.36	PNNL CE ANALYSIS	22,484	Area	$ 0.70	$ 15,786		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*		*157,768*	watts	$ 6.75	$ -		No cost assumed for this buidling type
EEM	Reduced LPDs, ~20% more efficient	HBL	127,266	watts	$ -	$ -		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances (based on improved fan efficiencies)**						**$ 37,359**	
Standard	*CV fans: 0.00094 bhp/cfm*					$ -		
Standard	*VAV fans: 0.00130 bhp/cfm*					$ -		
EEM	CV fans: 0.00088 bhp/cfm	RSMeans 23 74 33.10	2.01	tons	$ 1,031	$ 2,070		Costed as increased system size for reduction in static pressure
EEM	VAV fans: 0.00100 bhp/cfm	RSMeans D3040 134	9,898	cfm	$ 3.565	$ 35,289		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ 14,280**	
Standard	*Standard efficiency fryers, dishwashers, ovens, and holding cabinets*		-	0	$ -	$ -		
EEM	Enegy Star fryers, dishwashers, ovens, and holding cabinets	Energy Star Savings Calculator	2,319	Area	$ 6.16	$ 14,280		
EEM 11	**Thermal bridging reduction**						**$ 7,344**	
Standard	*Standard wall insulation*		-		$ -	$ -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	21,600	Area	$ 0.3400	$ 7,344		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*6,525*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~10% more efficient	RSMeans 26 51 13.55			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (30,626)**	
Standard	*Air-cooled chiller, 295 tons*	*RSMeans 23 64 19.10*	*1*	units	$ 198,755	$ *198,755*		
EEM	Air-cooled chiller, 243 tons	RSMeans 23 64 19.10	1	units	$ 168,129	$ 168,129		
ACA 2	**Reduced capacity for heating equipment**						**$ (192)**	
Standard	*Hot water boiler, gas fired, 3420 MBH*	RSMeans D3020 130	*1*	units	$ 108,879	$ *108,879*		
EEM	Hot water boiler, gas fired, 3413 MBH	RSMeans D3020 130	1	units	$ 108,687	$ 108,687		
ACA 3	**Reduced capacity for air handling equipment**						**$ (21,624)**	
Standard	*VAV with Reheat, 66152 cfm*	RSMeans D3040 134	*1*	*units*	$ 659,746	$ *659,746*		
EEM	*VAV with Reheat, 63970 cfm*	RSMeans D3040 134	1	units	$ 638,122	$ 638,122		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 12,896**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	10	outlets	$ 1,300	$ 12,896		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 86,344***	

2020 NYStretch
SECONDARY SCHOOL - 6A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 78,907**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		128,112	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential steel-frame wall) 6A: U-0.049; R-17.5*		41,755	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 6A: U-0.029; R-33.4 (+ R-3.4)	RSMeans 07 22 16.10	128,112	Area	$ 0.5998	$ 76,836		
EEM	Enhanced wall insulation (nonresidential steel-frame wall) 6A: U-0.047; R-19.1 (+ R-1.55)	RSMeans 07 21 13.10	41,755	Area	$ 0.0496	$ 2,071		
EEM 2	**Enhanced fenestration**						**$ 16,119**	
Standard	*Standard windows, U-0.37*		22,484	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.34	PNNL CE ANALYSIS	22,484	Area	$ 0.72	$ 16,119		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*		*157,768*	watts	$ 6.75	$ -		No cost assumed for this buidling type
EEM	Reduced LPDs, ~20% more efficient	HBL	127,266	watts	$ -	$ -		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances (based on improved fan efficiencies)**						**$ 36,864**	
Standard	*CV fans: 0.00094 bhp/cfm*					$ -		
Standard	*VAV fans: 0.00130 bhp/cfm*					$ -		
EEM	CV fans: 0.00088 bhp/cfm	RSMeans 23 74 33.10	1.99	tons	$ 1,031	$ 2,054		Costed as increased system size for reduction in static pressure
EEM	VAV fans: 0.00100 bhp/cfm	RSMeans D3040 134	9,764	cfm	$ 3.565	$ 34,810		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ 14,280**	
Standard	*Standard efficiency fryers, dishwashers, ovens, and holding cabinets*		-	0	$ -	$ -		
EEM	Enegy Star fryers, dishwashers, ovens, and holding cabinets	Energy Star Savings Calculator	2,319	Area	$ 6.16	$ 14,280		
EEM 11	**Thermal bridging reduction**						**$ 7,344**	
Standard	*Standard wall insulation*		-		$ -	$ -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	21,600	Area	$ 0.3400	$ 7,344		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*6,525*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~10% more efficient	RSMeans 26 51 13.55			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (3,519)**	
Standard	*Air-cooled chiller, 230 tons*	*RSMeans 23 64 19.10*	*1*	units	$ 159,995	$ *159,995*		
EEM	Air-cooled chiller, 224 tons	RSMeans 23 64 19.10	1	units	$ 156,476	$ 156,476		
ACA 2	**Reduced capacity for heating equipment**						**$ (2,935)**	
Standard	*Hot water boiler, gas fired, 2438 MBH*	RSMeans D3020 130	*1*	units	$ 81,357	$ *81,357*		
EEM	Hot water boiler, gas fired, 2333 MBH	RSMeans D3020 130	1	units	$ 78,423	$ 78,423		
ACA 3	**Reduced capacity for air handling equipment**						**$ (22,044)**	
Standard	*VAV with Reheat, 65326 cfm*	RSMeans D3040 134	*1*	*units*	$ 651,558	$ *651,558*		
EEM	*VAV with Reheat, 63101 cfm*	RSMeans D3040 134	1	units	$ 629,514	$ 629,514		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 12,896**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	10	outlets	$ 1,300	$ 12,896		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 137,912***	

2020 NYStretch
LARGE HOTEL - 4A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 8,770**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		21,300	Area	$ -	$ -		
Standard	*Standard wall insulation (residential mass wall) 4A: U-0.090; R-9.31*		30,265	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 4A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	21,300	Area	$ 0.3881	$ 8,266		
EEM	Enhanced wall insulation (residential mass wall) 4A: U-0.086; R-9.83 (+ R-0.52)	RSMeans 07 21 13.10	30,265	Area	$ 0.0166	$ 504		
EEM 2	**Enhanced fenestration**						**$ 7,042**	
Standard	*Standard windows, U-0.39*		13,068	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.37	PNNL CE ANALYSIS	13,068	Area	$ 0.54	$ 7,042		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 138,136**	
Standard	*Lighting per ASHRAE 90.1-2016*		*95,014*	watts	$ 6.75	$ *641,345*		
EEM	Reduced LPDs, ~20% more efficient	HBL	74,550	watts	$ -	$ 779,481		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ 21,952**	
Standard	*VAV fans: 0.00130 bhp/cfm*					$ -		
EEM	VAV fans: 0.00100 bhp/cfm	RSMeans D3040 134	6,157.34	cfm	$ 3.565	$ 21,952		Costed as increased system size for reduction in static pressure
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ 6,810**	
Standard	*Standard efficiency fryers, dishwashers, ovens, and holding cabinets*		-	0	$ -	$ -		
EEM	Enegy Star fryers, dishwashers, ovens, and holding cabinets	Energy Star Savings Calculator	1,106	Area	$ 6.16	$ 6,810		
EEM 11	**Thermal bridging reduction**						**$ 2,197**	
Standard	*Standard wall insulation*		-		$ -	$ -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	6,462	Area	$ 0.3400	$ 2,197		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*12,951*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~24% more efficient	*RSMeans 26 51 13.55*			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (3,703)**	
Standard	*Air-cooled chiller, 255 tons*	*RSMeans 23 64 19.10*	*1*	units	$ 175,162	$ *175,162*		
EEM	Air-cooled chiller, 249 tons	*RSMeans 23 64 19.10*	1	0	$ 171,459	$ 171,459		
ACA 2	**Reduced capacity for heating equipment**						**$ (2,677)**	
Standard	*Hot water boiler, gas fired, 2197 MBH*	*RSMeans D3020 130*	*1*	units	$ 74,604	$ *74,604*		
EEM	Hot water boiler, gas fired, 2101 MBH	*RSMeans D3020 130*	1	0	$ 71,926	$ 71,926		
ACA 3	**Reduced capacity for air handling equipment**						**$ (20,784)**	
Standard	*VAV w/reheat, 41891 cfm*	*RSMeans D3040 134*	*1*	*units*	$ 419,364	$ *419,364*		
EEM	*VAV w/reheat, 39793 cfm*	RSMeans D3040 134	1	units	$ 398,580	$ 398,580		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 2,600**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	2	outlets	$ 1,300	$ 2,600		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 160,341***	

2020 NYStretch
LARGE HOTEL - 5A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 8,905**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		21,300	Area	$ -	$ -		
Standard	*Standard wall insulation (residential mass wall)* *5A: U-0.080; R-10.70*		30,265	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 5A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	21,300	Area	$ 0.3881	$ 8,266		
EEM	Enhanced wall insulation (residential mass wall) 5A: U-0.076; R-11.3 (+ R-0.66)	RSMeans 07 21 13.10	30,265	Area	$ 0.0211	$ 639		
EEM 2	**Enhanced fenestration**						**$ 8,212**	
Standard	*Standard windows, U-0.39*		13,068	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.36	PNNL CE ANALYSIS	13,068	Area	$ 0.63	$ 8,212		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 138,136**	
Standard	*Lighting per ASHRAE 90.1-2016*		*95,014*	watts	$ 6.75	$ *641,345*		
EEM	Reduced LPDs, ~20% more efficient	HBL	74,550	watts	$ -	$ 779,481		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ 22,502**	
Standard	*VAV fans: 0.00130 bhp/cfm*					$ -		
EEM	VAV fans: 0.00100 bhp/cfm	RSMeans D3040 134	6,311.43	cfm	$ 3.565	$ 22,502		Costed as increased system size for reduction in static pressure
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ 6,810**	
Standard	*Standard efficiency fryers, dishwashers, ovens, and holding cabinets*		-	0	$ -	$ -		
EEM	Enegy Star fryers, dishwashers, ovens, and holding cabinets	Energy Star Savings Calculator	1,106	Area	$ 6.16	$ 6,810		
EEM 11	**Thermal bridging reduction**						**$ 2,197**	
Standard	*Standard wall insulation*		-		$ -	$ -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	6,462	Area	$ 0.3400	$ 2,197		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*12,951*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~11% more efficient	*RSMeans 26 51 13.55*			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (3,555)**	
Standard	*Air-cooled chiller, 249 tons*	*RSMeans 23 64 19.10*	*1*	units	$ 171,684	$ *171,684*		
EEM	Air-cooled chiller, 243 tons	*RSMeans 23 64 19.10*	1	0	$ 168,129	$ 168,129		
ACA 2	**Reduced capacity for heating equipment**						**$ (2,925)**	
Standard	*Hot water boiler, gas fired, 2484 MBH*	*RSMeans D3020 130*	*1*	units	$ 82,642	$ *82,642*		
EEM	Hot water boiler, gas fired, 2379 MBH	*RSMeans D3020 130*	1	0	$ 79,717	$ 79,717		
ACA 3	**Reduced capacity for air handling equipment**						**$ (20,574)**	
Standard	*VAV w/reheat, 42865 cfm*	*RSMeans D3040 134*	*1*	*units*	$ 429,021	$ *429,021*		
EEM	*VAV w/reheat, 40789 cfm*	RSMeans D3040 134	1	units	$ 408,447	$ 408,447		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 19,158**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	15	outlets	$ 1,300	$ 19,158		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 178,865***	

2020 NYStretch
LARGE HOTEL - 6A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 12,775**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		21,300	Area	$ -	$ -		
Standard	*Standard wall insulation (residential mass wall)* *6A: U-0.071; R-12.3*		30,265	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 6A: U-0.029; R-33.4 (+ R-3.4)	RSMeans 07 22 16.10	21,300	Area	$ 0.5998	$ 12,775		
EEM	Enhanced wall insulation (residential mass wall) 6A: U-0.067; R-13.1 (+ R-0.84)	RSMeans 07 21 13.10	30,265	Area	$ 0.0269	$ 814		
EEM 2	**Enhanced fenestration**						**$ 8,470**	
Standard	*Standard windows, U-0.37*		13,068	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.35	PNNL CE ANALYSIS	13,068	Area	$ 0.65	$ 8,470		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	*$* -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 138,136**	
Standard	*Lighting per ASHRAE 90.1-2016*		*95,014*	watts	$ 6.75	*$ 641,345*		
EEM	Reduced LPDs, ~20% more efficient	HBL	74,550	watts	$ -	$ 779,481		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	*$* -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	*$* -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ 22,057**	
Standard	*VAV fans: 0.00130 bhp/cfm*					*$* -		
EEM	VAV fans: 0.00100 bhp/cfm	RSMeans D3040 134	6,186.85	cfm	$ 3.565	$ 22,057		Costed as increased system size for reduction in static pressure
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	*$* -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	*$* -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ 6,810**	
Standard	*Standard efficiency fryers, dishwashers, ovens, and holding cabinets*		-	0	$ -	*$* -		
EEM	Enegy Star fryers, dishwashers, ovens, and holding cabinets	Energy Star Savings Calculator	1,106	Area	$ 6.16	$ 6,810		
EEM 11	**Thermal bridging reduction**						**$ 2,197**	
Standard	*Standard wall insulation*		-		$ -	*$* -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	6,462	Area	$ 0.3400	$ 2,197		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*12,951*	*watts*	$ -	*$* -		
EEM	Reduced LPDs, ~11% more efficient	*RSMeans 26 51 13.55*			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	*$* -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	*$* -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	*$* -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (3,519)**	
Standard	*Air-cooled chiller, 230 tons*	*RSMeans 23 64 19.10*	*1*	units	$ 159,995	*$ 159,995*		
EEM	Air-cooled chiller, 224 tons	*RSMeans 23 64 19.10*	1	0	$ 156,476	$ 156,476		
ACA 2	**Reduced capacity for heating equipment**						**$ (2,935)**	
Standard	*Hot water boiler, gas fired, 2438 MBH*	*RSMeans D3020 130*	*1*	units	$ 81,357	*$ 81,357*		
EEM	Hot water boiler, gas fired, 2333 MBH	*RSMeans D3020 130*	1	0	$ 78,423	$ 78,423		
ACA 3	**Reduced capacity for air handling equipment**						**$ (20,154)**	
Standard	*VAV w/reheat, 42018 cfm*	*RSMeans D3040 134*	*1*	*units*	$ 420,623	*$ 420,623*		
EEM	*VAV w/reheat, 39984 cfm*	RSMeans D3040 134	1	units	$ 400,469	$ 400,469		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	*$* -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 19,158**	
Standard			-	0	$ -	*$* -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	15	outlets	$ 1,300	$ 19,158		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	*$* -		
EEM			-	0	$ -	$ -		
						Total	***$ 182,994***	

2020 NYStretch
FULL-SERVICE RESTAURANT - 4A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 2,602**	
Standard	*Standard U-0.021, R-49 roof insulation (attic roof)*		6,130	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential steel-frame wall) 4A: U-0.064; R-13.4*		2,460	Area	$ -	$ -		
EEM	Enhanced roof insulation (attic roof) 4A: U-0.020; R-51.4 (+ R-2.35)	RSMeans 07 22 16.10	6,130	Area	$ 0.4145	$ 2,541		
EEM	Enhanced wall insulation (nonresidential steel-frame wall) 4A: U-0.061; R-14.2 (+ R-0.77)	RSMeans 07 21 13.10	2,460	Area	$ 0.0246	$ 61		
EEM 2	**Enhanced fenestration**						**$ 251**	
Standard	*Standard windows, U-0.37*		508	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.35	PNNL CE ANALYSIS	508	Area	$ 0.50	$ 251		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 8,372**	
Standard	*Lighting per ASHRAE 90.1-2016*		*4,418*	watts	$ 6.75	*$ 29,820*		
EEM	Reduced LPDs, ~20% more efficient	HBL	3,178	watts	$ -	$ 38,192		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ -**	
Standard	*n/a - does not apply to this building type*			tons	$ 1,031	$ -		
EEM	n/a - does not apply to this building type			cfm	$ 4	$ -		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ 9,216**	
Standard	*Standard efficiency fryers, dishwashers, ovens, and holding cabinets*		-	0	$ -	$ -		
EEM	Enegy Star fryers, dishwashers, ovens, and holding cabinets	Energy Star Savings Calculator	1,497	Area	$ 6.16	$ 9,216		
EEM 11	**Thermal bridging reduction**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	Area	$ 0	$ -		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*1,433*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~9% more efficient	*RSMeans 26 51 13.55*			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (255)**	
Standard	*Packaged single-zone AC, 26.2 tons*	*RSMeans 23 74 33.10*	*1*	units	$ 31,039	*$ 31,039*		
EEM	Packaged single-zone AC, 26 tons	*RSMeans 23 74 33.10*	1	units	$ 30,784	$ 30,784		
ACA 2	**Reduced capacity for heating equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	units	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 3	**Reduced capacity for air handling equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	*units*	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 2,600**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	2	outlets	$ 1,300	$ 2,600		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 22,786***	

2020 NYStretch
FULL SERVICE RESTAURANT - 5A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 2,624**	
Standard	*Standard U-0.021, R-49 roof insulation (attic roof)*		6,130	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential steel-frame wall) 5A: U-0.055; R-16.0*		2,460	Area	$ -	$ -		
EEM	Enhanced roof insulation (attic roof) 5A: U-0.020; R-51.4 (+ R-2.35)	RSMeans 07 22 16.10	6,130	Area	$ 0.4145	$ 2,541		
EEM	Enhanced wall insulation (nonresidential steel-frame wall) 5A: U-0.052; R-17.1 (+ R-1.05)	RSMeans 07 21 13.10	2,460	Area	$ 0.0336	$ 83		
EEM 2	**Enhanced fenestration**						**$ 291**	
Standard	*Standard windows, U-0.37*		508	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.35	PNNL CE ANALYSIS	508	Area	$ 0.57	$ 291		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 8,372**	
Standard	*Lighting per ASHRAE 90.1-2016*		*4,418*	watts	$ 6.75	*$ 29,820*		
EEM	Reduced LPDs, ~20% more efficient	HBL	3,178	watts	$ -	$ 38,192		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ -**	
Standard	*n/a - does not apply to this building type*			tons	$ 1,031	$ -		
EEM	n/a - does not apply to this building type			cfm	$ 4	$ -		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ 9,216**	
Standard	*Standard efficiency fryers, dishwashers, ovens, and holding cabinets*		-	0	$ -	$ -		
EEM	Enegy Star fryers, dishwashers, ovens, and holding cabinets	Energy Star Savings Calculator	1,497	Area	$ 6.16	$ 9,216		
EEM 11	**Thermal bridging reduction**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	Area	$ 0	$ -		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*1,433*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~9% more efficient	*RSMeans 26 51 13.55*			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (268)**	
Standard	*Packaged single-zone AC, 26.3 tons*	*RSMeans 23 74 33.10*	*1*	units	$ 31,156	*$ 31,156*		
EEM	Packaged single-zone AC, 26.1 tons	*RSMeans 23 74 33.10*	1	units	$ 30,887	$ 30,887		
ACA 2	**Reduced capacity for heating equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	units	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 3	**Reduced capacity for air handling equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	*units*	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ -**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	-	outlets	$ 1,300	$ -		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 20,234***	

2020 NYStretch
FULL SERVICE RESTAURANT - 6A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 5,475**	
Standard	*Standard U-0.021, R-49 roof insulation (attic roof)*		6,130	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential steel-frame wall) 6A: U-0.049; R-17.5*		2,460	Area	$ -	$ -		
EEM	Enhanced roof insulation (attic roof) 6A: U-0.019; R-53.9 (+ R-4.95)	RSMeans 07 22 16.10	6,130	Area	$ 0.8732	$ 5,353		
EEM	Enhanced wall insulation (nonresidential steel-frame wall) 6A: U-0.047; R-19.1 (+ R-1.55)	RSMeans 07 21 13.10	2,460	Area	$ 0.0496	$ 122		
EEM 2	**Enhanced fenestration**						**$ 278**	
Standard	*Standard windows, U-0.35*		508	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.33	PNNL CE ANALYSIS	508	Area	$ 0.55	$ 278		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 8,372**	
Standard	*Lighting per ASHRAE 90.1-2016*		*4,418*	watts	$ 6.75	*$ 29,820*		
EEM	Reduced LPDs, ~20% more efficient	HBL	3,178	watts	$ -	$ 38,192		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ -**	
Standard	*n/a - does not apply to this building type*			tons	$ 1,031	$ -		
EEM	n/a - does not apply to this building type			cfm	$ 4	$ -		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ 9,216**	
Standard	*Standard efficiency fryers, dishwashers, ovens, and holding cabinets*		-	0	$ -	$ -		
EEM	Enegy Star fryers, dishwashers, ovens, and holding cabinets	Energy Star Savings Calculator	1,497	Area	$ 6.16	$ 9,216		
EEM 11	**Thermal bridging reduction**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	Area	$ 0	$ -		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*1,433*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~9% more efficient	*RSMeans 26 51 13.55*			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (258)**	
Standard	*Packaged single-zone AC, 25.3 tons*	*RSMeans 23 74 33.10*	*1*	units	$ 30,079	*$ 30,079*		
EEM	Packaged single-zone AC, 25.1 tons	*RSMeans 23 74 33.10*	1	units	$ 29,821	$ 29,821		
ACA 2	**Reduced capacity for heating equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	units	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 3	**Reduced capacity for air handling equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	*units*	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ -**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	-	outlets	$ 1,300	$ -		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 23,083***	

2020 NYStretch
OUTPATIENT HEALTHCARE - 4A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 6,067**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		14,782	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential steel-frame wall)* *4A: U-0.064; R-13.4*		13,402	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 4A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	14,782	Area	$ 0.3881	$ 5,737		
EEM	Enhanced wall insulation (nonresidential steel-frame wall) 4A: U-0.061; R-14.2 (+ R-0.77)	RSMeans 07 21 13.10	13,402	Area	$ 0.0246	$ 330		
EEM 2	**Enhanced fenestration**						**$ 1,740**	
Standard	*Standard windows, U-0.38*		3,318	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.36	PNNL CE ANALYSIS	3,318	Area	$ 0.52	$ 1,740		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ 8,500**	
Standard	*Not Required*		-	units	$ -	$ -		
EEM	Testing required	BET, LLC	1	units	$ 8,500	$ 8,500		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 71,679**	
Standard	*Lighting per ASHRAE 90.1-2016*		*39,536*	watts	$ 6.75	*$ 266,868*		
EEM	Reduced LPDs, ~20% more efficient	HBL	28,917	watts	$ -	$ 338,548		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	*$ -*		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	*$ -*		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ 17,767**	
Standard	*VAV fans: 0.00130 bhp/cfm*					*$ -*		Costed as increased system size for reduction in static pressure
EEM	VAV fans: 0.00100 bhp/cfm	RSMeans D3040 134	4,983.57	cfm	$ 3.565	$ 17,767		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	*$ -*		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	*$ -*		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	*$ -*		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ 1,596**	
Standard	*Standard wall insulation*		-		$ -	*$ -*		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	4,694	Area	$ 0.3400	$ 1,596		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	RSMeans 26 51 13.55	*1,619*	*watts*	$ -	*$ -*		
EEM	Reduced LPDs, ~9% more efficient	RSMeans 26 51 13.55			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	*$ -*		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	*$ -*		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	*$ -*		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ -**	
Standard	*INCLUDED WITH AHU IN ACA 3*		-	units	$ -	*$ -*		
EEM			-	units	$ 177,744	$ -		
ACA 2	**Reduced capacity for heating equipment**						**$ 133**	
Standard	*Hot water boiler, gas fired, 302 MBH*	RSMeans D3020 130	*1*	units	$ 21,475	*$ 21,475*		
EEM	Hot water boiler, gas fired, 306 MBH	RSMeans D3020 130	1	0	$ 21,608	$ 21,608		
ACA 3	**Reduced capacity for air handling equipment**						**$ (15,955)**	
Standard	*VAV AHU, 33818 cfm*	RSMeans D3040 134	*1*	*units*	$ 339,376	*$ 339,376*		
EEM	*VAV AHU, 32207 cfm*	RSMeans D3040 134	1	units	$ 323,421	$ 323,421		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	*$ -*		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 2,600**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	2	outlets	$ 1,300	$ 2,600		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	*$ -*		
EEM			-	0	$ -	$ -		
						Total	***$ 94,127***	

2020 NYStretch
OUTPATIENT HEALTHCARE - 5A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 6,187**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		14,782	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential steel-frame wall)* *5A: U-0.055; R-16.0*		13,402	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 5A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	14,782	Area	$ 0.3881	$ 5,737		
EEM	Enhanced wall insulation (nonresidential steel-frame wall) 5A: U-0.052; R-17.1 (+ R-1.05)	RSMeans 07 21 13.10	13,402	Area	$ 0.0336	$ 450		
EEM 2	**Enhanced fenestration**						**$ 1,972**	
Standard	*Standard windows, U-0.38*		3,318	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.36	PNNL CE ANALYSIS	3,318	Area	$ 0.59	$ 1,972		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ 3,200**	
Standard	*Not Required*		-	units	$ -	$ -		
EEM	Testing required	BET, LLC	1	units	$ 3,200	$ 3,200		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 71,679**	
Standard	*Lighting per ASHRAE 90.1-2016*		*39,536*	watts	$ 6.75	*$ 266,868*		
EEM	Reduced LPDs, ~20% more efficient	HBL	28,917	watts	$ -	$ 338,548		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	*$ -*		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ 18,375**	
Standard	*VAV fans: 0.00130 bhp/cfm*					*$ -*		Costed as increased system size for reduction in static pressure
EEM	VAV fans: 0.00100 bhp/cfm	RSMeans D3040 134	5,154.07	cfm	$ 3.565	$ 18,375		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	*$ -*		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	*$ -*		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	*$ -*		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ 1,596**	
Standard	*Standard wall insulation*		-		$ -	*$ -*		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	4,694	Area	$ 0.3400	$ 1,596		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	RSMeans 26 51 13.55	*5,764*	*watts*	$ -	*$ -*		
EEM	Reduced LPDs, ~10% more efficient	RSMeans 26 51 13.55			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	*$ -*		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	*$ -*		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	*$ -*		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ -**	
Standard	*INCLUDED WITH AHU IN ACA 3*		-	units	$ -	*$ -*		
EEM			-	units	$ 177,744	$ -		
ACA 2	**Reduced capacity for heating equipment**						**$ 102**	
Standard	*Hot water boiler, gas fired, 364 MBH*	RSMeans D3020 130	*1*	units	$ 23,223	*$ 23,223*		
EEM	Hot water boiler, gas fired, 368 MBH	RSMeans D3020 130	1	0	$ 23,325	$ 23,325		
ACA 3	**Reduced capacity for air handling equipment**						**$ (16,585)**	
Standard	*VAV AHU, 34983 cfm*	RSMeans D3040 134	*1*	*units*	$ 350,923	*$ 350,923*		
EEM	*VAV AHU, 33309 cfm*	RSMeans D3040 134	1	units	$ 334,338	$ 334,338		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	*$ -*		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 17,962**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	14	outlets	$ 1,300	$ 17,962		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	*$ -*		
EEM			-	0	$ -	$ -		
						Total	***$ 104,489***	

2020 NYStretch
OUTPATIENT HEALTHCARE - 6A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 9,530**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		14,782	Area	$ -	$ -		
Standard	*Standard wall insulation (nonresidential steel-frame wall)* *6A: U-0.049; R-17.5*		13,402	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 6A: U-0.029; R-33.4 (+ R-3.4)	RSMeans 07 22 16.10	14,782	Area	$ 0.5998	$ 8,866		
EEM	Enhanced wall insulation (nonresidential steel-frame wall) 6A: U-0.047; R-19.1 (+ R-1.55)	RSMeans 07 21 13.10	13,402	Area	$ 0.0496	$ 665		
EEM 2	**Enhanced fenestratior**						**$ 1,831**	
Standard	*Standard windows, U-0.36*		3,318	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.34	PNNL CE ANALYSIS	3,318	Area	$ 0.55	$ 1,831		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ 3,200**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type	BET, LLC	1	0	$ 3,200	$ 3,200		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling unit**						**$ 71,679**	
Standard	*Lighting per ASHRAE 90.1-2016*		*39,536*	watts	$ 6.75	*$ 266,868*		
EEM	Reduced LPDs, ~20% more efficient	HBL	28,917	watts	$ -	$ 338,548		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lightin**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting contro**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ 18,212**	
Standard	*VAV fans: 0.00130 bhp/cfm*					$ -		Costed as increased system size for reduction in static pressure
EEM	VAV fans: 0.00100 bhp/cfm	RSMeans D3040 134	5,108.16	cfm	$ 3.565	$ 18,212		
EEM 8	**Hotel guestroom HVAC vacancy contro**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipmen**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ 1,596**	
Standard	*Standard wall insulation*		-		$ -	$ -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	4,694	Area	$ 0.3400	$ 1,596		
EEM 12	**Exterior lighting power reductior**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	RSMeans 26 51 13.55	*5,764*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~10% more efficient	RSMeans 26 51 13.55			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipmen**						**$ -**	
Standard	*INCLUDED WITH AHU IN ACA 3*		-	units	$ -	$ -		
EEM			-	units	$ 177,744	$ -		
ACA 2	**Reduced capacity for heating equipmen**						**$ 94**	
Standard	*Hot water boiler, gas fired, 366 MBH*	RSMeans D3020 130	*1*	units	$ 23,274	*$ 23,274*		
EEM	Hot water boiler, gas fired, 369 MBH	RSMeans D3020 130	1	0	$ 23,368	$ 23,368		
ACA 3	**Reduced capacity for air handling equipmen**						**$ (12,806)**	
Standard	*VAV AHU, 34305 cfm*	RSMeans D3040 134	*1*	*units*	$ 344,205	*$ 344,205*		
EEM	*VAV AHU, 33012 cfm*	RSMeans D3040 134	1	units	$ 331,399	$ 331,399		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirement**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of space**						**$ 17,962**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	14	outlets	$ 1,300	$ 17,962		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 111,298***	

2020 NYStretch
WAREHOUSE - 4A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 22,863**	
Standard	*Standard U-0.032, R-30 roof insulation (metal building)* *4A: U-0.037; R-32.2 (+ R-2.2)*		49,495	Area	$ -	$ -		
Standard	*Standard wall insulation (metal building)* *4A: U-0.060; R-15.3*		26,687	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 4A: U-0.035; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	49,495	Area	$ 0.3881	$ 19,208		
EEM	Enhanced wall insulation (nonresidential mass wall) 4A: U-0.048; R-19.5 (+ R-4.28)	RSMeans 07 21 13.10	26,687	Area	$ 0.1370	$ 3,655		
EEM 2	**Enhanced fenestration**						**$ 100**	
Standard	*Standard windows, U-0.38*		190	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.36	PNNL CE ANALYSIS	190	Area	$ 0.53	$ 100		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ 17,000**	
Standard	*Not Required*		-	units	$ -	$ -		
EEM	Testing required	Vidaris	1	units	$ 17,000	$ 17,000		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*		*24,400*	watts	$ 6.75	$ -		
EEM	Reduced LPDs, ~20% more efficient	HBL	18,689	watts	$ -	$ -		No cost assumed for this buidling type
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-		$ -	$ -		
EEM	n/a - IECC only		-		$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-		$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-		$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ -**	
Standard	*n/a - does not apply to this building type*				$ 1,031	$ -		
EEM	n/a - does not apply to this building type				$ 4	$ -		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	$ -		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-	Area	$ 0	$ -		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*4,100*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~8% more efficient	*RSMeans 26 51 13.55*			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	$ -		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-		$ -	$ -		
EEM	n/a - applies to IECC path only		-		$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ -**	
Standard	*INCLUDED WITH AHU IN ACA 3*		-	units	$ -	$ -		
EEM			-	units		$ -		
ACA 2	**Reduced capacity for heating equipment**						**$ -**	
Standard	*INCLUDED WITH AHU IN ACA 3*		-	units	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 3	**Reduced capacity for air handling equipment**						**$ (2,999)**	
Standard	*PSZ AHU, CAV, 3390 cfm*	*RSMeans 23 74 33.10*	*1*	*units*	$ 16,691	*$ 16,691*		
EEM	*PSZ AHU, CAV, 2543 cfm*	RSMeans 23 74 33.10	1	units	$ 13,692	$ 13,692		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 2,600**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	2	outlets	$ 1,300	$ 2,600		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-		$ -	$ -		
EEM			-		$ -	$ -		
						Total	***$ 39,565***	

2020 NYStretch
WAREHOUSE - 5A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 20,019**	
Standard	*Standard U-0.032, R-30 roof insulation (metal building)* *5A: U-0.037; R-32.2 (+ R-2.2)*		49,495	Area	$ -	$ -		
Standard	*Standard wall insulation (metal building)* *5A: U-0.050; R-18.6*		26,687	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 5A: U-0.035; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	49,495	Area	$ 0.3881	$ 19,208		
EEM	Enhanced wall insulation (nonresidential mass wall) 5A: U-0.048; R-19.5 (+ R-0.95)	RSMeans 07 21 13.10	26,687	Area	$ 0.0304	$ 811		
EEM 2	**Enhanced fenestration**						**$ 103**	
Standard	*Standard windows, U-0.38*		190	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.36	PNNL CE ANALYSIS	190	Area	$ 0.54	$ 103		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ 6,400**	
Standard	*Not Required*		-	*units*	$ -	$ -		
EEM	Testing required	Vidaris	1	units	$ 6,400	$ 6,400		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*		*24,400*	*watts*	$ 6.75	$ -		
EEM	Reduced LPDs, ~20% more efficient	HBL	18,689		$ -	$ -		No cost assumed for this buidling type
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-		$ -	$ -		
EEM	n/a - IECC only		-		$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-		$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-		$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ -**	
Standard	*CV fans: 0.00094 bhp/cfm* *VAV fans: 0.00130 bhp/cfm*				$ 1,031	$ -		
EEM	CV fans: 0.00088 bhp/cfm VAV fans: 0.00100 bhp/cfm				$ 4	$ -		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	$ -		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ 0	$ -		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*5,101*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~8% more efficient	*RSMeans 26 51 13.55*			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ -**	
Standard	*INCLUDED WITH AHU IN ACA 3*		-	units	$ -	$ -		
EEM			-	units	$ 177,744	$ -		
ACA 2	**Reduced capacity for heating equipment**						**$ -**	
Standard	*INCLUDED WITH AHU IN ACA 3*		-	units	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 3	**Reduced capacity for air handling equipment**						**$ (1,274)**	
Standard	*PSZ AHU, CAV, 2755 cfm*	*RSMeans 23 74 33.10*	*1*	*units*	$ 14,442	*$ 14,442*		
EEM	*PSZ AHU, CAV, 2394 cfm*	RSMeans 23 74 33.10	1	units	$ 13,167	$ 13,167		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 4,338**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	3	outlets	$ 1,300	$ 4,338		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 29,586***	

2020 NYStretch
WAREHOUSE - 6A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 30,496**	
Standard	*Standard U-0.032, R-30 roof insulation (metal building)* *6A: U-0.031; R-33.4 (+ R-3.4)*		49,495	Area	$ -	$ -		
Standard	*Standard wall insulation (metal building)* *6A: U-0.050; R-18.6*		26,687	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 6A: U-0.028; R-33.4 (+ R-3.4)	RSMeans 07 22 16.10	49,495	Area	$ 0.5998	$ 29,685		
EEM	Enhanced wall insulation (nonresidential mass wall) 6A: U-0.048; R-19.5 (+ R-0.95)	RSMeans 07 21 13.10	26,687	Area	$ 0.0304	$ 811		
EEM 2	**Enhanced fenestration**						**$ 105**	
Standard	*Standard windows, U-0.36*		190	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.34	PNNL CE ANALYSIS	190	Area	$ 0.55	$ 105		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ 6,400**	
Standard	*Not Required*		*1*	*units*	$ -	$ -		
EEM	Testing required	Vidaris	1	units	$ 6,400	$ 6,400		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*		*24,400*	*watts*	$ 6.75	$ -		
EEM	Reduced LPDs, ~20% more efficient	HBL	18,689		$ -	$ -		No cost assumed for this buidling type
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-		$ -	$ -		
EEM	n/a - IECC only		-		$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-		$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-		$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ -**	
Standard	*CV fans: 0.00094 bhp/cfm* *VAV fans: 0.00130 bhp/cfm*				$ 1,031	$ -		
EEM	CV fans: 0.00088 bhp/cfm VAV fans: 0.00100 bhp/cfm				$ 4	$ -		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	$ -		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ 0	$ -		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*	*RSMeans 26 51 13.55*	*5,101*	*watts*	$ -	$ -		
EEM	Reduced LPDs, ~8% more efficient	*RSMeans 26 51 13.55*			$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	each	$ -	$ -		
EEM	n/a - does not apply to this building type		-	each	$ -	$ -		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ -**	
Standard	*INCLUDED WITH AHU IN ACA 3*		-	units	$ -	$ -		
EEM			-	units	$ 177,744	$ -		
ACA 2	**Reduced capacity for heating equipment**						**$ -**	
Standard	*INCLUDED WITH AHU IN ACA 3*		-	units	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 3	**Reduced capacity for air handling equipment**						**$ (2,024)**	
Standard	*PSZ AHU, CAV, 2882 cfm*	*RSMeans 23 74 33.10*	*1*	*units*	$ 14,891	*$ 14,891*		
EEM	*PSZ AHU, CAV, 2310 cfm*	RSMeans 23 74 33.10	1	units	$ 12,867	$ 12,867		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 4,338**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	3	outlets	$ 1,300	$ 4,338		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 39,315***	

2020 NYStretch
10 STORY HIGH-RISE APARTMENT - 4A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 3,991**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck,*		8,435	Area	$ -	$ -		
Standard	*Standard wall insulation (residential steel-frame wall) 4A: U-0.064; R-13.4*		29,112	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 4A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	8,435	Area	$ 0.3881	$ 3,274		
EEM	Enhanced wall insulation (residential steel-frame wall) 4A: U-0.061; R-14.2 (+ R-0.77)	RSMeans 07 21 13.10	29,112	Area	$ 0.0246	$ 717		
EEM 2	**Enhanced fenestration**						**$ 6,679**	
Standard	*Standard windows, U-0.39*		12,383	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.37	PNNL CE ANALYSIS	12,383	Area	$ 0.54	$ 6,679		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*		*60,160*	watts	$ -	$ -		
EEM	Reduced LPDs, ~20% more efficient	HBL	57,804	watts	$ -	$ -		No cost assumed for this buidling type
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ -**	
Standard	*n/a - does not apply to this building type*				$ -	$ -		
EEM	n/a - does not apply to this building type				$ -	$ -		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	$ -		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*Hot water boiler with 80% thermal efficiency*		-		$ -	$ -		
EEM	Hot water boiler with 94% thermal efficiency		-		$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ 1,270**	
Standard	*Standard wall insulation*		-		$ -	$ -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	3,735	Area	$ 0.3400	$ 1,270		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*n/a - not modeled for this building type*	*RSMeans 26 51 13.55*	-		$ -	$ -		
EEM	*n/a - not modeled for this building type*	*RSMeans 26 51 13.55*	-		$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ 10,000**	
Standard	*Standard elevator motors, 30hp*		-	each	$ -	$ -		
EEM	Elevator motors with regenerative drives, 30 hp	Previous projects	1	each	$ 10,000	$ 10,000		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (2,551)**	
Standard	*PTAC, 105 tons*	*RSMeans D3050 255*	*1*	units	$ 179,837	$ *179,837*		
EEM	PTAC, 104 tons	*RSMeans D3050 255*	1	units	$ 177,287	$ 177,287		
ACA 2	**Reduced capacity for heating equipment**						**$ (469)**	
Standard	*Hot water boiler, gas fired, 1076 MBH*	*RSMeans D3020 130*	*1*	units	$ 43,188	$ *43,188*		
EEM	Hot water boiler, gas fired, 1059 MBH	*RSMeans D3020 130*	1	0	$ 42,719	$ 42,719		
ACA 3	**Reduced capacity for air handling equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	*units*	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ 5,255**	
Standard	*Opaque wall with U-0.061*		-	0	$ -	$ -		
EEM	Opaque wall with U-0.045, R-22.2 (+R-5.85)	RSMeans 07 21 13.10	28,086	0	$ 0.1871	$ 5,255		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 2,600**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	2	outlets	$ 1,300	$ 2,600		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 26,775***	

2020 NYStretch
10 STORY HIGH-RISE APARTMENT - 5A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 4,252**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		8,435	Area	$ -	$ -		
Standard	*Standard wall insulation (residential steel-frame wall) 5A: U-0.055; R-16.0*		29,112	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 5A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	8,435	Area	$ 0.3881	$ 3,274		
EEM	Enhanced wall insulation (residential steel-frame wall) 5A: U-0.052; R-17.1 (+ R-1.05)	RSMeans 07 21 13.10	29,112	Area	$ 0.0336	$ 978		
EEM 2	**Enhanced fenestration**						**$ 9,755**	
Standard	*Standard windows, U-0.39*		12,383	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.36	PNNL CE ANALYSIS	12,383	Area	$ 0.79	$ 9,755		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*		*60,160*	watts	$ -	$ -		No cost assumed for this buidling type
EEM	Reduced LPDs, ~20% more efficient	HBL	57,804	watts	$ -	$ -		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ -**	
Standard	*n/a - does not apply to this building type*				$ -	$ -		
EEM	n/a - does not apply to this building type				$ -	$ -		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	$ -		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ 1,270**	
Standard	*Standard wall insulation*		-		$ -	$ -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	3,735	Area	$ 0.3400	$ 1,270		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*n/a - not modeled for this building type*	*RSMeans 26 51 13.55*	-		$ -	$ -		
EEM	*n/a - not modeled for this building type*	*RSMeans 26 51 13.55*	-		$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ 10,000**	
Standard	*Standard elevator motors, 30hp*		-	each	$ -	$ -		
EEM	Elevator motors with regenerative drives, 30 hp	Previous projects	1	each	$ 10,000	$ 10,000		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (4,679)**	
Standard	*PTAC, 106 tons*	*RSMeans D3050 255*	*1*	units	$ 180,632	$ *180,632*		
EEM	PTAC, 103.2 tons	*RSMeans D3050 255*	1	units	$ 175,954	$ 175,954		
ACA 2	**Reduced capacity for heating equipment**						**$ (771)**	
Standard	*Hot water boiler, gas fired, 1073 MBH*	*RSMeans D3020 130*	*1*	units	$ 43,089	$ *43,089*		
EEM	Hot water boiler, gas fired, 1045 MBH	*RSMeans D3020 130*	1	0	$ 42,318	$ 42,318		
ACA 3	**Reduced capacity for air handling equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	*units*	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ 7,938**	
Standard	*Opaque wall with U-0.052*		-	0	$ -	$ -		
EEM	Opaque wall with U-0.036, R-28.1 (+R-8.83)	RSMeans 07 21 13.10	28,086	0	$ 0.2826	$ 7,938		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 2,600**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	2	outlets	$ 1,300	$ 2,600		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 30,364***	

2020 NYStretch
10 STORY HIGH-RISE APARTMENT - 6A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 6,503**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		8,435	Area	$ -	$ -		
Standard	*Standard wall insulation (residential steel-frame wall) 6A: U-0.049; R-17.5*		29,112	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 6A: U-0.029; R-33.4 (+ R-3.4)	RSMeans 07 22 16.10	8,435	Area	$ 0.5998	$ 5,059		
EEM	Enhanced wall insulation (residential steel-frame wall) 6A: U-0.044; R-19.1 (+ R-1.55)	RSMeans 07 21 13.10	29,112	Area	$ 0.0496	$ 1,444		
EEM 2	**Enhanced fenestration**						**$ 10,005**	
Standard	*Standard windows, U-0.38*		12,383	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.35	PNNL CE ANALYSIS	12,383	Area	$ 0.81	$ 10,005		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ -**	
Standard	*Lighting per ASHRAE 90.1-2016*		*60,160*	watts	$ 6.75	$ -		No cost assumed for this buidling type
EEM	Reduced LPDs, ~20% more efficient	HBL	57,804	watts	$ -	$ -		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ -**	
Standard	*n/a - does not apply to this building type*				$ -	$ -		
EEM	n/a - does not apply to this building type				$ -	$ -		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	$ -		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ 1,270**	
Standard	*Standard wall insulation*		-		$ -	$ -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	3,735	Area	$ 0.3400	$ 1,270		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*n/a - not modeled for this building type*	*RSMeans 26 51 13.55*	-		$ -	$ -		
EEM	*n/a - not modeled for this building type*	*RSMeans 26 51 13.55*	-		$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ 10,000**	
Standard	*Standard elevator motors, 30hp*		-	each	$ -	$ -		
EEM	Elevator motors with regenerative drives, 30 hp	Previous projects	1	each	$ 10,000	$ 10,000		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (6,309)**	
Standard	*PTAC, 108 tons*	*RSMeans D3050 255*	*1*	units	$ 183,620	*$ 183,620*		
EEM	PTAC, 104 tons	*RSMeans D3050 255*	1	units	$ 177,311	$ 177,311		
ACA 2	**Reduced capacity for heating equipment**						**$ (1,006)**	
Standard	*Hot water boiler, gas fired, 1112 MBH*	*RSMeans D3020 130*	*1*	units	$ 44,195	*$ 44,195*		
EEM	Hot water boiler, gas fired, 1076 MBH	*RSMeans D3020 130*	1	0	$ 43,189	$ 43,189		
ACA 3	**Reduced capacity for air handling equipment**						**$ -**	
Standard	*(INCLUDED W/PACKAGED UNITS IN ACA 1)*		-	*units*	$ -	*$ -*		
EEM			-	units	$ -	$ -		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ 12,444**	
Standard	*Opaque wall with U-0.044*		-	0	$ -	*$ -*		
EEM	Opaque wall with U-0.027, R-36.57 (+R-13.9)	RSMeans 07 21 13.10	28,086	0	$ 0.4431	$ 12,444		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 2,600**	
Standard			-	0	$ -	*$ -*		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	2	outlets	$ 1,300	$ 2,600		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	*$ -*		
EEM			-	0	$ -	$ -		
						Total	***$ 35,508***	

2020 NYStretch
20 STORY HIGH-RISE APARTMENT - 4A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 4,397**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		8,435	Area	$ -	$ -		
Standard	*Standard wall insulation (residential steel-frame wall)* *4A: U-0.064; R-13.4*		45,603	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 4A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	8,435	Area	$ 0.3881	$ 3,274		
EEM	Enhanced wall insulation (residential steel-frame wall) 4A: U-0.061; R-14.2 (+ R-0.77)	RSMeans 07 21 13.10	45,603	Area	$ 0.0246	$ 1,124		
EEM 2	**Enhanced fenestration**						**$ 20,165**	
Standard	*Standard windows, U-0.39*		37,387	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.37	PNNL CE ANALYSIS	37,387	Area	$ 0.54	$ 20,165		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 15,786**	
Standard	*Lighting per ASHRAE 90.1-2016*		*13,812*	watts	$ 6.75	*$ 93,229*		Cost for retail area only
EEM	Reduced LPDs, ~20% more efficient	HBL	11,473	watts	$ -	$ 109,015.58		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	*$ -*		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	*$ -*		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ -**	
Standard	*n/a - does not apply to this building type*				$ -	*$ -*		
EEM	n/a - does not apply to this building type				$ -	$ -		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	*$ -*		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*Natural gas water heaters, 1200 MBH, 90% thermal efficiency (as (3) 400MBH units)*		*3*	*each*	$ -	*$ -*		
EEM	Natural gas water heaters, 1200 MBH, 94% thermal efficiency(as (3) 400MBH units)		3	each	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	*$ -*		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ 1,270**	
Standard	*Standard wall insulation*		-		$ -	*$ -*		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	3,735	Area	$ 0.3400	$ 1,270		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*n/a - not modeled for this building type*	RSMeans 26 51 13.55	-		$ -	*$ -*		
EEM	*n/a - not modeled for this building type*	RSMeans 26 51 13.55	-		$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ 20,000**	
Standard	*Standard elevator motors, 30hp*		-	each	$ -	*$ -*		
EEM	Elevator motors with regenerative drives, 30 hp	Previous projects	2	each	$ 10,000	$ 20,000		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	*$ -*		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	*$ -*		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (5,840)**	
Standard	*WSHP, 174 tons*	RSMeans D3050 240	*1*	units	$ 492,590	*$ 492,590*		
Standard	*Closed circuit cooling tower, 140 tons*	RSMeans 23 65 133.10	*1*	units	$ 109,749	*$ 109,749*		
EEM	WSHP, 172 tons	RSMeans D3050 240	1	units	$ 487,823	$ 487,823		
EEM	Closed circuit cooling tower, 138.2 tons	RSMeans 23 65 133.10	1	units	$ 108,676	$ 108,676		
ACA 2	**Reduced capacity for heating equipment**						**$ -**	
Standard	*(INCLUDED W/PACKAGED UNITS IN ACA 1)*		-	units	$ -	*$ -*		
EEM			-	units	$ -	$ -		
ACA 3	**Reduced capacity for air handling equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	*units*	$ -	*$ -*		
EEM			-	units	$ -	$ -		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	*$ -*		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 2,600**	
Standard			-	0	$ -	*$ -*		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	2	outlets	$ 1,300	$ 2,600		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	*$ -*		
EEM			-	0	$ -	$ -		
						Total	***$ 58,379***	

2020 NYStretch
20 STORY HIGH-RISE APARTMENT - 5A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 4,806**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		8,435	Area	$ -	$ -		
Standard	*Standard wall insulation (residential steel-frame wall) 5A: U-0.055; R-16.0*		45,603	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 5A: U-0.030; R-32.2 (+ R-2.2)	RSMeans 07 22 16.10	8,435	Area	$ 0.3881	$ 3,274		
EEM	Enhanced wall insulation (residential steel-frame wall) 5A: U-0.052; R-17.1 (+ R-1.05)	RSMeans 07 21 13.10	45,603	Area	$ 0.0336	$ 1,532		
EEM 2	**Enhanced fenestration**						**$ 29,452**	
Standard	*Standard windows, U-0.39*		37,387	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.36	PNNL CE ANALYSIS	37,387	Area	$ 0.79	$ 29,452		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 15,786**	
Standard	*Lighting per ASHRAE 90.1-2016*		*13,812*	watts	$ 6.75	*$ 93,229*		Cost for retail area only
EEM	Reduced LPDs, ~20% more efficient	HBL	11,473	watts	$ -	$ 109,016		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ -**	
Standard	*n/a - does not apply to this building type*				$ -	$ -		
EEM	n/a - does not apply to this building type				$ -	$ -		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	$ -		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		*3*	*each*	$ -	$ -		
EEM	n/a - does not apply to this building type		3	each	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ 1,270**	
Standard	*Standard wall insulation*		-		$ -	$ -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	3,735	Area	$ 0.3400	$ 1,270		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*n/a - not modeled for this building type*	RSMeans 26 51 13.55	-		$ -	$ -		
EEM	*n/a - not modeled for this building type*	RSMeans 26 51 13.55	-		$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ 20,000**	
Standard	*Standard elevator motors, 30hp*		-	each	$ -	$ -		
EEM	Elevator motors with regenerative drives, 30 hp	Previous projects	2	each	$ 10,000	$ 20,000		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (5,884)**	
Standard	*WSHP, 172 tons*	RSMeans D3050 240	*1*	units	$ 486,559	*$ 486,559*		
Standard	*Closed circuit cooling tower, 138 tons*	RSMeans 23 65 133.10	*1*	units	$ 108,392	*$ 108,392*		
EEM	WSHP, 169.8 tons	RSMeans D3050 240	1	units	$ 481,756	$ 481,756		
EEM	Closed circuit cooling tower, 136.5 tons	RSMeans 23 65 133.10	1	units	$ 107,311	$ 107,311		
ACA 2	**Reduced capacity for heating equipment**						**$ -**	
Standard	*(INCLUDED W/PACKAGED UNITS IN ACA 1)*		-	units	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 3	**Reduced capacity for air handling equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	*units*	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 2,600**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	2	outlets	$ 1,300	$ 2,600		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 68,030***	

2020 NYStretch
20 STORY HIGH-RISE APARTMENT - 6A
EEM Incremental Cost Worksheet
Prepared by Vidaris Inc.
19-Jun-2019

EEM	Description	Source of Item Cost	Number of EEM Units	Unit	Cost / Unit	Total Item Cost	Total Incremental Cost	Notes / Comments
EEM 1	**Enhanced insulation for roofs and walls**						**$ 7,321**	
Standard	*Standard U-0.032, R-30 roof insulation (insulation entirely above deck)*		8,435	Area	$ -	$ -		
Standard	*Standard wall insulation (residential steel-frame wall) 6A: U-0.049; R-17.5*		45,603	Area	$ -	$ -		
EEM	Enhanced roof insulation (insulation entirely above deck) 6A: U-0.029; R-33.4 (+ R-3.4)	RSMeans 07 22 16.10	8,435	Area	$ 0.5998	$ 5,059		
EEM	Enhanced wall insulation (residential steel-frame wall) 6A: U-0.044; R-19.1 (+ R-1.55)	RSMeans 07 21 13.10	45,603	Area	$ 0.0496	$ 2,262		
EEM 2	**Enhanced fenestration**						**$ 30,209**	
Standard	*Standard windows, U-0.38*		37,387	*Area*	$ -	$ -		
EEM	Enhanced windows, U-0.35	PNNL CE ANALYSIS	37,387	Area	$ 0.81	$ 30,209		
EEM 3	**Air leakage testing for mid-sized buildings**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
EEM 4	**Reduced LPD for interior lighting; high efficacy lights in dwelling units**						**$ 15,786**	
Standard	*Lighting per ASHRAE 90.1-2016*		*13,812*	watts	$ 6.75	*$ 93,229*		Cost for retail area only
EEM	Reduced LPDs, ~20% more efficient	HBL	11,473	watts	$ -	$ 109,016		
EEM 5	**Occupancy sensors and automatic lighting controls including egress lighting**						**$ -**	
Standard	*n/a - IECC only*		-	0	$ -	$ -		
EEM	n/a - IECC only		-	0	$ -	$ -		
EEM 6	**Exterior lighting control**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - IECC only; already included in NYS amendments to 90.1-2016		-	0	$ -	$ -		
EEM 7	**Reduce fan power allowances**						**$ -**	
Standard	*n/a - does not apply to this building type*				$ -	$ -		
EEM	n/a - does not apply to this building type				$ -	$ -		
EEM 8	**Hotel guestroom HVAC vacancy control**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-		$ -	$ -		
EEM	n/a - already included in 90.1-2016		-		$ -	$ -		
EEM 9	**High-efficiency SHW**						**$ -**	
Standard	*n/a - does not apply to this building type*		*3*	*each*	$ -	$ -		
EEM	n/a - does not apply to this building type		3	each	$ -	$ -		
EEM 10	**High-efficiency commercial kitchen equipment**						**$ -**	
Standard	*n/a - does not apply to this building type*		-		$ -	$ -		
EEM	n/a - does not apply to this building type		-		$ -	$ -		
EEM 11	**Thermal bridging reduction**						**$ 1,270**	
Standard	*Standard wall insulation*		-		$ -	$ -		
EEM	Additional Parapet Insulation: Assume 12in at wall + 42in of parapet height + 12in wide parapet + 42in of parapet height to roof deck. 9 ft of total insulation of R-4.2/in for entire perimeter of roof.	RSMeans 07 22 16.10	3,735	Area	$ 0.3400	$ 1,270		
EEM 12	**Exterior lighting power reduction**						**$ -**	
Standard	*n/a - not modeled for this building type*	RSMeans 26 51 13.55	-		$ -	$ -		
EEM	*n/a - not modeled for this building type*	RSMeans 26 51 13.55	-		$ -	$ -		
EEM 13	**Efficient elevator, regenerative drives**						**$ 20,000**	
Standard	*Standard elevator motors, 30hp*		-	each	$ -	$ -		
EEM	Elevator motors with regenerative drives, 30 hp	Previous projects	2	each	$ 10,000	$ 20,000		
EEM 14	**ERV for apartment makeup air units**						**$ -**	
Standard	*n/a - already included in 90.1-2016*		-	0	$ -	$ -		
EEM	n/a - already included in 90.1-2016		-	0	$ -	$ -		
EEM 15	**Demand-based recirculated SHW controls**						**$ -**	
Standard	*n/a*		-	0	$ -	$ -		
EEM	n/a - applies to IECC path only		-	0	$ -	$ -		
ADDITIONAL COST ADJUSTMENTS								
ACA 1	**Reduced capacity for cooling equipment**						**$ (9,656)**	
Standard	*WSHP, 166 tons*	RSMeans D3050 240	*1*	units	$ 471,779	*$ 471,779*		
Standard	*Closed circuit cooling tower, 134 tons*	RSMeans 23 65 133.10	*1*	units	$ 105,066	*$ 105,066*		
EEM	WSHP, 163.5 tons	RSMeans D3050 240	1	units	$ 463,897	$ 463,897		
EEM	Closed circuit cooling tower, 131.3 tons	RSMeans 23 65 133.10	1	units	$ 103,292	$ 103,292		
ACA 2	**Reduced capacity for heating equipment**						**$ -**	
Standard	*(INCLUDED W/PACKAGED UNITS IN ACA 1)*		-	units	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 3	**Reduced capacity for air handling equipment**						**$ -**	
Standard	*(INCLUCED W/PACKAGED UNITS IN ACA 1)*		-	*units*	$ -	$ -		
EEM			-	units	$ -	$ -		
ACA 4	**Increased insulation to account for PTAC openings, thermal bridging requirements**						**$ -**	
Standard	*n/a - does not apply to this building type*		-	0	$ -	$ -		
EEM	n/a - does not apply to this building type		-	0	$ -	$ -		
ACA 5	**Electric vehicle charging station capable parking lots for 5% of spaces**						**$ 2,600**	
Standard			-	0	$ -	$ -		
EEM	208/240V 40 amp outlets (zones 5A and 6A only)	chargehub.com	2	outlets	$ 1,300	$ 2,600		
ACA 6	**Solar-ready zone per Appendix CA of 2018 IECC**						**$ -**	
Standard			-	0	$ -	$ -		
EEM			-	0	$ -	$ -		
						Total	***$ 67,531***	

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Energy Savings and Cost-Effectiveness Analysis of the 2020 NYStretch Energy Code Residential Provisions

Final Report | Report Number 19-37 | July 2019

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Energy Savings and Cost-Effectiveness Analysis of the 2020 NYStretch Energy Code Residential Provisions

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Abstract

This report summarizes the energy savings and cost-effectiveness analysis of the residential provisions of the 2020 NYStretch Energy Code of New York State. This is compared to the residential provisions of the 2016 New York City Energy Conservation Code (NYCECC) in New York City, and the residential provisions of the 2020 ECCC NYS in the rest of the state. The report includes the methodology used in the analysis, assumptions, and results at the applicable climate design zones for New York State. An additional analysis evaluating the energy savings and cost-effectiveness of the additional energy efficiency credits path (R407) is also conducted. The results associated with the analysis are summarized in the Appendix.

Keywords

Energy code, stretch energy code, cost effectiveness, NYSERDA

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Acronyms and Abbreviations

CDZ	climate design zone
CPI	consumer price index
DHW	domestic hot water
DOE	US Department of Energy
DWHR	drain water heat recovery
ECCC NYS	2020 Energy Conservation Construction Code of New York State
EF	energy factor
EIA	Energy Information Association
ERV	energy recovery ventilator
EUL	effective useful life
EV	electric vehicle

ft	feet
HRV	heat recovery ventilator
HVAC	heating, ventilation, and air conditioning
IECC	International Energy Conservation Code
kWh	kilowatt hours
LCC	life cycle cost
lf	linear foot
lm	lumen
LPD	lighting power density
MF	multifamily
m/s	meters per second
MW	megawatts
NAHB	National Association of Home Builders
NPV	net present value
NREL	National Renewable Energy Laboratory
NREM	National Residential Efficiency Measures Database
NYC	New York City
NY	New York
NYCECC	New York City Energy Conservation Code
NYDOS	New York Department of State
NYS	New York State
NYSERDA	New York State Energy Research and Development Authority
PNNL	Pacific Northwest National Laboratory
RGGI	Regional Greenhouse Gas Initiative
SF	single family
SRE	sensible recovery efficiency
UEF	uniform energy factor
W	watts

Summary

This analysis was conducted at the request of the New York State Energy Research and Development Authority (NYSERDA) to assist with the adoption of the 2020 NYStretch Energy Code. The analysis evaluates the energy savings and cost-effectiveness potential of the residential prescriptive and mandatory provisions of the 2020 NYStretch code when compared to the residential provisions of the 2020 Energy Conservation Construction Code of New York State (ECCC NYS) and the 2016 New York City Energy Conservation Construction Code (NYCECC).

The analysis closely follows the methodology set forth by the U.S. Department of Energy (U.S. DOE) for conducting cost-effectiveness analyses of residential code changes (Taylor et al. 2015) and the procedure used for the previous energy and cost-effectiveness evaluation of the 2020 ECCC NYS (NYSERDA 19-32, 2019). The analysis also leverages the residential prototype building models developed by Resource Refocus LLC for the evaluation of the 2020 ECCC NYS, which were in turn developed from the set of DOE residential prototype building models developed by the Pacific Northwest National Laboratory (PNNL) for the 2015 IECC code development analysis. This approach maintains a consistency between the current analysis and past work conducted by NYSERDA, U.S. DOE, and PNNL for New York State (NYSERDA 2019 and Mendon et al. 2016).

The analysis included a qualitative assessment to evaluate the anticipated energy impact of code changes proposed by the 2020 NYStretch code, including a determination of which impacts could be quantified through an energy analysis. An energy analysis was then conducted by creating customized energy models tailored to the code requirements for New York State. The energy savings from the energy analysis were then combined with the incremental construction costs associated with the changes to determine the simple payback, the 10-year net present value (NPV) of energy cost savings and the 30-year Life Cycle Cost (LCC) savings.

Overall, the prescriptive and mandatory provisions of the 2020 NYStretch code are expected to yield positive energy savings and cost-effective benefits to homeowners compared to the baseline 2020 ECCC NYS and the 2016 NYCECC. Table S-1 summarizes the statewide site energy, source energy, and energy cost savings, and Table S-2 summarizes the disaggregated energy and cost savings for each

climate design zone (CDZ). Table S-3 summarizes the disaggregated incremental construction costs and simple payback by building type in each CDZ. Finally, Table S-4 summarizes the average energy cost savings, incremental construction costs and cost-effectiveness results for the prescriptive and mandatory provisions of NYStretch, weighted over the single- and multifamily building construction weights for New York State.

Table S-1. Statewide Average Annual Energy and Cost Savings

	Total Regulated Site Energy (kBtu/dwelling unit)	Total Regulated Source Energy (kBtu/dwelling unit)	Total Energy Costs ($/dwelling unit)
Baseline*	59926.4	91545.1	1514.9
2020 NYStretch	45161.4	71769.2	1216.7
Savings	24.6%	21.6%	19.7%

* The baseline code is the 2016 NYCECC in CDZ 4A-NYC and 2020 ECCC NYS in all other CDZs

Table S-2. Average Annual Energy and Cost Savings by Climate Design Zone

Climate Design Zone	Total Regulated Site Energy Savings	Total Regulated Source Energy Savings	Total Energy Costs Savings
4A-NYC	21.1%	19.9%	19.0%
4A-balance	21.5%	19.8%	18.8%
5A	25.3%	21.9%	19.6%
6A	26.2%	23.1%	20.9%

Table S-3. Average Annual Simple Payback by Building Type and Climate Design Zone

	Single-family			Multifamily		
Climate Design Zone	Total Annual Energy Cost Savings ($/dwelling unit)	Total Incremental Costs ($/dwelling unit)	Simple Payback (Years)	Total Annual Energy Cost Savings ($/dwelling unit)	Total Incremental Costs ($/dwelling unit)	Simple Payback (Years)
4A-NYC	$301	$1,910	6.3	$176	$1,625	9.2
4A-balance	$301	$2,463	8.2	$167	$1,488	8.9
5A	$351	$2,202	6.3	$172	$1,751	10.2
6A	$372	$1,506	4.1	NA	NA	NA
NY State	$348	$2,057	5.9	$171	$1,591	9.3

Table S-4. Weighted Results

For the Prescriptive and Mandatory Provisions of the 2020 NYStretch Code at the State Level

	New York State Average
Annual Energy Cost Savings ($/dwelling unit)	$278
Incremental Costs ($/dwelling unit)	$1,795
Simple Payback (Years)	6.4
10-Year NPV of Cost Savings Including Replacement Costs and Residual Values ($/dwelling unit)	$2,854
30-Yr LCC Savings ($/dwelling unit)	$1,741

While the present analysis focuses on the prescriptive and mandatory provisions of NYStretch, the code offers other compliance paths. The multiple compliance paths in NYStretch are expected to yield equal or higher savings. The performance paths offer flexibility to the builder in meeting the code, resulting in a wide variability in the performance of homes complying with the simulated paths or the passive house path. It should also be noted that this analysis assumes no fuel switching between the baseline and the NYStretch cases. Additionally, while NYStretch contains many elements that encourage better building design, this analysis used conservative savings and incremental cost estimates for many of the measures. In this respect, the estimated energy savings reported from the analysis are likely to be conservative compared to actual energy savings that can be achieved by the 2020 NYStretch code.

1 Introduction

The New York State Energy Research and Development Authority (NYSERDA) developed the 2020 NYStretch Energy Code with guidance from an advisory group composed of public and private stakeholders. It is a voluntary, locally adoptable stretch energy code designed as an overlay to the 2020 Energy Conservation Construction Code of New York State (ECCC NYS) and is expected to be far more efficient than the residential provisions of the 2018 International Energy Conservation Code (IECC) and the commercial provisions of ASHRAE Standard. 90.1-2016.

In order to assist communities in adopting the stretch code, NYSERDA requested an analysis of the energy savings and cost-effectiveness of the 2020 NYStretch code compared to the State baseline codes, the 2016 New York State Energy Conservation and Construction Code (NYSECC) and the 2020 ECCC NYS. This analysis was conducted in each of the three climate design zones (CDZ) in New York State: 4A, 5A, and 6A and results are provided in this technical report, along with a narrative summarizing the findings and their implications for New York State's code development process.

The analysis builds on previous analysis conducted by the team for NYSERDA, including the cost-effectiveness analysis of the 2020 ECCC NYS compared to the previous 2016 NYSECC as well as technical reports and analyses published by the U.S. Department of Energy (U.S. DOE) and the Pacific Northwest National Laboratory (PNNL). Additionally, the methodology also draws from other technical resources as needed. Relevant to the residential scope of the analysis, NYSERDA made available the proposed Draft NYStretch Energy Code, January 2019[1] and results of an energy analysis conducted by the New Buildings Institute (NBI) and Earth Advantage during the stretch code development process. The firm Earth Advantage provided a presentation describing the potential savings for the residential provisions of the 2020 NYStretch code based on their modeling results using REMRate.

2 Qualitative Assessment

This section contains qualitative comparison tables for the prescriptive and mandatory provisions of the proposed 2020 NYStretch Energy Code (NYStretch) compared to the 2020 Energy Conservation Construction Code of New York State (ECCC NYS) in climate design zones (CDZ) 4A, 5A, and 6A. Because CDZ 4A covers New York City, which follows the more stringent 2016 New York City Energy Conservation Code (NYCECC), an additional evaluation of the 2020 NYStretch compared to the 2016 NYCECC is also conducted for New York City.

The qualitative assessment includes an evaluation of the expected energy impact of each provision and whether the change will be captured through energy modeling during the quantitative analysis. The assessment is limited to prescriptive and mandatory provisions of the residential provisions of the code as they apply to new construction only. It does not include editorial, clarification, and administrative type of changes, which are not expected to have a direct impact on energy. Table 1 summarizes the changes between the baseline 2020 ECCC NYS and the proposed 2020 NYStretch code, along with the results of the qualitative assessment.

Table 1. A Preliminary Qualitative Comparison

The Differences with the Largest Energy Impact between the 2020 NYStretch Code and the 2020 ECCC NYS (Prescriptive + Mandatory Provisions)

Code Section	Component	CDZ	2020 ECCC NYS		2020 NYStretch	Energy Impact Captured through Energy Modeling (Yes/No)
R402.1	Fenestration U-factor	4A	0.32		0.27	Yes The overall impact of the changes to the prescriptive envelope are expected to yield positive energy savings across all CDZs.
		5A	0.3		0.27	
		6A	0.3 [a]	0.28 [a]	0.27	
	Fenestration SHGC	4A	0.4		0.4	
		5A	NR		NR	
		6A	NR [a]	NR [a]	NR	
	Ceiling R value	4A	49		49	
		5A	49		49	
		6A	49 [a]	60 [a]	49	
	Wood-framed R-value	4A	20 or 13+5		21 int or 20+5 or 13+10	
		5A	20 or 13+5		21 int or 20+5 or 13+10	
		6A	20+5 or 13+10 [a]	23 cavity [a]	20+5 or 13+10	

Table 1 continued

Code Section	Component	CDZ	2020 ECCC NYS		2020 NYStretch	Energy Impact Captured through Energy Modeling (Yes/No)
R402.1	Floor R-value	4A	19		30	
		5A	30		30	
		6A	30 [a]	30 [a]	30	
	Basement wall R-value	4A	10 or 13		15 or 19	
		5A	15 or 19		15 or 19	
		6A	15 or 19 [a]	15 or 19 [a]	15 or 19	
	Slab R-value and depth	4A	10, 2 ft		10, 4 ft	
		5A	10, 2 ft		10, 4 ft	
		6A	10, 4 ft [a]	10, 4 ft [a]	10, 4ft	
	Crawlspace wall R-value	4A	15 or 19		15 or 19	
		5A	15 or 19		15 or 19	
		6A	15 or 19*	15 or 19*	15 or 19	
R402.4.1.1	Insulation Installation	all	Grade Not Specified		No more than 2% of total insulated area shall have compressed insulation or gaps/voids (Grade I insulation required)	No Assumptions for the baseline configuration would need significant installation quality data. In absence of such data, the impact of this change cannot be evaluated through energy modeling. This change is expected to improve insulation installation, resulting in better U-factors for the overall assemblies. Thus, the practical impact of this change is expected to be positive energy savings.
R403.3	Duct Location	all	Not controlled		Duct System is required to be within conditioned space.	Yes The savings from this change will not be modeled explicitly, but will be applied to the heating, cooling and fan energy during post-processing. This change is expected to save conduction and leakage losses from ducts and result in positive energy savings.

Table 1 continued

Code Section	Component	CDZ	2020 ECCC NYS	2020 NYStretch	Energy Impact Captured through Energy Modeling (Yes/No)
R403.3.8	Duct Sizing	all		Ducts are required to be sized in accordance with ACCA Manual D.	No Modeling this change would require developing a full duct network in *EnergyPlus* as well as adequate information about current trends in duct sizing in the field. Both issues would result in several configurations of the duct layout making the exercise cost prohibitive. This change is expected to save losses from incorrectly sized ducts and result in positive energy savings.
R403.5.5	Supply of heated water	all	None	The new section adds four options for increasing the efficiency of hot water supply. These include limiting the maximum allowable pipe length or volume, installing drain water heat recovery units or recirculation systems.	Yes The savings from this change will not be modeled explicitly but will be applied to the hot water energy during post-processing. This change is expected to reduce losses from domestic hot water (DHW) pipes and is expected to result in positive energy savings.
R403.6.2	Balanced and HRV/ERV systems	all	None	The new section requires an energy or heat recovery ventilator (ERV or HRV) in each dwelling unit in CDZ 5A and 6A. In CDZ 4A, it allows a balanced ventilation system to comply with the requirement.	Yes The impact from this code change will be modeled assuming an ERV/HRV system in CDZ 5A and 6A and balanced ventilation in CDZ 4A and CDZ 4A-balance. This change is expected to reduce heating energy but also comes with an increase in fan energy. The overall impact may thus be neutral.

Table 1 continued

Code Section	Component	CDZ	2020 ECCC NYS	2020 NYStretch	Energy Impact Captured through Energy Modeling (Yes/No)
R403.6.3	Verification of ventilation systems	all	None	The new section requires that the performance of ventilation systems be tested and verified by an approved agency.	No This is a verification requirement and thus cannot be modeled. This change is expected to ensure proper functioning of the ventilation system. The energy impact from this provision is expected to be neutral.
R404.1	Lighting Equipment	all	60 lm/W for lamps over 40 W; 50 lm/W for lamps between 15 W and 40 W; 40 lm/W for lamps 15 W or less.	This change increases the minimum required efficacy of lamps to be 65 lm/W and the total luminaire efficacy to be 45 lm/W.	Yes The savings from this change will be modeled by reducing the lighting power density (LPD) in the models per the revised efficacy limits. This change is expected to reduce losses from inefficient lighting and is expected to result in positive energy savings.
R404.2	Electrical power packages	all	None	This new section adds requirements for a solar ready zone and electrical vehicle (EV) service equipment	No This code change requires the buildings to be solar ready and have EV infrastructure but does not explicitly mandate any specific equipment. This change is expected to yield savings by encouraging design considerations for solar energy and EV infrastructure.

[a] The 2020 ECCC NYS includes two prescriptive envelope options for CZ 6A.

Table 2 summarizes the additional differences between the baseline 2016 NYCECC and the 2020 NYStretch code, along with the results of the qualitative assessment.

Table 2. A Preliminary Qualitative Comparison

The Additional Differences between the 2020 NYStretch Code and the 2016 NYCECC (Prescriptive + Mandatory Provisions)

Component	2016 NYCECC	2020 NYStretch	Energy Impact Captured through Energy Modeling (Yes/No)
Fenestration U-factor	0.32	0.27	Yes The impact is expected to yield positive energy savings in CDZ 4A.
Fenestration SHGC	0.4	0.4	No The exterior walls will be modeled as R-20+5 in both the baseline and the NYStretch cases. All other requirements are the same between the baseline and the 2020 NYStretch code.
Ceiling R value	49	49	
Wood-framed R-value	20+5	21 int or 20+5 or 13+10	
Floor R-value	30	30	
Basement wall R-value	15/19	15/19	
Slab R-value and depth	10,4	10, 4 ft	
Crawlspace wall R-value	15/19	15/19	
Lighting Equipment	75% of permanently installed lamps are required to be high efficacy	90% of permanently installed lamps have to be high efficacy with a minimum required efficacy of lamps to be 65 lm/W and the total luminaire efficacy to be 45 lm/W.	Yes The savings from this change will be modeled by reducing the lighting power density (LPD) in the models per the revised efficacy limits. This change is expected to reduce losses from inefficient lighting and result in positive energy savings.

In summary, the overall energy impact of the 2020 NYStretch code is expected to be positive (energy savings) over the baseline codes.

3 Quantitative Analysis

This section describes the overall quantitative analysis used to assess the stringency and cost-effectiveness of the residential provisions of the proposed 2020 NYStretch Energy Code compared to the 2016 New York City Energy Conservation Code (2016 NYCECC) in New York City and the 2020 Energy Conservation Construction Code of New York State (2020 ECCC NYS) in the rest of the State. The analysis methodology builds on US Department of Energy's (DOE) methodology for determining the cost-effectiveness of residential code changes (Taylor et al. 2015), similar work conducted by the Pacific Northwest National Laboratory (PNNL) in previous code cycles (Mendon et al. 2016) and the previous analysis of the 2020 ECCC NYS conducted by Resource Refocus LLC for NYSERDA (NYSERDA 2019). Additionally, the analysis leverages the DOE residential prototype building models developed by PNNL for the 2015 International Energy Conservation Code (IECC) code development process and modified by Resource Refocus LLC for support to the New York Department of State (DOS) for the 2020 ECCC NYS Rulemaking process (NYSERDA 2019).

3.1 Overview of the Analysis

The 2020 NYStretch is designed to overlay the 2020 ECCC NYS. Thus, the stretch code continues to offer multiple paths for compliance, including a prescriptive option, a Passive House option, and two simulated performance path alternatives. Regardless of the compliance path chosen, additional mandatory requirements need to be met. The multiple compliance paths offer flexibility to the builder in meeting the code, resulting in a wide variability in the performance of homes complying with the simulated performance paths or the passive house path. The prescriptive path on the other hand offer less variability in terms of design and is typically more widely used in residential buildings compared to performance paths. Thus, the present analysis is based on the prescriptive and mandatory provisions of the 2020 NYStretch code. An overview of the analysis along with the methodology involved in the process is described in the following sections.

3.1.1 Determining the Baseline Annual Energy Use and Energy Cost for Residential Prototypes

This task involved the following steps:

1. The energy models developed by Resource Refocus LLC for the previous 2020 ECCC NYS cost-effectiveness analysis were leveraged for this step. The models were modified to reflect the revised federal minimum efficiencies for oil and gas furnaces, heat pumps, and oil boilers.

2. The baseline models for CDZ 4A were further split into two sets: one representing the requirements of the 2016 NYCECC and the other set representing the requirements of the 2020 ECCC NYS. This was done to accurately compute the energy savings and cost-effectiveness of the 2020 NYStretch in New York City because the 2016 NYCECC has different envelope requirements compared to the 2020 ECCC NYS.
3. The two sets of models were used to simulate energy use for the baseline case for single-family and low-rise multifamily units. The set representing the requirements of the 2016 NYCECC was simulated in CDZ 4A, which was selected as the representative climate location for New York City and the other set representing the requirements of the 2020 ECCC NYS was simulated in the balance of CDZ 4A and CDZs 5A and 6A.
4. The annual energy use for the code-regulated end-uses of heating, cooling, fans, lighting, and domestic hot water (DHW) were extracted and converted to energy costs.
5. The annual energy use and energy cost were aggregated to the CDZ and State level using the weights provided by NYSERDA.

3.1.2 Determining the Annual Energy Use, Annual Energy Cost, and Incremental Construction Cost for Residential Prototypes using NYStretch

This task involved the following steps:

1. A detailed evaluation of the residential provisions of the 2020 NYStretch code was conducted as it applies to the three CDZs in the State (4A, 5A, and 6A).
2. A set of NYStretch models was developed to minimally meet the residential prescriptive and mandatory provisions of the 2020 NYStretch Code.
3. The whole building incremental construction costs were calculated for the NYStretch set compared to the respective baseline. These costs were further adjusted for location and inflation.
4. The annual energy use for the code-regulated end uses of heating, cooling, fans, lighting, and DHW was extracted and converted to annual energy costs.
5. The annual energy use and energy cost were aggregated to the CDZ and State level using the weights provided by NYSERDA.

3.1.3 Cost Effectiveness of Residential Provisions of NYStretch

This task involved the following steps:

1. The energy use estimates were used to calculate energy cost savings for each prototype.
2. The energy savings were matched with corresponding incremental construction costs for each case.
3. A simple payback, 10-year present value calculation of energy cost savings, and a 30-year life cycle cost (LCC) savings were calculated.
4. The cost-effectiveness metrics were aggregated to the CDZ and State level using the associated construction weights.

3.2 Suite of Energy Models and Aggregation Scheme

The analysis leverages the models developed by Resource Refocus during the previous 2020 ECCC NYS cost-effectiveness analysis conducted for NYSERDA (NYSERDA 2019). These models, in turn developed from a set of 32 DOE/PNNL 2015 IECC residential prototype models, represent a majority of the new residential building construction stock. The set includes a detached single-family building model (total conditioned floor area of 2,400 ft^2, two stories and 8.5' ceilings) and a low-rise multifamily building model (a three-story apartment building with six dwelling units per floor, in rows of three separated by a central breezeway; conditioned floor area of 1,200 ft^2 per unit and 8.5' ceilings), each configured with four common heating systems (gas-fired furnace, electric resistance furnace, heat pumps, and oil-fired furnaces) and four foundation types (slab-on-grade, heated and unheated basements, and crawlspaces) (Mendon et al. 2014 and Taylor et al. 2015).

These models are supplemented with a set of associated construction weights for the State, provided by NYSERDA and are summarized in Table 3. NYSERDA recommended a smaller subset of models to optimize the analysis effort and accuracy of results, resulting in a total representative construction weight of 93%. Thus, the weights were normalized to total 100% at the CDZ and State level during the analysis.

Table 3. Matrix of Construction Weights Used in the Analysis

	CDZ 4A		CDZ 5A		CDZ 6A		
	SF	MF	SF	MF	SF	MF	TOTALS
Slab-on-Grade, Heat Pump	0.64%	1.69%	2.01%	0.56%	0.86%	0.0%	5.76%
Slab-on-Grade, Oil Furnace	0.0%	0.0%	0.38%	0.0%	0.0%	0.0%	0.38%
Slab-on-Grade, Gas Furnace	1.80%	2.12%	5.68%	0.70%	2.44%	0.0%	12.74%
Heated Basement, Heat Pump	0.81%	2.14%	2.55%	0.71%	1.10%	0.0%	7.31%
Heated Basement, Oil Furnace	0.0%	0.33%	0.48%	0.0%	0.0%	0.0%	0.81%
Heated Basement, Gas Furnace	2.29%	2.69%	7.21%	0.89%	3.09%	0.0%	16.18%
Unheated Basement, Heat Pump	1.30%	3.45%	4.11%	1.15%	1.76%	0.0%	11.77%
Unheated Basement, Oil Furnace	0.0%	0.53%	0.77%	0.0%	0.33%	0.0%	1.64%
Unheated Basement, Gas Furnace	3.69%	4.33%	11.61%	1.44%	4.98%	0.0%	26.05%
Crawlspace, Heat Pump	0.0%	0.99%	1.18%	0.33%	0.51%	0.0%	3.01%
Crawlspace, Gas Furnace	1.06%	1.24%	3.34%	0.41%	1.43%	0.0%	7.50%
			Percentage of total NYS Construction weights				93.14%

The weights for CDZ 4A were further divided between New York City and the balance of CDZ 4A using an average of county-level housing starts from 2014 to 2018 based on data provided by NYSERDA from the Dodge Data and Analytics database. Average housing starts for the counties of Bronx, King, New York, Queens, and Richmond were grouped into "CDZ-4A-NYC" and the counties of Nassau, Suffolk, and Westchester were grouped into "CDZ 4A-balance" as summarized in Table 4.

Table 4. Split of Construction Weights between CDZ 4A-NYC and CDZ 4A-balance

Prototype	CDZ 4A-NYC	CDZ 4A-balance	Total
Single-family	19.6%	80.4%	100.0%
Multifamily	38.0%	62.0%	100.0%

3.3 Energy Analysis

3.3.1 Simulation Tool

The analysis was conducted in version 8.0 of EnergyPlus. While more recent versions of the engine are currently available, the analysis was conducted using the same version of EnergyPlus as the previous cost-effectiveness analysis conducted for the 2020 ECCC NYS to minimize the time required for model upgrades and potential troubleshooting. Additionally, version upgrades often involve changes in estimated energy use and maintaining the same version of EnergyPlus allows for a direct comparison with earlier work conducted by PNNL for New York State (Mendon et al. 2016).

3.3.2 Weather Locations

The analysis was conducted using weather data for New York City (CDZ 4A), Buffalo (CDZ 5A) and Watertown (CDZ 6A). The baseline set of models representing the 2020 ECCC NYS was simulated in all three climate design zones with the exception of a portion of CDZ 4A representing New York City, in which a baseline set representing the 2016 NYCECC was simulated. Correspondingly, the NYStretch models were simulated in all three climate design zones.

3.3.3 Site, Source, and Energy Cost Calculations

Site energy use from the annual simulation was extracted for the major code regulated end-uses, including heating, cooling, ventilation, fans, lighting, and DHW and converted to energy costs using the average fuel costs for electricity, natural gas, and fuel oil for the State, which was published by the Energy Information Association (EIA). Site energy was also converted to source energy using site-source conversion factors for electricity, natural gas, and fuel oil.

3.3.4 Baseline Models for New York State

Energy models representing the baseline 2020 ECCC NYS developed for the previous 2020 ECCNYS cost-effectiveness analysis were leveraged for this analysis. First, the models were modified to use the revised federal minimum equipment efficiencies as shown in Table 5. The baseline set for CDZ 4A was then further split into a set representing the minimum requirements of the 2016 NYCECC.

Table 5. Federal Minimum Equipment Efficiencies

Parameter	Updated Federal Minimum Efficiency2
Gas furnace	80%
Oil furnace	83%
Oil boiler	84%
Heat pump	SEER 14

3.3.4.1 Adjustment for Duct Sealing

The 2020 ECCC NYS models were developed from the 2015 IECC PNNL/DOE models provided by NYSERDA. The PNNL/DOE models do not account for losses associated with an air distribution system, and the savings associated with duct sealing provisions were added to the energy use by PNNL with an involved post-processing setup (Mendon et al. 2013). Consistent with the previous 2020 ECCC NYS cost-effectiveness analysis, this analysis used a conservative estimate of 10% heating and cooling savings across the board from duct sealing provisions for the baseline and NYStretch cases.

3.3.5 Implementation of the 2020 NYStretch Requirements

The 2020 NYStretch code requires more stringent windows, insulation, and lighting compared to the baseline codes. Additionally, it also requires several improvements to the mechanical systems, including requiring ducts to be placed within conditioned zones, efficient hot water delivery systems, and balanced ventilation systems including heat or energy recovery in the colder climate zones. Each change was qualitatively evaluated to identify the changes that would result in an energy impact and could be captured using energy modeling. This section describes the modeling methodology used for evaluating the applicable changes.

3.3.5.1 Envelope Improvements

The 2020 NYStretch code requires a lower U-factor for fenestration in all three climate design zones, improved wall insulation in CDZ 4A and 5A, improved floor insulation in CDZ 4A, improved basement wall insulation in CDZ 4A and higher depth of slab insulation in CDZ 4A and 5A. All these changes were modeled by updating the material properties for the respective assembly layers in the relevant *EnergyPlus* objects. For windows, the U-factor field in the simple glazing object was updated to use a value of 0.27. For exterior walls, basement walls, and floors, the conductivity of the consolidated insulation and framing layer was adjusted to yield the required R value.

The 2020 NYStretch code allows three options for meeting the prescriptive wall insulation requirement in CDZ 4A and 5A, including R-21 intermediate framing (walls with R-10 insulated headers), R-20+5 and R-13+10. This compares with the baseline requirement of R-20 or R-13+5 in the 2020 ECCC NYS and a requirement of R-20+5 in the 2016 NYCECC. This code provision was evaluated by assuming R-21 intermediate framing walls in CDZ 4A-balance and 5A in the NYStretch cases. In CDZ 4A-NYC, because the baseline already required R-20+5, the NYStretch cases were also modeled using the R-20+5 option.

3.3.5.2 Ducts in Conditioned Space

The PNNL/DOE models do not account for losses associated with an air distribution system and cannot be used to determine the energy savings from moving ducts into conditioned space without a major change to the models. Analogous to the treatment of duct sealing, a flat multiplier was applied to heating and cooling energy consumption to account for moving the ducts. A literature review revealed reported savings of 10–25%, but basic assumptions, including CDZ and original duct placement, were often unavailable. Therefore, a simplified modeling exercise was conducted in *BEopt* version 2.8 to evaluate savings in CDZs 4A, 5A, and 6A.

BEopt models of a 2,400 ft^2 two-story, single-family home with three foundation types—slab, unheated basement, and heated basement—were constructed to calculate the savings from moving ducts to conditioned space. All other house characteristics were maintained as the Building America defaults except the duct location.

Table 6 shows the savings from moving ducts with 15% leakage, insulated with R-8, to conditioned space. Broadly, the cooling savings were relatively consistent in all three CDZs – about 15% for the slab, 10% for the unheated basement, and 5% for the heated basement. For heating, CDZs 5A and 6A have similar savings, but the savings in CDZ 4A were about 10 percentage points higher—15% vs 25% for the slab, 10% vs 20% for the unheated basement, and 5% vs. 15% for the heated basement.

Table 6. Savings from Moving Ducts to Conditioned Space

		Duct Location	CDZ 4A	CDZ 5A	CDZ 6A
Cooling	Slab	Attic	16%	17%	16%
	Unheated basement	Basement	11%	10%	13%
	Heated basement	Basement	7%	6%	5%
Heating – electricity[a]	Slab	Attic	22%	12%	12%
	Unheated basement	Basement	19%	8%	7%
	Heated basement	Basement	16%	5%	5%
Heating - gas	Slab	Attic	26%	16%	16%
	Unheated basement	Basement	20%	9%	9%
	Heated basement	Basement	15%	5%	4%

[a] While the house has a gas furnace, there is a small amount of electricity consumption for heating, particularly fan use.

When combined with the foundation weights for CDZs 4A, 5A, and 6A, the average cooling savings were found to be between 10% and 17%, the fan energy savings between 7% and 22%, and the heating savings between 9% and 26%, depending on the CDZ. Based on these results, an average savings of 20% from the code provision were assumed in CDZ 4A-NYC and CDZ 4A-balance and 10% in CDZs 5A and 6A. These savings were applied only to prototypes with slab-on-grade, crawlspace, and unheated basements because prototypes with heated basements were conservatively assumed to have most of the ducting system located within the conditioned basement, based on Building America House Simulation Protocols (Wilson et al. 2014). For the applicable prototypes, the savings were assumed to be in addition to the 10% savings assumed from the duct sealing provisions in the baseline and implemented as a savings multiplier to the heating, cooling, and fan energy in the 2020 ECCC NYS and 2020 NYStretch cases.

3.3.5.3 Drain Water Heat Recovery

The 2020 NYStretch code includes provisions for improving the efficiency of hot water supply systems. The code offers multiple options, including a compact piping layout with limits on pipe run lengths, drain water heat recovery (DWHR), or a hot water recirculation system. While all three options are designed to cut losses in the hot water delivery systems, they are associated with different costs and challenges. For example, a compact piping layout can be efficiently implemented during the design of a house. However, a DWHR or a recirculation system might be more suitable for a broader range of house configurations. Similarly, the savings that can be harnessed from any of these options vary significantly with the configuration of the house and the hot water usage profile.

The PNNL/DOE models use a simplifying assumption of treating hot water pipes as adiabatic, meaning there is no heat transfer between them and other spaces in the building. Therefore, adding DWHR to the models or shortening pipe lengths does not account for any interactive effects with space heating and cooling. Because the interactive effects are expected to be of the second order in nature, the analysis uses a savings multiplier based on a literature review. Savings percentages ranging from 25–40% were found in the literature including an estimate of 40% from Minnesota Power,[3] an estimate of 25 to 30% from Van Decker,[4] and 25% from Manitoba Hydro.[5] This analysis uses a conservative savings estimate of 25%. These savings are implemented by applying a multiplier of 0.75 to the hot water energy consumption in the 2020 NYStretch cases.

3.3.5.4 Ventilation

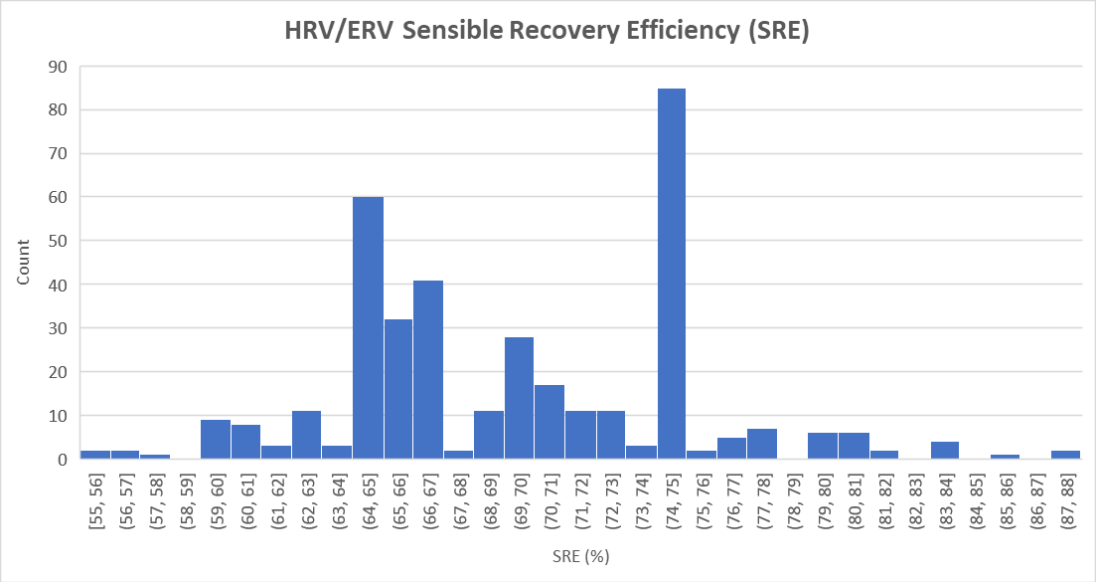
The 2020 NYStretch code requires energy recovery ventilation (ERV) or a heat recovery ventilation (HRV) in CDZ 5A and 6A. In CDZ 4A, a balanced ventilation system is allowed to comply. The baseline 2020 ECCC NYS or 2016 NYCECC do not require ERV/HRVs or balanced ventilation. This code provision is evaluated by assuming balanced ventilation in CDZ 4A-NYC and CDZ 4A-balance and HRVs in CDZ 5A and 6A.

Because the 2020 NYStretch code does not include a minimum efficiency requirement for HRVs, the directory of available products from the Home Ventilation Institute (HVI) was reviewed to identify a suitable assumption. Figure 1 shows the distribution of the sensible recovery efficiency (SRE) of products available in the market today. Most of the products have SRE between 64% and 75% with some exceptionally high-efficiency units with SRE greater than 85% also available. The analysis assumes HRVs with SRE of 70% in the NYStretch cases in CDZ 5A and 6A. The HRVs are modeled using

the *EnergyPlus* "ZoneVentilation:EnergyRecoveryVentilator" object, by setting latent heat recovery efficiency to zero and sensible heat recovery efficiency to 0.7. In CDZ 4A-NYC and CDZ 4A-balance, the NYStretch models are configured with the "balanced" zone ventilation option in *EnergyPlus*.

Figure 1. Distribution of Sensible Recovery Efficiencies of ERVs/HRVs

See endnotes for more information[6]



3.3.5.5 High Efficacy Lighting

The 2020 NYStretch makes an incremental improvement to the minimum lighting efficacy requirement. Compared to the tiered requirements in the baseline 2020 ECCC NYS and the 75% high-efficacy lighting requirement in the 2016 NYCECC, the 2020 NYStretch code requires 90% of all permanently installed lighting to be high-efficacy with the minimum efficacy of lamps to be 65 lm/W and that of the total luminaire to be 45 lm/W. This code provision is expected to yield a reduction in the annual lighting energy use.

The lighting energy in the DOE/PNNL 2015 IECC models is calculated using the Building America Benchmark specifications (Wilson et al. 2014) and translated to the models as a lighting power density (LPD) or a peak lighting power input (Mendon et al. 2013). A similar approach was utilized in the previous 2020 ECCNYS cost-effectiveness analysis (NYSERDA 2019). The present analysis uses a modified approach based on the same principles by updating the energy ratio (ER) associated with the CFLs in the Building America equations to use 65 lm/W. All other parameters in the equations are left unchanged.

Table 7 shows the calculated lighting energy use for the baseline and 2020 NYStretch for the single-family prototype and each multifamily unit.

Table 7. Lighting Energy Use

	2020 ECCC NYS		2016 NYCECC		2020 NYStretch	
	Single-family	Multifamily	Single-family	Multifamily	Single-family	Multifamily
Interior Hard-Wired Lighting Energy (kWh/yr)	787.1	474.0	867.6	522.4	762.3	459.0
Interior Hard-Wired Lighting LPD (W/ft^2)	0.106	0.106	0.117	0.117	0.103	0.103
Exterior Lighting Energy (kWh/yr)	209.4	104.7	230.9	115.4	202.8	101.4
Exterior Lighting Peak (W)	47.63	47.63	52.50	52.50	46.13	46.13
Garage Lighting Energy (kWh/yr)	14.4	14.4	15.9	15.9	14.0	14.0
Garage Lighting Peak (W)	7.81	7.81	8.61	8.61	7.56	7.56

3.4 Incremental Cost Calculations

The incremental costs associated with the code changes captured in the energy analysis are determined using sources such as RS Means (RS Means 2019), DOE's Building Community Cost database developed by PNNL,[7] the construction cost estimation study conducted by Faithful+Gould for DOE (F+G 2012), National Renewable Energy Laboratory's (NREL) National Residential Efficiency Measures (NREM) database, and technical reports published by DOE. Where required, the costs are adjusted to current dollars using the consumer price index (CPI). Finally, the costs are adjusted using location cost multipliers to come up with representative construction cost estimates for the State.

3.4.1 Location Multipliers

Location multipliers are used to adjust national average costs to account for locational diversity in material and labor costs. This analysis uses location factors from the 2019 RS Means Residential Costs Data Book (RS Means 2019). The data for all available locations in New York State is grouped into CDZs 4A, 5A, and 6A using the 2018 IECC climate zone map (ICC 2017). CDZ 4A is further split into CDZ 4A-NYC and CDZ 4A-balance by separating the factors for New York City and surrounding areas from the remainder of CDZ 4A. The factors are then averaged to yield the overall factors used in this analysis, as summarized in Table 8.

Table 8. Location Cost Multipliers Used in the Analysis

Climate Design Zone	Average Location Factor
4A-NYC	1.374
4A-balance	1.234
5A	1.059
6A	0.998

3.4.2 Incremental Cost for Each Measure

This section describes the assumptions behind the development of incremental costs for each measure that was evaluated in the energy analysis.

3.4.2.1 Fenestration

The 2020 NYStretch requires a more stringent fenestration U-factor of 0.27 in all CDZs. This compares to a baseline requirement of U-0.32 in CDZ 4A and U-0.30 in CDZ 5A and 6A. In CDZ 6A, the 2020 ECCC NYS has an additional prescriptive path with a U-0.28.

Incremental costs associated with code fenestration requirements, especially at higher efficiencies, are often difficult to map to real fenestration products because available products have rated U-factors and SHGC for various combinations of framing and glass and lack the level of granularity used by the code. ENERGY STAR® addresses this complexity by using a regression-based approach in its Cost and Savings Estimates for homes certified under ENERGY STAR Version 3 (ENERGY STAR 2016). The regression uses data from National Residential Efficiency Measures Database (NREM) developed by the National Renewable Energy Laboratory (NREL) to develop a set of regression equations. These regression equations are used to calculate the incremental costs associated with this code provision resulting in an incremental cost of $\$1.04/ft^2$ in CDZ 4A including CDZ 4A-balance, $\$0.62/ft^2$ in CDZ 5A and an average of $\$0.33/ft^2$ based on the two prescriptive baseline options in CDZ 6A. This results in an incremental cost of $391 in CDZ 4A and CDZ 4A-balance, $235 in CDZ 5A, $157 in CDZ 6A for the single-family prototype, $196 in CDZ 4A and CDZ 4A-balance, $117 in CDZ 5A, and $63 in CDZ 6A for each multifamily unit, after adjusting for inflation. These estimates are further multiplied by the location factors before use in the analysis.

3.4.2.2 Exterior Wall Insulation

There are multiple baseline and 2020 NYStretch prescriptive options for wall insulation (Tables 1 and 2). In CDZ 4A-balance and 5A, this analysis assumes R-20 in the baseline and R-21 intermediate framing (with R-10 insulated headers) in the NYStretch case. In CDZ 4A-NYC and 6A, this analysis assumed R-20+5 in both the baseline and NYStretch cases.

The additional cost associated with R-21 int compared to R-20 walls is the cost of insulating the wall headers with R-10 insulation. The analysis assumes the headers are insulated with 2" of extruded polystyrene (XPS) at R-5/inch. Table 9 shows three estimates of incremental cost.

Table 9. Incremental Cost Estimates for Exterior Wall Insulation: R-21 int vs. R-20

Source	Incremental Cost	Notes
F+G (2012)	$1.77/ft^2	$1.62/ft^2 in 2012 dollars, adjusted to 2019 dollars
RS Means (2019)	$1.88/ft^2	
NREL NREM (2019)	$1.70/ft^2	
Assumption	**$1.77/ft^2**	

According to the dimensions of the DOE/PNNL single-family prototype building used by Faithful + Gould in their 2012 cost estimation exercise, the total length of 2x10 headers is 258 feet (F+G 2012). This results in a total incremental cost of $380 associated with this code provision for the single-family prototype. Detailed drawings of the multifamily prototype building are not available. Thus, the analysis assumes that the ratio of headers to exterior wall area is the same in the single- and multifamily prototypes, which translates to an incremental cost of $136 for each multifamily unit. These estimates are further multiplied by the location factors before use in the analysis.

3.4.2.3 Floor Insulation

The 2020 NYStretch code requires R-30 floor insulation in CDZ 4A compared to R-19 required by the 2020 ECCC NYS in CDZ 4A. The analysis assumes that fiberglass blanket insulation is installed between floor joists. Two estimates of incremental cost are shown in Table 10.

Table 10. Incremental Cost Estimates for Floor Insulation: R-30 vs. R-19

Source	Incremental Cost	Notes
F+G (2012)	$0.46/ft^2	$0.42/ft^2 in 2012 dollars, adjusted to 2019 dollars
RS Means (2019)	$0.40/ft^2	
Assumption	**$0.40/ft^2**	

Using $0.40/ft^2, the total incremental cost works out to $480 for the single-family prototype and $160 for each multifamily unit. Because the 2016 NYCECC already requires floor insulation of R-30 in the areas governed by the code (CDZ 4A-NYC in this analysis), this incremental cost is assumed to apply only to the balance of CDZ 4A (CDZ 4A-balance), after applying applicable location multipliers.

3.4.2.4 Slab Insulation

The 2020 NYStretch code requires slab insulation to be installed up to a depth of four feet compared to the two feet required by the baseline 2020 ECCC NYS in CDZ 4A and 5A. The analysis assumes slab edge insulation to be 2" thick XPS (R-10) with 60 PSI compressive strength. Table 11 shows three estimates of the incremental cost.

Table 11. Incremental Cost Estimates for Slab Insulation: 4' vs. 2' R-10 XPS

Source	Incremental Cost	Notes
F+G (2012)	$1.77/ft^2	$3.24/lf for 2' deep slab edge insulation with R-10 XPS in 2012 dollars, adjusted to 2019 dollars
RS Means (2019)	$2.42/ft^2	2" thick XPS used in foundation applications
NREL NREM (2019)	$2.00/ft^2	2" thick XPS used in foundation applications
Assumption	**$2.00/ft^2**	

Using a cost of $2.00/ft^2, the total incremental cost is $560 for the single-family prototype and $247 for each multifamily unit. Because the 2016 NYCECC already requires four feet of R-10 slab insulation in the areas governed by the code (CDZ 4A-NYC in this analysis), this incremental cost is assumed to apply only to the balance of CDZ 4A (CDZ 4A-balance) and CDZ 5A, after applying applicable location multipliers.

3.4.2.5 Basement Wall Insulation

The 2020 NYStretch code requires R-15 continuous or R-19 cavity insulation for basement walls compared to the R-10 continuous or R-13 cavity insulation required by the baseline 2020 ECCC NYS in CDZ 4A. The analysis assumes basement walls insulation to be kraft-faced fiberglass placed within the wall cavity. Table 12 shows three estimates of incremental cost including the cost of additional insulation as well as deeper framing because R-13 insulation is 3.5" thick and can be placed in a 2 x 4 cavity.

An average incremental cost of $0.8/ft^2 results in a total incremental cost of $784 for the single-family prototype and $345 for each multifamily unit. Because the 2016 NYCECC already requires R-15/R-19 basement wall insulation in the areas governed by the code (CDZ 4A-NYC in this analysis), this incremental cost is assumed to apply only to prototypes with conditioned basements in the balance of CDZ 4A (CDZ 4A-balance), after applying applicable location multipliers.

Table 12. Incremental Cost Estimates for Basement Wall Insulation: R-19 vs. R-10 Cavity

Source	Incremental Cost	Notes
F+G (2012)	$0.84/ft^2	$0.77/ ft^2 in 2012 dollars, adjusted to 2019 dollars
RS Means (2019)	$0.97/ft^2	
NREL NREM (2019)	$0.5/ft^2	
Assumption	**$0.8/ft^2**	

3.4.2.6 Efficient Hot Water Supply

The 2020 NYStretch code has several options for encouraging the efficient delivery of hot water, including an option for a compact piping system, a recirculation system, and a DWHR system. Like other elements of the code that are focused on good design practices, the incremental cost associated with this measure varies from case to case. For example, Klein (2012) lays out several examples for developing a compact hot water delivery system, which when implemented correctly during the early design stages of a project would most likely result in first cost savings by eliminating long pipe runs that require installation and insulation. If a compact hot water delivery system is not feasible for any reason, a DWHR system or recirculation pump in some water heater configurations can help reduce heat loss through pipes or recover a portion of the waste heat.

Similar to the range in energy savings from these systems, the incremental costs also tend to vary. The U.S. Department of Energy (DOE) reports a range of $300 to $500 for installing DWHR systems, noting that installation is likely to be less expensive in new home construction.[8] The final Codes and Standards Enhancement (CASE) report developed by the California Energy Commission on DHWR reports a total cost of $700 to $800 for a complete installation. The study further notes that the product life for DWHR is 30 to 50 years and that no maintenance is required because the equipment has no moving parts. [9] Finally, the third option, recirculating pumps, are cheaper to install depending on the water heater configuration and can be controlled using a timer or a switch. The cost of installing a recirculation pump is approximately $400.[10]

The present analysis assumes a DHWR because it is suitable for a wide range of home designs. Additionally, it is expected that some builders will use the compact piping layout option, thus achieving energy savings for negligible incremental costs. An average incremental cost of $400 is assumed for this measure for both the single-family prototype as well as each multifamily unit. The cost is further adjusted by location factors.

3.4.2.7 Ventilation

The 2020 NYStretch code requires heat recovery ventilation (HRV) or energy recovery ventilation (ERV) in CDZ 5A and 6A. In CDZ 4A, a balanced ventilation system is deemed to comply. As discussed previously in the energy analysis, this analysis assumes a balanced ventilation system in CDZ 4A and an HRV with 70% sensible recovery efficiency (SRE) in CDZ 5A and 6A.

HRVs and ERVs are becoming more popular as the recent energy codes have driven down the air leakage thresholds, thereby introducing the need for controlled mechanical ventilation systems. While point exhaust-based systems are still commonly used to meet the IECC requirement across the country, central fan-integrated supply (CFIS) systems and ERV/HRVs are beginning to be introduced because of the better ventilation effectiveness they provide.

This analysis assumes an average incremental cost of $300 for the single-family prototype and each multifamily unit for the CFIS unit that meets the requirement in CDZ 4A. For CDZs 5A and 6A, the analysis assumes an incremental cost of $1,000 for the single-family prototype and each multifamily unit. These costs are further adjusted using location factors.

Tables 13 and 14 show three estimates of total cost and incremental cost compared to local exhaust-based systems for HRV/ERVs and CFIS.

Table 13. Incremental Cost Estimates for Ventilation: HRV/ERV System vs. Exhaust Ventilation

Source	Total Cost	Incremental Cost	Notes
Moore (2018)	$1,300	$1,103	New construction HRV
Aldrich et al (2013)	$1,500	$1,100	Local ERV system
NREL NREM (2019)	$1,300	$940	HRV with 70% SRE
Assumption		**$1,000**	HRV with 70% SRE

Table 14. Incremental Cost Estimates for Ventilation: CFIS System vs. Exhaust Ventilation

Source	Total Cost	Incremental Cost
Moore (2018)	$310	$113
Aldrich et al (2013)	$650	$250
NREL NREM (2019)	$850	$490
Assumption		**$300**

3.4.2.8 Lighting

The 2020 NYStretch code raises the threshold of high-efficacy lamps to require a minimum of 65 lm/W and that of luminaires to require a minimum of 45 lm/W, while leaving the required percentage of high-efficacy hard-wired lighting unchanged at 90% as the baseline 2020 ECCC NYS. The required percentage of high-efficacy hard-wired lighting in the 2016 NYCECC, however, is 75%.[11]

The overall impact of the 2020 NYStretch code is to require the installation of CFLs at the higher end of the CFL efficacy spectrum or LEDs. Many of the CFLs designed to replace 40-60 W incandescent lamps that are currently labeled under the ENERGY STAR program have efficacies greater than 65 lm/W[12] and would, therefore, meet the NYStretch requirement. LEDs typically have higher efficacies, around 80 lm/W,[13] but this analysis is based on conservative estimates of energy savings and assumes the code provision is met with CFLs. Thus, the incremental cost associated with this change is assumed to be negligible because most CFLs available in the market today easily meet the ENERGY STAR designation for no incremental cost. For CDZ 4A-NYC, however, the baseline 2016 NYCECC requires only 75% of permanently installed lamps to be high efficacy. Thus, the incremental cost of meeting the 2020 NYStretch code provisions for those cases is based on purchasing more CFL bulbs at an incremental cost of $2.93/bulb compared to incandescent lamps. In the single-family prototype, the cost of replacing seven bulbs is assumed to be $20.51; for each multifamily unit, the cost of replacing three bulbs is assumed to be $8.79 (NYSERDA 2019).

3.4.2.9 Ducts in Conditioned Space

The 2020 NYStretch code requires that all ducts be located within conditioned space, while the baseline codes do not regulate the location of ducts. Moving ducts into conditioned zones reduces losses associated with heat transfer and is proven to be a source of significant savings especially in warmer climates.

However, the typical placement of ducts varies widely depending on the house configuration, HVAC layout and even foundation type. Homes with basements tend to have a portion or all the ducts located inside basements while homes with slab-on-grade or crawlspaces tend to have most of the ducts located in the attic space which unless it is conditioned, can result in large losses.

DOE's Building America program developed several case studies and low-cost installation methods for locating ducts within the thermal boundary of a house by implementing dropped ceilings or chases in single-story homes and installing ducts between floor in multi-story ones.[14] They also suggest sealing an attic or crawlspace and insulating them at the perimeter to create a suitable conditioned zone for placing ducts. However, the actual cost associated with this measure depends on many factors as they apply to a given house. Building America found costs ranging from as little as $\$0.39/ft^2$ of conditioned floor area when utilizing efficient chase systems to as much as $\$2.50/ft^2$ when using spray foam insulation (Beal et al. 2011).

In the 2018 IECC, a new code provision related to buried ducts was approved (ICC 2017). This provision, which has been carried through the 2020 ECCC NYS and the 2020 NYStretch code, allows ducts buried within attic insulation to be considered "inside conditioned space" if they meet certain criteria. The criteria includes a lower leakage rate, the air handling unit (AHU) being placed inside conditioned space, and a minimum insulation level above and below the duct surface. The approach is expected to yield good energy savings while still being a lower cost solution.

Research conducted by the National Association of Home Builders (NAHB) Home Innovation Research labs compares different strategies for meeting this code requirement along with a comparison of costs.[15] This analysis assumes that this requirement is met by implementing buried ducts within conditioned space, including building a mechanical closet to house the AHU. The cost for this method per NAHB's research is between \$913 and \$1,107 for a 2,428 ft^2 single-story, slab-on-grade house configuration. It is further noted that the cost for a two-story design would be proportional to the percentage of living area on the second floor. Because the single-family prototype used in this analysis has 50% of the living area on the second floor, the incremental cost associated with this measure is assumed to be \$505 for the single-family prototype. The incremental cost for each multifamily unit is also accordingly assumed to be \$505 because the conditioned floor area is half that of the NAHB prototype. The prototypes with

conditioned basements are assumed to incur no additional costs because most of the ducts are already assumed to be placed in the conditioned basement as described in section 3.3.5.2. Therefore, the incremental costs are assumed to apply only to the prototypes with slab-on-grade, crawlspace and unconditioned basement.

3.4.2.10 Credit Associated with Down-Sizing HVAC Equipment

The collective impact of the prescriptive and mandatory requirements of the 2020 NYStretch code reduce the design heating and cooling loads of the building and result in a reduction in the size of HVAC equipment required to service the loads for the single- and multifamily dwelling units. Because the analysis employs a whole building cost approach, the impact of equipment downsizing due to improved shell efficiency is considered in the analysis. The HVAC sizing information reported by *EnergyPlus* indicates a range in equipment capacity reduction between different prototypes and CDZs and is more notable on the cooling side. It is also expected that the actual sizes installed in the field will vary based on individual design practices. Thus, the analysis conservatively assumes a 0.5-ton reduction in HVAC equipment in CDZ 4A-balance and 5A where most of the envelope improvements apply over the baseline 2020 ECCC NYS. In CDZ 4A-NYC and 6A, the downsizing in equipment is less noticeable because the envelope requirements are mostly similar between the baseline and the 2020 NYStretch code. Thus, an equipment downsizing credit of $330 was assumed in this analysis only for CDZ 4A-balance and 5A (ENERGY STAR 2016). This credit is subtracted from the total incremental cost after adjusting for inflation and location factors.

3.4.3 Total Incremental Costs by Prototype and Climate Design Zone

The total incremental costs per dwelling unit for each prototype in each climate design zone are shown in Table 15.

Table 15. Total Incremental Costs of the Prescriptive and Mandatory Provisions of the 2020 NYStretch Code Compared to the 2016 NYCECC in CDZ 4A-NYC and 2020 ECCC NYS Elsewhere

	Single-family				Multifamily			
	Slab	Crawlspace	Heated Basement	Unheated Basement	Slab	Crawlspace	Heated Basement	Unheated Basement
4A-NYC	$2,048	$2,048	$1,528	$2,048	$1,763	$1,763	$1,243	$1,763
4A-balance	$3,278	$3,180	$3,087	$3,180	$1,917	$1,810	$1,571	$1,810
5A	$2,900	$2,307	$1,905	$2,307	$2,117	$1,856	$1,455	$1,856
6A	$1,602	$1,602	$1,224	$1,602	$1,509	$1,509	$1,131	$1,509

3.5 Cost-Effectiveness Analysis

Combined with the respective energy cost savings, the incremental construction costs were used to calculate a simple payback, present value of savings over a 10-year period, and 30-year Life-Cycle Cost (LCC) savings. While the cost-effectiveness calculations are based on the parameters and equations laid out in DOE's cost-effectiveness methodology (Taylor et al. 2015), certain economic parameters have been updated using latest New York specific data where available.

3.5.1 Fuel Prices

Energy use from the annual simulation is extracted for the major code regulated end-uses of heating, cooling, ventilation, fans, lighting, and domestic DHW and converted to energy costs using the average fuel costs for electricity, natural gas, and fuel oil for the State published by the Energy Information Association (EIA). The latest full year data published by EIA is for 2017 (EIA 2019a, 2019b, and 2019c). Additionally, NYSERDA provided electricity and natural gas prices specific to New York City, which were used only in CDZ 4A-NYC. The average fuel prices used in the analysis are described in Table 16.

Table 16. Fuel Prices

Fuel	CDZ 4A-NYC	All Other CDZs
Electricity	$ 0.200/kWh	$ 0.180/kWh
Natural gas	$ 0.900/therm	$ 1.167/therm
Fuel Oil	$ 2.774/therm	$ 2.774/therm

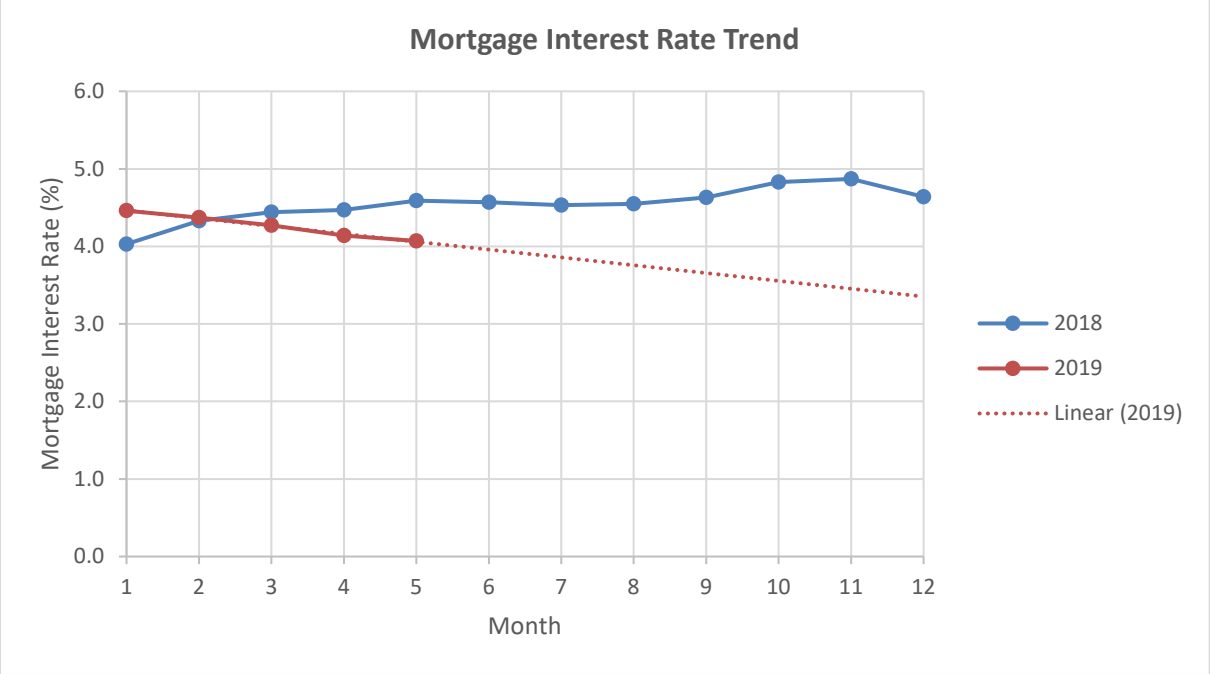
3.5.2 Economic Parameters

The protocols and economic factors used in DOE's cost-effectiveness methodology were followed to calculate the present value and LCC savings. The present value calculation of energy cost savings requested by the State was conducted using a 10-year term, and the LCC savings calculation used a 30-year term to match the typical term used by DOE in its analysis.

3.5.2.1 Mortgage Interest Rate

The mortgage interest rate has averaged around 4.5% in 2018 per latest estimates from Freddie Mac and has been trending downwards in the first half of 2019 as shown in Figure 2.[16]

Figure 2: Mortgage Interest Rate Trends for 2018 and 2019[17]



Based on the trajectory, this analysis uses an estimate of 4.0% mortgage interest rate. The discount rate is maintained the same as the mortgage interest rate per DOE's methodology.

3.5.2.2 Inflation Rate

The analysis uses the latest annualized inflation rate for December 2018 of 1.9%.[18] The home price escalation rate is maintained the same as the inflation rate per DOE's methodology.

3.5.2.3 Fuel Price Escalation Rates

The fuel price escalation rates used in the analysis are the average escalation rates for the 2018–2050 period reported by EIA in its 2019 Annual Energy Outlook for the Mid Atlantic census region.[19] The escalation rate for electricity is assumed to be 0.6%, that for natural gas is assumed to be 0.9% and that for fuel oil is assumed to be 1%.

3.5.2.4 Down Payment Rate

The analysis assumes a 20% down payment rate to be more representative of the current scenario in the State (NYSERDA 2019).

3.5.2.5 Income Tax Rate

The federal income tax rate is assumed to be 15% and the state income tax rate for the State is assumed to be 6.33% for a married filing jointly bracket of $43,000 through $161,550.[20]

3.5.2.6 Property Tax Rate

The property taxes in the State vary widely by location. This analysis uses an average property tax rate of 1.65%. The economic parameters used this analysis are summarized in Table 17.

Table 17. Summary of Economic Parameters

Parameter	Value
Mortgage Interest Rate	4%
Loan Term	30 years
Down Payment Rate	20.0%
Points and Loan Fees	0.5% (non-deductible)
Discount Rate	4% (equal to Mortgage Interest Rate)
Period of Analysis	30 years
Property Tax Rate	1.65%
Income Tax Rate	21.3%
Home Price Escalation Rate	1.9%
Inflation Rate	1.9%
Energy Escalation Rates - Electricity	0.6%
Energy Escalation Rates – Natural Gas	0.9%
Energy Escalation Rates – Fuel Oil	1.0%

3.5.2.7 Useful Measure Life, Replacements, and Residual Value

For building components that have useful lives longer than 30 years, a credit for "residual life" was applied at year 30 in the LCC calculation. For building components with a useful life less than the analysis term, the analysis assumes a like-for-like replacement consistent with the DOE methodology. Table 18 summarizes the effective useful life (EUL) of components assumed in the analysis. In order to streamline the cost-effectiveness analysis and calculations, measures with similar EULs were grouped together. For example, all measures related to opaque insulation requirements and the provision for buried ducts were grouped together into the "opaque insulation" set with an EUL of 60 years. Windows and lighting were individually evaluated with an EUL of 20 years and seven years respectively, and the provisions associated with ventilation were included in the "HVAC" set and evaluated with an EUL of 15 years.

Table 18. Effective Useful Life of Building Components

Component	EUL (Years)
Opaque Insulation	60
Windows	20
Lighting	7
HVAC	15

4 Results

This section summarizes the results of the energy and cost-effectiveness analysis of the 2020 NYStretch Energy Code compared to the 2016 New York City Energy Conservation Code (NYCECC) in CDZ 4A-NYC and 2020 Energy Conservation Construction Code of New York State (ECCC NYS) elsewhere.

4.1 Energy Savings at the Climate Design Zone and State Level

The results of the energy savings analysis of the proposed 2020 NYStretch code over the respective baseline code, by end-use at the climate design zone and State level are included. These results have been aggregated over the entire set of building types, foundation types and heating systems using the construction weights matrix.

4.1.1 Site Energy Savings

Tables 19–21 summarize the site energy savings for code regulated end-uses by CDZ and at the State level. The results for the CDZ 6A baseline have been averaged over the two alternative options and the results for multifamily buildings in CDZ 6A are not included because the associated construction weight was zero. In summary, the results show ~24.6% site energy savings at the State level.

Table 19. Regulated Site Energy Savings for the Prescriptive and Mandatory Provisions the 2020 NYStretch Code for Single-Family Buildings

Climate Zone 4A-NYC						
	Heating (kBtu/dwelling unit)	Cooling (kBtu/dwelling unit)	Lighting (kBtu/dwelling unit)	Fan (kBtu/dwelling unit)	DHW (kBtu/dwelling unit)	Total Regulated Energy (kBtu/dwelling unit)
2016 NYCECC	25990.3	6066.3	5472.2	2937.8	16426.6	56893.3
2020 NYStretch	20244.0	4889.8	4966.9	2309.2	12318.2	44728.1
Savings (%)	22.1%	19.4%	9.2%	21.4%	25.0%	21.4%
Climate Zone 4A-balance						
	Heating (kBtu/dwelling unit)	Cooling (kBtu/dwelling unit)	Lighting (kBtu/dwelling unit)	Fan (kBtu/dwelling unit)	DHW (kBtu/dwelling unit)	Total Regulated Energy (kBtu/dwelling unit)
2020 ECCC NYS	29118.5	6083.7	5093.2	3156.3	16431.5	59883.2
2020 NYStretch	21981.5	4988.1	4966.9	2412.6	12320.5	46669.6
Savings (%)	24.5%	18.0%	2.5%	23.6%	25.0%	22.1%

Table19 continued

Climate Zone 5A						
	Heating (kBtu/dwelling unit)	Cooling (kBtu/dwelling unit)	Lighting (kBtu/dwelling unit)	Fan (kBtu/dwelling unit)	DHW (kBtu/dwelling unit)	Total Regulated Energy (kBtu/dwelling unit)
2020 ECCC NYS	43133.8	3926.1	5096.0	3232.6	18050.4	73438.9
2020 NYStretch	29343.4	3621.9	4969.6	3396.8	13527.8	54859.5
Savings (%)	32.0%	7.7%	2.5%	-5.1%	25.1%	25.3%
Climate Zone 6A						
	Heating (kBtu/dwelling unit)	Cooling (kBtu/dwelling unit)	Lighting (kBtu/dwelling unit)	Fan (kBtu/dwelling unit)	DHW (kBtu/dwelling unit)	Total Regulated Energy (kBtu/dwelling unit)
2020 ECCC NYS	44539.3	3634.2	5083.3	2887.5	19014.7	75159.1
2020 NYStretch	29811.0	3346.4	4957.2	3135.4	14251.9	55502.0
Savings (%)	33.1%	7.9%	2.5%	-8.6%	25.0%	26.2%

Table 20. Regulated Site Energy Savings for the Prescriptive and Mandatory Provisions of the 2020 NYStretch Code for Multifamily Buildings

Climate Zone 4A-NYC						
	Heating (kBtu/dwelling unit)	Cooling (kBtu/dwelling unit)	Lighting (kBtu/dwelling unit)	Fan (kBtu/dwelling unit)	DHW (kBtu/dwelling unit)	Total Regulated Energy (kBtu/dwelling unit)
2016 NYCECC	7896.4	3597.9	2933.5	1492.7	12053.4	27973.9
2020 NYStretch	6171.9	3058.3	2662.1	1233.4	9039.5	22165.2
Savings (%)	21.8%	15.0%	9.3%	17.4%	25.0%	20.8%
Climate Zone 4A-balance						
	Heating (kBtu/dwelling unit)	Cooling (kBtu/dwelling unit)	Lighting (kBtu/dwelling unit)	Fan (kBtu/dwelling unit)	DHW (kBtu/dwelling unit)	Total Regulated Energy (kBtu/dwelling unit)
2020 ECCC NYS	8631.2	3592.6	2730.0	1546.6	12054.4	28554.8
2020 NYStretch	6606.6	3055.2	2662.1	1268.1	9040.0	22632.0
Savings (%)	23.5%	15.0%	2.5%	18.0%	25.0%	20.7%

Table 20 continued

Climate Zone 5A						
	Heating (kBtu/dwelling unit)	Cooling (kBtu/dwelling unit)	Lighting (kBtu/dwelling unit)	Fan (kBtu/dwelling unit)	DHW (kBtu/dwelling unit)	Total Regulated Energy (kBtu/dwelling unit)
2020 ECCC NYS	12643.5	2438.2	2730.0	1610.1	13026.2	32447.9
2020 NYStretch	7078.5	2540.4	2662.1	2134.9	9763.8	24179.6
Savings (%)	44.0%	-4.2%	2.5%	-32.6%	25.0%	25.5%

Table 21. Weighted Average Regulated Site Energy Savings for the Prescriptive and Mandatory Provisions of the 2020 NYStretch Code

Climate Zone 4A-NYC						
	Heating (kBtu/dwelling unit)	Cooling (kBtu/dwelling unit)	Lighting (kBtu/dwelling unit)	Fan (kBtu/dwelling unit)	DHW (kBtu/dwelling unit)	Total Regulated Energy (kBtu/dwelling unit)
2016 NYCECC	14639.4	4517.8	3879.6	2031.2	13683.2	38751.2
2020 NYStretch	11416.1	3740.8	3521.0	1634.4	10261.4	30573.7
Savings (%)	22.0%	17.2%	9.2%	19.5%	25.0%	21.1%
Climate Zone 4A-balance						
	Heating (kBtu/dwelling unit)	Cooling (kBtu/dwelling unit)	Lighting (kBtu/dwelling unit)	Fan (kBtu/dwelling unit)	DHW (kBtu/dwelling unit)	Total Regulated Energy (kBtu/dwelling unit)
2020 ECCC NYS	16266.1	4521.0	3610.7	2146.5	13685.6	40229.9
2020 NYStretch	12336.3	3775.5	3521.0	1694.6	10262.6	31590.0
Savings (%)	24.2%	16.5%	2.5%	21.1%	25.0%	21.5%
Climate Zone 5A						
	Heating (kBtu/dwelling unit)	Cooling (kBtu/dwelling unit)	Lighting (kBtu/dwelling unit)	Fan (kBtu/dwelling unit)	DHW (kBtu/dwelling unit)	Total Regulated Energy (kBtu/dwelling unit)
2020 ECCC NYS	38986.7	3723.7	4774.2	3011.9	17367.0	67863.6
2020 NYStretch	26315.1	3474.8	4655.8	3225.1	13015.9	50686.6
Savings (%)	32.5%	6.7%	2.5%	-7.1%	25.1%	25.3%

Table 21 continued

Climate Zone 6A						
	Heating (kBtu/dwelling unit)	Cooling (kBtu/dwelling unit)	Lighting (kBtu/dwelling unit)	Fan (kBtu/dwelling unit)	DHW (kBtu/dwelling unit)	Total Regulated Energy (kBtu/dwelling unit)
2020 ECCC NYS	44539.3	3634.2	5083.3	2887.5	19014.7	75159.1
2020 NYStretch	29811.0	3346.4	4957.2	3135.4	14251.9	55502.0
Savings (%)	33.1%	7.9%	2.5%	-8.6%	25.0%	26.2%
New York State						
	Heating (kBtu/dwelling unit)	Cooling (kBtu/dwelling unit)	Lighting (kBtu/dwelling unit)	Fan (kBtu/dwelling unit)	DHW (kBtu/dwelling unit)	Total Regulated Energy (kBtu/dwelling unit)
Baseline	32381.7	3974.2	4440.3	2700.8	16429.4	59926.4
2020 NYStretch	22265.5	3552.5	4330.2	2698.0	12315.3	45161.4
Savings (%)	31.2%	10.6%	2.5%	0.1%	25.0%	24.6%

4.1.2 Source Energy Savings

The site energy savings calculated based on the results of the energy simulation exercise are converted into source energy savings using site-source conversion factors included in Table 4.2.1.2 of the 2020 NYStretch code. Factors for fuels relevant to this analysis are summarized in Table 22.

Table 22. Site to Source Energy Conversion Ratios

Energy Type	New York Ratio
Electricity (Grid Purchase)	2.55
Natural Gas	1.05
Fuel Oil	1.01

Tables 23–25 summarize the source energy savings resulting from the prescriptive and mandatory provisions of the 2020 NYStretch code compared to the respective baseline code in each CDZ.

Table 23. Source Energy Savings for the Prescriptive and Mandatory Provisions of the 2020 NYStretch Code for Single-family Buildings

Climate Zone	Baseline Total Source Energy (kBtu/dwelling unit)	2020 NYStretch Total Source Energy (kBtu/dwelling unit)	Source Energy Savings
4A-NYC	90636.9	72065.8	20.5%
4A-balance	94033.4	74807.6	20.4%
5A	108649.2	84773.9	22.0%
6A	110706.5	85165.4	23.1%

Table 24. Source Energy Savings for the Prescriptive and Mandatory Provisions of the 2020 NYStretch Code for Multifamily Buildings

Climate Zone	Baseline Total Source Energy (kBtu/dwelling unit)	2020 NYStretch Total Source Energy (kBtu/dwelling unit)	Source Energy Savings
4A-NYC	50053.5	40359.2	19.4%
4A-balance	50626.1	41010.5	19.0%
5A	56132.8	44709.6	20.4%

Table 25. Weighted Average Source Energy Savings for the Prescriptive and Mandatory Provisions of the 2020 NYStretch Code

Climate Zone	Baseline Total Source Energy (kBtu/dwelling unit)	2020 NYStretch Total Source Energy (kBtu/dwelling unit)	Source Energy Savings
4A-NYC	65177.7	52175.2	19.9%
4A-balance	66802.6	53605.6	19.8%
5A	101506.3	79324.6	21.9%
6A	110706.5	85165.4	23.1%
NY State Average	91545.1	71769.2	21.6%

4.2 Energy Cost Savings at the Climate Design Zone and State Level

The energy cost savings from the NYStretch code over the 2020 Energy Conservation Construction Code of New York State by fuel type at the CDZ and State level are included in Tables 26-28. The results for the CDZ 6A baseline have been averaged over the two alternative options and the results for multifamily

buildings in CDZ 6A are not included because the associated construction weight was zero. In summary, the results show ~19.7% energy cost savings at the State level. Results by building type and climate zone can be found in Appendix B.

Table 26. Annual Energy Cost Savings of the Prescriptive and Mandatory Provisions of the 2020 NYStretch Code for Single-family Buildings

Climate Zone 4A-NYC				
	Electricity Cost ($/dwelling unit)	**Natural Gas Cost ($/dwelling unit)**	**Fuel Oil Cost ($/dwelling unit)**	**Total Energy Cost ($/dwelling unit)**
2016 NYCECC	1207.5	326.6	0.0	1534.1
2020 NYStretch	980.9	251.9	0.0	1232.8
Savings (%)	18.8%	22.9%	NA	19.6%
Climate Zone 4A-balance				
	Electricity Cost ($/dwelling unit)	**Natural Gas Cost ($/dwelling unit)**	**Fuel Oil Cost ($/dwelling unit)**	**Total Energy Cost ($/dwelling unit)**
2020 ECCC NYS	1097.6	456.3	0.0	1553.9
2020 NYStretch	909.1	343.8	0.0	1252.8
Savings (%)	17.2%	24.7%	NA	19.4%
Climate Zone 5A				
	Electricity Cost ($/dwelling unit)	**Natural Gas Cost ($/dwelling unit)**	**Fuel Oil Cost ($/dwelling unit)**	**Total Energy Cost ($/dwelling unit)**
2020 ECCC NYS	1115.2	576.4	81.2	1772.8
2020 NYStretch	960.1	403.9	57.5	1421.5
Savings (%)	13.9%	29.9%	29.1%	19.8%
Climate Zone 6A				
	Electricity Cost ($/dwelling unit)	**Natural Gas Cost ($/dwelling unit)**	**Fuel Oil Cost ($/dwelling unit)**	**Total Energy Cost ($/dwelling unit)**
2020 ECCC NYS	1122.0	612.0	40.7	1774.7
2020 NYStretch	948.7	426.3	28.0	1403.0
Savings (%)	15.4%	30.3%	31.3%	20.9%

Table 27. Annual Energy Cost Savings of the Prescriptive and Mandatory Provisions of the 2020 NYStretch Code for Multifamily Buildings

Climate Zone 4A-NYC				
	Electricity Cost ($/dwelling unit)	**Natural Gas Cost ($/dwelling unit)**	**Fuel Oil Cost ($/dwelling unit)**	**Total Energy Cost ($/dwelling unit)**
2016 NYCECC	810.0	117.1	31.9	958.9
2020 NYStretch	669.1	88.8	24.7	782.5
Savings (%)	17.4%	24.2%	22.6%	18.4%
Climate Zone 4A-balance				
	Electricity Cost ($/dwelling unit)	**Natural Gas Cost ($/dwelling unit)**	**Fuel Oil Cost ($/dwelling unit)**	**Total Energy Cost ($/dwelling unit)**
2020 ECCC NYS	728.9	158.2	33.3	920.4
2020 NYStretch	608.9	118.9	25.5	753.3
Savings (%)	16.5%	24.9%	23.4%	18.2%
Climate Zone 5A				
	Electricity Cost ($/dwelling unit)	**Natural Gas Cost ($/dwelling unit)**	**Fuel Oil Cost ($/dwelling unit)**	**Total Energy Cost ($/dwelling unit)**
2020 ECCC NYS	777.2	207.0	0.0	984.2
2020 NYStretch	680.7	131.8	0.0	812.5
Savings (%)	12.4%	36.3%	NA	17.4%

Table 28. Weighted Average Annual Energy Cost Savings of the Prescriptive and Mandatory Provisions of the 2020 NYStretch Code

Climate Zone 4A-NYC				
	Electricity Cost ($/dwelling unit)	**Natural Gas Cost ($/dwelling unit)**	**Fuel Oil Cost ($/dwelling unit)**	**Total Energy Cost ($/dwelling unit)**
2016 NYCECC	958.1	195.2	20.0	1173.3
2020 NYStretch	785.3	149.6	15.5	950.3
Savings (%)	18.0%	23.4%	22.6%	19.0%

Table 28 continued

Climate Zone 4A-balance				
	Electricity Cost ($/dwelling unit)	**Natural Gas Cost ($/dwelling unit)**	**Fuel Oil Cost ($/dwelling unit)**	**Total Energy Cost ($/dwelling unit)**
2020 ECCC NYS	866.3	269.3	20.9	1156.5
2020 NYStretch	720.7	202.7	16.0	939.4
Savings (%)	16.8%	24.7%	23.4%	18.8%
Climate Zone 5A				
	Electricity Cost ($/dwelling unit)	**Natural Gas Cost ($/dwelling unit)**	**Fuel Oil Cost ($/dwelling unit)**	**Total Energy Cost ($/dwelling unit)**
2020 ECCC NYS	1069.2	526.2	70.1	1665.5
2020 NYStretch	922.1	366.9	49.7	1338.7
Savings (%)	13.8%	30.3%	29.1%	19.6%
Climate Zone 6A				
	Electricity Cost ($/dwelling unit)	**Natural Gas Cost ($/dwelling unit)**	**Fuel Oil Cost ($/dwelling unit)**	**Total Energy Cost ($/dwelling unit)**
2020 ECCC NYS	1122.0	612.0	40.7	1774.7
2020 NYStretch	948.7	426.3	28.0	1403.0
Savings (%)	15.4%	30.3%	31.3%	20.9%
New York State				
	Electricity Cost ($/dwelling unit)	**Natural Gas Cost ($/dwelling unit)**	**Fuel Oil Cost ($/dwelling unit)**	**Total Energy Cost ($/dwelling unit)**
2020 ECCC NYS	1010.8	455.6	48.5	1514.9
2020 NYStretch	859.6	322.6	34.6	1216.7
Savings (%)	15.0%	29.2%	28.6%	19.7%

4.3 Cost-Effectiveness

The results of the cost-effectiveness analysis in terms of simple payback, a 10-year net present value (NPV) of energy cost savings including replacement costs and residual value of efficiency measures, and a 30-yr Life Cycle Cost (LCC) savings are described below.

4.3.1 Simple Payback

Table 29 shows the weighted average annual energy cost savings, the associated total incremental costs, and the resulting simple payback for the 2020 NYStretch code compared to the 2016 NYCECC in CDZ 4A-NYC and 2020 ECCC NYS elsewhere, for the single- and multifamily prototypes.

Table 29. Weighted Average Simple Payback

Climate Design Zone	Single-family			Multifamily		
	Total Annual Energy Cost Savings ($/dwelling unit)	Total Incremental Costs ($/dwelling unit)	Simple Payback (Years)	Total Annual Energy Cost Savings ($/dwelling unit)	Total Incremental Costs ($/dwelling unit)	Simple Payback (Years)
4A-NYC	$301	$1,910	6.3	$176	$1,625	9.2
4A-balance	$301	$2,463	8.2	$167	$1,488	8.9
5A	$351	$2,202	6.3	$172	$1,751	10.2
6A	$372	$1,506	4.1	NA	NA	NA
NY State	$348	$2,057	5.9	$171	$1,591	9.3

4.3.2 10-Year Present Value of Energy Cost Savings

Table 30 shows the 10-year net present value of energy cost savings for the NYStretch code compared to the 2016 NYCECC in CDZ 4A-NYC and 2020 ECCC NYS elsewhere, for the single- and multifamily prototypes. The results include applicable replacement costs for measures with EULs less than the analysis term of 30 years and residual values for measures with EULs longer than the analysis term. The results have been aggregated over the entire set of building types, foundation types, and heating systems using the construction weights matrix. In all cases, the energy cost savings comfortably exceed the first-year incremental costs.

Table 30. Weighted Average Net Present Value (NPV) of Energy Cost Savings over 10 Years

	Single-family		Multifamily	
Climate Design Zone	**Total First Year Incremental Costs ($/dwelling unit)**	**10-Year NPV of Cost Savings Including Replacement Costs and Residual Values ($/dwelling unit)**	**Total First Year Incremental Costs ($/dwelling unit)**	**10-Year NPV of Cost Savings Including Replacement Costs and Residual Values ($/dwelling unit)**
4A-NYC	$1,910	$2,866	$1,625	$1,784
4A-balance	$2,463	$3,509	$1,488	$1,930
5A	$2,202	$3,590	$1,751	$1,825
6A	$1,506	$3,473	NA	NA
NY State	$2,057	$3,524	$1,591	$1,862

4.3.3 30-year Life Cycle Cost (LCC) Savings

Table 31 summarizes the LCC savings of the NYStretch code over the 2020 ECCC NYS at the CDZ and State level. The results have been aggregated over the entire set of building types, foundation types and heating systems using the construction weights matrix. The residential provisions of NYStretch code are found to be cost-effective for the homeowner and yield positive savings over the life of the home in all cases, except for multifamily buildings in CDZ 5A. However, the overall State average LCC savings are positive.

Table 31. Weighted Average 30-Year LCC Savings

Climate Design Zone	Single-family 30 Year LCC Savings ($/dwelling unit)	Multifamily 30 Year LCC Savings ($/dwelling unit)
4A-NYC	$1,804	$94
4A-balance	$1,763	$649
5A	$2,235	$(442)
6A	$2,724	NA
NY State	$2,275	$226

Table 32 summarizes the average energy cost savings, incremental construction costs, and cost-effectiveness results for the prescriptive and mandatory provisions of NYStretch, weighted over the single- and multifamily building construction weights for the State.

Table 32. Weighted Results for the Prescriptive and Mandatory Provisions of the 2020 NYStretch Code at the State Level

	New York State Average
Annual Energy Cost Savings ($/dwelling unit)	$278
Incremental Costs ($/dwelling unit)	$1,795
Simple Payback (Years)	6.4
10-Year NPV of Cost Savings Including Replacement Costs and Residual Values ($/dwelling unit)	$2,854
30-Yr LCC Savings ($/dwelling unit)	$1,741

4.3.3.1 Consideration of the Avoided Cost of Carbon Emissions

The analysis and results described thus far do not include the impact of carbon emissions in the calculations. However, as New York State moves towards aggressive carbon goals for buildings, accounting for the impact of carbon emissions of different fuels becomes imperative. To understand the magnitude of this impact, an exploratory exercise was conducted by blending in a "avoided cost of carbon emissions" in the fuel prices and recalculating the 30-year LCC savings. These factors for electricity, natural gas, and fuel oil were obtained from NYSERDA's Regional Greenhouse Gas Initiative (RGGI) analysis.

Consistent with the Benefit Cost Analysis Framework adopted by the NYS Public Service Commission, the analysis that developed the avoided cost of carbon emissions uses the U.S. Environmental Protection Agency's estimate of the social cost of carbon (SCC) at the 3% discount rate. For electricity, the net social cost of carbon emissions on a per-MWh basis ($/MWh) is net of the projected RGGI compliance costs included in the New York State Independent System Operator (NYISO) CARIS2 2018 Base Case model, and is derived using the NYS Department of Public Service (DPS) estimate of the marginal emissions factor for electricity (lb. CO2/MWh) calculated using the CARIS2 2018 Base Case model; a description of the DPS methodology is provided in Attachment B of the Order Establishing the Benefit Cost Analysis Framework (issued January 21, 2016 in NYS PSC Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision). For natural gas and oil, the social cost of

carbon emissions on a per-MMBtu basis ($/MMBtu) is derived using the marginal emissions factors for buildings (lb. CO2e/MMBtu) published in the Final Performance Metrics Report of the NYS Clean Energy Advisory Council – Metrics, Tracking and Performance Assessment Working Group (filed July 19, 2017 in NYS PSC Matter 16-00561).

The fuel prices used in the analysis, before and after including the cost of carbon, are summarized in Table 33 and the revised LCC savings results are included in Table 34.

Table 33. Fuel Prices used in the Analysis, With and Without the Cost of Carbon

Climate Zone	Without the Cost of Carbon			With the Cost of Carbon		
	Electricity ($/kWh)	Natural Gas ($/therm)	Fuel Oil ($/therm)	Electricity ($/kWh)	Natural Gas ($/therm)	Fuel Oil ($/therm)
4A NYC	0.200	0.900	2.774	0.223	1.248	3.258
4A except NYC	0.180	1.167	2.774	0.203	1.515	3.258
5A	0.180	1.167	2.774	0.203	1.515	3.258
6A	0.180	1.167	2.774	0.203	1.515	3.258

Table 34. Weighted Average 30-Year LCC Savings When the Avoided Cost of Carbon is Included

Climate Design Zone	Single-family 30 Year LCC Savings ($/dwelling unit)	Multifamily 30 Year LCC Savings ($/dwelling unit)
4A-NYC	$2,804	$610
4A-balance	$2,810	$1,162
5A	$3,617	$191
6A	$5,088	NA
NY State	$3,838	$769

It is observed that the inclusion of carbon cost in the fuel price increases LCC savings across the board, including multifamily buildings in CDZ 5A. This indicates the added benefit of including such costs in cost-effectiveness analyses for buildings, especially as decarbonization goals replace energy savings goals and since the buildings are likely to exist as they are constructed for the next 70 to 100 years.

5 Discussion

The 2020 NYStretch code contains many elements that encourage better building design such as better hot water piping layouts, better duct placement etc., which can be easy to implement in new construction if planned well at the design stage. This analysis typically uses conservative savings and incremental cost estimates for many of these measures because of the range of designs and performances that can be achieved in the field. Consequently, the energy savings and cost-effectiveness results reported fall on the lower end of potential savings that can be achieved through the 2020 NYStretch code. The actual energy savings that can be achieved in the field are likely to be higher leading to better cost-effectiveness outcomes.

Additionally, this analysis assumes no fuel switching between the baseline and the 2020 NYStretch cases. The energy cost savings and correspondingly lower LCC savings for models with gas furnaces because it is an inexpensive way for water and space heating. It is plausible that newer homes, especially those built under a stretch code, would be more likely to use electric heating to leverage on-site or off-site generation resulting in better cost-effectiveness outcomes across the board. Furthermore, as demonstrated in section 4.3.3.1, when the avoided cost of carbon is included in the analysis, the LCC savings improve substantially. This effect is mainly driven by the models with gas heating. As the State works toward decarbonization goals for buildings, the consideration of carbon in conducting energy and cost-effectiveness analyses for buildings would need to be central in policy development.

6 Conclusion

The prescriptive and mandatory elements of the residential provisions of the 2020 NYStretch Energy Code are expected to yield positive energy savings over the baseline 2020 Energy Conservation Construction Code of New York State (2020 ECCC NYS) and the 2016 New York City Energy Conservation Construction Code (2016 NYCECC). The savings range from 21 to 26% at the CDZ level in terms of site energy savings and from 18 to 21% in terms of energy costs. The provisions are also found to be cost-effective when evaluated using a 10-year net present value of energy cost savings as well as a full 30-year LCC savings calculations from the perspective of the homeowner for single-family buildings and most multifamily buildings.

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Appendix A. Cost-Effectiveness Analysis of Section R407

A.1 Background

This section summarizes the results of an additional analysis of a Section R407 (Additional Energy Efficiency Credits) contained in the draft NYStretch Energy Code version dated January 2019.[21] Section R407 includes a table of additional efficiency credits for various envelope, equipment and generation options, with different points for a single-family versus multifamily dwelling unit. Table A-1 summarizes the additional efficiency credits table along with the available credits. When complying with this path, detached one- and two-family dwellings, semi-detached two-family dwellings and townhouses are required to obtain 2.0 credits from column A and all other residential buildings are required to obtain 3.0 credits from column B.

Table A-1. Summary of the Options and Credits from the R407 Additional Energy Efficiency Credits Table

Category	Option	Measure	Column A	Column B
High-efficiency Envelope Options	1.1	U ≤ 0.042 Exterior Above Grade Walls	1	0.5
	1.2	U ≤0.020 Ceilings + U≤0.25 Windows	0.5	0.5
	1.3	15% Better UA	1.5	1
	1.4	U≤ 0.24 Windows	0.5	0.5
	1.5	2 ACH50 + High-efficiency Fans	0.5	0.5
	1.6	2 ACH50 + High-efficiency Fans + Heat Recovery Ventilation (HRV)	1	1
High-efficiency Equipment and Power Generation Options	2.1	High-efficiency Furnace or Heat Pump	1.5	1
	2.2	Ducted/Ductless Minisplit Heat Pump	0.5	1
	2.3	High-efficiency Water Heater	0.5	1.5
	2.4	Higher-efficiency Water Heater	1	2
	2.5	Minimum 1 kW of photovoltaic power or wind power.	1.0/kW/housing unit	1.0/kW/housing unit
			(max 2 credits)	(max 2 credits)
	2.6	Solar Domestic Hot Water	1.0/dwelling unit	1.0/dwelling unit

Thus, based on the main analysis methodology and building types under consideration, the single-family prototype would need to obtain 2.0 credits from column A and each multifamily unit would need to obtain 3.0 credits from column B. The additional analysis included the energy savings and cost-effectiveness evaluation of two least incremental cost package options that satisfied the requirements of the additional efficiency credits path.

Based on the results of this analysis and a concern that the section as written might face federal preemption, NYSERDA decided to remove the Additional Energy Efficiency Credits section from the final version of NYStretch. This appendix memorializes the approach, assumptions, and results of the cost effectiveness analysis.

A.2 Overview of the Analysis

The scope of the additional analysis included the evaluation of two least incremental cost options that would satisfy the credit requirements set forth in section R407. Because the additional efficiency credits associated with the same measures are different for single-family versus multifamily dwelling units, this analysis optimized the least cost packages separately for the single- and multifamily prototypes. The analysis, however, did not optimize packages at the CDZ level.[22] The packages were evaluated as whole building packages, including the prescriptive and mandatory provisions of the 2020 NYStretch code.

The costs associated with each measure from Table A-2 were calculated and mapped against the credit points offered by each to create optimal combinations to yield the required number of 2.0 credits for the single-family prototype and 3.0 credits for the multifamily prototype. Figures A-1 and A-2 show the spread of incremental costs for various measures related to the associated credits offered for the single-family and multifamily prototypes.

Figure A-1. Incremental Costs versus Additional Efficiency Credit Offered for Each Option for a Single-Family Building

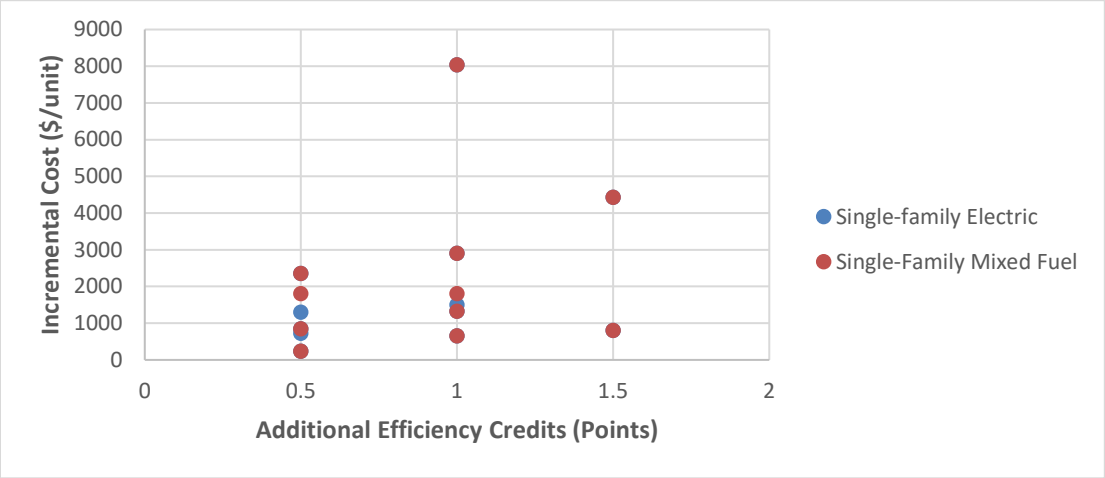
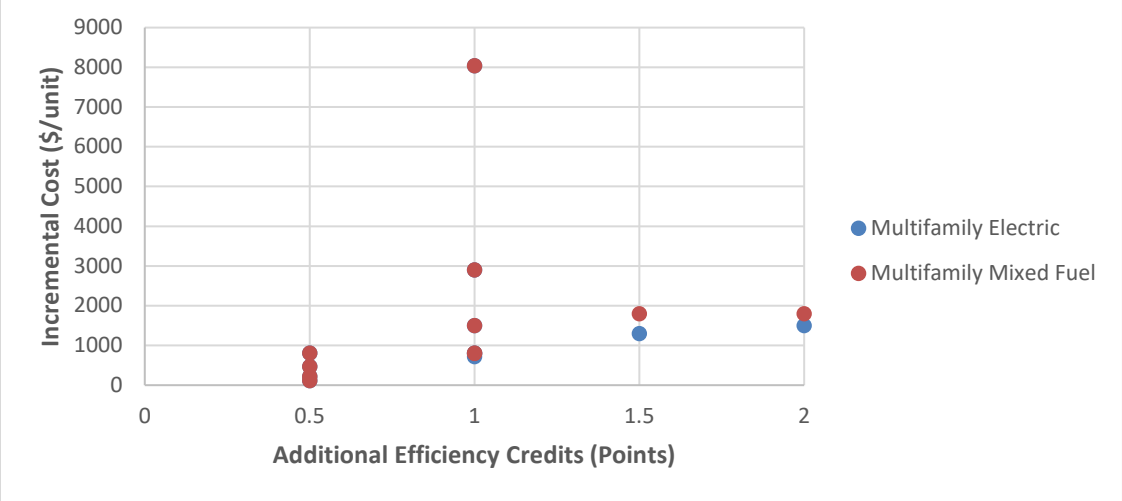


Figure A-2. Incremental Costs versus Additional Efficiency Credit Offered for Each Option for Each Multifamily Unit



For the single-family prototype, high-efficiency space conditioning equipment (option 2.1 in Table A-1) was found to be the least expensive way to obtain 1.5 points out of the required total of 2.0. On the multifamily side, higher-efficiency water heating equipment (option 2.4 in Table A-1) was found to be the least expensive way to obtain 2.0 out of the required total of 3.0 points. Thus, high-efficiency space conditioning equipment was part of both least expensive package options for single-family and higher-efficiency water heating equipment was part of both least expensive package options for multifamily.

A.3 Single-Family Prototype Packages

As described earlier, option 2.1 from Table A-1 was the least expensive way to capture 1.5 points out of the required 2.0 points for the single-family prototype. The high-efficiency space conditioning measure requires an air source heat pump with a heating seasonal performance factor (HSPF) of 9.0, gas or oil-fired furnaces or boilers with an annual fuel utilization efficiency (AFUE) of 94% or a ground-source heat pump (GSHP) with a co-efficient of performance (COP) of 3.3. Because the cost of implementing GSHPs varies widely depending on the site and the set of models used in the analysis does not include a model with a GSHP, this analysis was conducted by assuming higher-efficiency air source heat pumps in the single-family prototype models with heat pumps and higher-efficiency gas and oil-fired furnaces in the single-family prototype models with gas and oil-fired furnaces respectively for the 2020 NYStretch cases. The baseline models in each case are maintained at the standard federal minimum efficiencies specified in Table 5 in the body of this report.

Additional measures that would yield 0.5 points were then required to create the two least first-cost option packages to yield a total of 2.0 credits for the additional energy efficiency credits path. Based on an evaluation of all options available in the additional efficiency credits table, these least expensive options were determined to be option 1.4 (U-0.24 windows) and option 1.5 (tighter envelope option with high-efficiency fans). The elements of the least incremental cost packages assumed in this analysis for the single-family prototype are summarized in Table A-2.

Table A-2. Additional Efficiency Credits Packages Selected for the Single-Family Prototype

No.	Package Description	Points
1	High-eff Furnace/HP + U-0.24 Windows	2.0
2	High-eff Furnace/HP + 2 ACH50 + High-efficiency Fans	2.0

It is noted that the incremental costs associated with some of the options from the additional efficiency credits table are less in some CDZs compared to the others because the baseline code requirements vary by CDZ while the additional credit options do not. For example, the option of U-0.042 walls can be met with R-20+6 walls, which when the baseline wall configuration is R-20+5, such as in CDZ 4A-NYC or CDZ 6A, would require only an additional 0.5” of insulating sheathing. This would make this measure inexpensive for capturing 1.0 point. However, because the packages were not optimized at the CDZ level, the analysis uses the same packages in all CDZs for simplicity.

A.3.1. Energy Modeling

In order to conduct a whole building evaluation, the measures for the two least expensive packages were implemented by modifying the energy models that already include the prescriptive and mandatory provisions of the 2020 NYStretch code.

The high-efficiency gas and oil-fired furnaces were modeled by directly changing the thermal efficiency field in the *EnergyPlus* heating coil objects to 0.90. In the case of heat pumps, the required heating seasonal performance factor HSPF of 9.0 is more typically found in two-stage equipment. Additionally, while option 2.1 does not require an improved seasonal energy efficiency ratio (SEER), typical heat pumps with higher HSPFs also include better SEERs. This analysis assumes an improved SEER of 18 in addition to the HSPF of 9.0 for the high-efficiency heat pumps based on Cutler et al. (2013). The *EnergyPlus* objects associated with heat pumps require a heating and cooling coil COP. This analysis assumes COPs recommended by Cutler et al. (2013) for modeling residential heat pumps at the required SEER and HSPF levels. The efficiencies and COPs assumed in this analysis are summarized in Table A-3.

Table A-3. Heat Pump COPs Used in Analysis

	HSPF	SEER	EER	COP_cooling	COP_heating
Speed 1	9.3	18	14.5	4.25	4
Speed 2			13.3	3.90	3.5

Improved air leakage is modeled by adjusting the effective leakage area (ELA) input to the models based on the methodology for converting results of a blower door test in air changes at 50 Pa (ACH50) to ELA described in Mendon et al. (2013). Table A-4 summarizes the ELA values used in this analysis.

Table A-4. Effective Leakage Areas (ELAs) Used in Analysis for the Single-family Prototype

	ELA at 3 ACH50 (cm^2)	ELA at 2 ACH50 (cm^2)
Living_unit	360.92	240.62

A.3.2. Incremental Costs

The incremental cost associated with high-efficiency space conditioning equipment is calculated over the current federal standards for equipment efficiency as summarized in Table 5. The cost includes equipment and installation as well as additional venting costs for condensing furnaces where applicable.

The National Residential Efficiency Measures Database (NREM) developed by the National Renewable Energy Laboratory (NREL) reports an additional cost of $700 for a installing a gas furnace with an AFUE of 95% compared to a standard furnace with AFUE of 80% and an incremental cost of $800 for installing a heat pump with HSPF 9.3 compared to a standard heat pump with HSPF 7.7. Navigant (2011) reports an incremental cost of $1,438 for 94% AFUE furnaces, replaced on burnout, compared to 80% AFUE furnaces including a labor cost of $308. The installation costs for condensing furnaces are typically higher in retrofit applications due to a higher cost of venting so this cost is likely on the higher end of the spectrum. DOE (2016) reports an average incremental installed cost of $630 in 2015 dollars for an AFUE 95% furnace compared to an AFUE 80% furnace, which when adjusted for inflation works out to $680 in 2019 dollars. This analysis conservatively assumes an incremental cost of $1,000/unit associated with this measure.

The incremental cost associated with the U-0.24 windows is calculated by applying the same regression-based methodology described in section 3.4.2.1 to calculate the additional incremental cost associated with U-0.24 windows compared to the U-0.27 windows. The additional cost of U-0.24 windows over U-0.27 windows is thus assumed to be $0.62/ft^2 (ENERGYSTAR 2016). This works out to an additional incremental cost of $235 for the single-family prototype after adjusting for inflation.

The incremental cost associated with a tighter envelope that meets the 2 ACH50 requirement compared to the 3 ACH50 required in the baseline codes is estimated at $0.31/ft^2 of conditioned floor area by NREM. Additionally, ENERGY STAR (2016) estimates a cost of $0.11/ft^2 for reducing infiltration from 7 ACH50 to 6 ACH50, $0.22/ft^2 for reducing infiltration from 7 ACH50 to 5 ACH50 and $0.31/ft^2 for reducing infiltration from 7 ACH50 to 4 ACH50. This analysis assumes an incremental cost of $0.31/ft^2 for this measure which works out to $744 for the single-family prototype building.

The additional requirement for a high-efficiency ventilation fan can be met either with a fan with an efficiency better than 0.35 W/CFM or alternatively with furnaces with multispeed fans that are controlled to operate at the lowest speed required to provide adequate ventilation in ventilation-only mode. Thus, the incremental cost associated with this measure is assumed to be $100/unit.

These additional costs were combined with the costs associated with the prescriptive and mandatory provisions described in Chapter 3 to yield whole building costs for use in the analysis. Table A-5 summarizes the total incremental cost for each of the two additional efficiency credits packages for

the single-family prototype, including the prescriptive and mandatory provisions of the 2020 NYStretch code. All costs are further adjusted for location factors as applicable.

Table A-5. Total Incremental Costs for the Single-family Prototype

CDZ	Single-family Package 1 (High-eff Furnace/HP + U-0.24 Windows)				Single-family Package 2 (High-eff Furnace/HP + 2 ACH50 + High-efficiency Fans)			
	Slab	Crawlspace	Heated Basement	Unheated Basement	Slab	Crawlspace	Heated Basement	Unheated Basement
4A-NYC	$3,745	$3,745	$3,225	$3,745	$4,582	$4,582	$4,062	$4,582
4A-balance	$4,090	$3,992	$3,899	$3,992	$4,842	$4,743	$4,651	$4,743
5A	$4,086	$3,493	$3,092	$3,493	$4,731	$4,138	$3,737	$4,138
6A	$2,835	$2,835	$2,457	$2,835	$3,442	$3,442	$3,064	$3,442

A.3.3. Effective Useful Life

This analysis assumes an effective useful life (EUL) of 20 years for the high-efficiency furnaces and heat pumps based on DOE (2016). For windows, the EUL is assumed to be 20 years, as it is in the main analysis. The EUL of improved envelope tightness is assumed to be 60 years and the EUL of high-efficiency fans is assumed to be 20 years.

A.4 Multifamily Prototype Packages

For multifamily buildings, the additional efficiency credits table includes two options, option 2.3 and option 2.4, for high-efficiency water heating equipment with varying levels of required minimum efficiencies. Option 2.4 with the higher required efficiencies of the two, natural gas or propane water heating with a minimum a uniform energy factor (UEF) of 0.97, or Heat Pump Water Heaters (HPWH) with a minimum UEF of 2.6, was found to be the least expensive method to capture 2.0 points out of the required 3.0 points. Additional measures that would yield 1.0 point were then required to create the two least first-cost option packages that would yield 3.0 credits for the additional efficiency credits path. Based on an evaluation of all options available in the additional efficiency credits table, these least expensive options were determined to be option 1.6 (tighter envelope option with heat recovery ventilation (HRV) and high-efficiency fans) and option 2.1 (high-efficiency space conditioning equipment). The elements of the least incremental cost packages assumed in this analysis for the single-family prototype are summarized in Table A-6.

The 2020 NYStretch code already requires HRVs in CDZ 5A and 6A. However, the code does not specify a required level of efficiency in the mandatory provisions. The basis for the assumption of a sensible recovery efficiency (SRE) of 0.70 used in lieu of a requirement in the prescriptive and mandatory provisions, is described in section 3.3.5.4. Thus, the additional efficiency credit associated with option 1.6 is then only the relative improvement of the SRE to 0.80 in CDZ 5A and 6A.

Table A-6 summarizes the elements of the least incremental cost packages assumed in this analysis for each multifamily unit.

Table A-6. Additional Efficiency Credits Packages Selected for the Multifamily Prototype

No.	Package Description	Points
1	High-eff Furnace/HP + Higher-eff Water Heater	3.0
2	Higher-eff Water Heater + 0.8 SRE HRVs + 2 ACH50 and High-eff Fans	3.0

A.4.1. Energy Modeling

The high-efficiency gas and oil-fired furnaces are modeled using the same procedure as that discussed for the single-family prototype. A similar procedure is used for modeling a tighter envelope for the multifamily prototype as that described for the single-family prototype above. However, for the DOE multifamily prototype used in this analysis, the ELA is proportionally distributed between the wall, ceiling, and floor areas as discussed by Mendon et al. (2013). Thus, the reduction in ELA from option 1.6 is also applied proportionally to the wall, ceiling, and floor areas as summarized in Table A-7.

Table A-7. Effective Leakage Areas (ELAs) Used in Analysis for the Multifamily Prototype

	ELA at 3 ACH50 (cm2)	ELA at 2 ACH50 (cm2)
MF_corner-units-middle-floor	47.01	31.33
MF_middle-units-middle-floor	34.19	22.79
MF_corner-units-other	107.35	71.55
MF_middle-units-other	94.53	63.00

Option 2.4 for high-efficiency water heating requires a natural gas or propane water heater with a UEF of 0.97 or a HPWH with a UEF of 2.6. Consistent with the DOE prototype model assumptions, the multifamily prototypes with natural gas or oil heating are assumed to use natural gas-fired water heaters while the models with heat pumps for space conditioning are assumed to use electric water

heaters in this analysis. In order to model the additional efficiency credit associated with this option, the gas water heaters are assumed to switch to tankless water heaters and the electric water heaters are assumed to switch to HPWHs in the 2020 NYStretch cases.

The *EnergyPlus* model for water heaters uses a burner efficiency and a shell loss factor (UA) to model the performance of the water heater (Mendon et al. 2013). Because this analysis assumes a tankless water heater to meet the UEF requirement for the gas water heater in option 2.4, the shell losses are set to zero in the 2020 NYStretch models. The HPWHs are modeled using the *EnergyPlus* WaterHeater:HeatPump model. The efficiency of HPWH varies depending on its mode of operation. For example, when the HPWH operates in a "pure" heat pump model, the efficiency is the highest compared to when it switches between the pure and "hybrid" supplemental resistance mode. As expected, the efficiency is the lowest when the HPWH operates in resistance mode only. Thus, HPWH manufacturers report UEFs for each mode separately. This analysis assumes that the HPWH operates in pure heat pump mode and the COP is assumed to be 3.1 based on analysis conducted by NRDC.[23]

A.4.2. Incremental Costs

The total incremental costs associated with high-efficiency space conditioning equipment are conservatively assumed to be the same as those described above for the single-family prototype. The cost for a tighter envelope is assumed to be $0.31/ft^2 based on the reasoning discussed for the single-family prototype and works out to $372 for each multifamily unit.

The average cost of HRVs with 0.8 SRE is difficult to pin-point because of the fewer products that exist in that range, as illustrated in Figure 1. Various sources note a cost from $850 per unit[24] to $1100-$1300 per unit.[25] This analysis assumes average equipment cost of $1,200 for an HRV with a 0.8 SRE. Assuming the labor and installation remain the same between an HRV with a 0.70 SRE, the total installed cost for this option is assumed to be $1,800.

NREM reports a range of $1,800–$3,500 for a gas tankless water heater compared to a storage type water heater. However, the cost is reported only for a retrofit application and the estimate includes cost of removing older equipment. In this case, the lower end of the range is more suitable for new construction. The 2015 California Codes and Standards Enhancement Initiative (CASE) report on the cost-effectiveness of gas instantaneous water heaters assumes an average incremental cost of $725[26] compared to a standard storage water heater. Navigant (2018) reports a total installed cost of $5,215 for a tankless water heater with a UEF of 0.83-0.96 and a total installed cost of $2,013 for a standard

storage type water heater with a 40-gallon tank, resulting in an incremental cost of $3,200 associated with this option.[27] A 2018 study conducted by the Energy Information Administration (EIA) reports a total installed cost of $2,550 for a HPWH with an UEF 3.28 compared to a total installed cost of $1,100 for a standard electric resistance storage water heater leading to an incremental cost of $1450 for this measure.[28] The Northeast Energy Efficiency Partnership (NEEP) (2016) reports an incremental cost of $1,053–$1,144 for HPWH with EF_{nc} higher than or equal to 2.6, compared to a baseline storage water heater.[29] This analysis assumes an average incremental cost of $1,200 associated with this option for both tankless gas and HPWHs compared to standard gas and electric storage water heaters respectively. Each unit in the multifamily prototype building is assumed to have an individual water heater.

Additionally, the analysis accounted for all prescriptive and mandatory provisions of the 2020 NYStretch code. Table A-8 summarizes the total incremental cost for each of the two additional efficiency credits packages for each unit in the multifamily prototype. Like the main analysis, this analysis calculated whole package incremental construction costs for the packages compared to the baseline codes and the costs were further adjusted for location factors as applicable.

Table A-8. Total Incremental Costs for Each Unit in the Multifamily Prototype

CDZ	Multifamily Package 1 (Higher-eff Water Heaters +High-eff Furnace/HP)				Multifamily Package 2 (Higher-eff Water Heaters + 2 ACH50 + 0.8 SRE HRVs)			
	Slab	Crawlspace	Heated Basement	Unheated Basement	Slab	Crawlspace	Heated Basement	Unheated Basement
4A-NYC	$4,786	$4,786	$4,266	$4,786	$5,984	$5,984	$5,464	$5,984
4A-balance	$4,352	$4,245	$4,006	$4,245	$5,428	$5,321	$5,082	$5,321
5A	$4,393	$4,132	$3,731	$4,132	$4,575	$4,314	$3,913	$4,314
6A	$3,704	$3,704	$3,326	$3,704	$3,876	$3,876	$3,498	$3,876

A.4.3. Effective Useful Life

This analysis assumes an EUL of 15 years for HRVs like the main analysis. An EUL of 20 years for the high-efficiency furnaces and heat pumps is assumed based on DOE (2016), the EUL of improved envelope tightness is assumed to be 60 years based on Mendon et al. (2013) and the EUL of water heaters is assumed to be 20 years (DOE 2010).

A.5 Results

The energy savings results in terms of site and source energy savings associated with the two least expensive additional efficiency credits packages for the single-family and multifamily prototypes are summarized in Tables A-9 and A-10 respectively. The fuel prices and site-to-source conversion ratios are maintained the same as the main analysis. The additional efficiency options are observed to yield additional 10-15% savings beyond the prescriptive and mandatory provisions of the 2020 NYStretch code.

Table A-9. Site Energy, Source Energy and Energy Cost Savings for the Single-family Prototype

Climate Zone 4A-NYC			
	Total Regulated Site Energy (kBtu/dwelling unit)	Total Regulated Source Energy (kBtu/dwelling unit)	Total Energy Costs ($/dwelling unit)
2016 NYCECCC	56514.2	89670.4	1511.9
2020 NYStretch Package 1	39763.7	65736.1	1151.2
2020 NYStretch Package 2	39989.9	65920.8	1151.5
Savings Package 1(%)	29.6%	26.7%	23.9%
Savings Package 2(%)	29.2%	26.5%	23.8%
Climate Zone 4A-balance			
	Total Regulated Site Energy (kBtu/dwelling unit)	Total Regulated Source Energy (kBtu/dwelling unit)	Total Energy Costs ($/dwelling unit)
2020 ECCC NYS	59883.2	94033.4	1553.9
2020 NYStretch Package 1	41360.5	68060.0	1158.7
2020 NYStretch Package 2	38891.9	64157.7	1093.9
Savings Package 1(%)	30.9%	27.6%	25.4%
Savings Package 2(%)	35.1%	31.8%	29.6%
Climate Zone 5A			
	Total Regulated Site Energy (kBtu/dwelling unit)	Total Regulated Source Energy (kBtu/dwelling unit)	Total Energy Costs ($/dwelling unit)
2020 ECCC NYS	73155.7	107810.3	1755.9
2020 NYStretch Package 1	49147.6	78069.8	1331.0
2020 NYStretch Package 2	45966.6	73936.1	1269.5
Savings Package 1(%)	32.8%	27.6%	24.2%
Savings Package 2(%)	37.2%	31.4%	27.7%

Table A-9 continued

Climate Zone 6A			
	Total Regulated Site Energy (kBtu/dwelling unit)	Total Regulated Source Energy (kBtu/dwelling unit)	Total Energy Costs ($/dwelling unit)
2020 ECCC NYS	75198.4	110746.2	1775.8
2020 NYStretch Package 1	49690.2	78364.1	1314.2
2020 NYStretch Package 2	50090.1	78796.4	1319.4
Savings Package 1(%)	33.9%	29.2%	26.0%
Savings Package 2(%)	33.4%	28.8%	25.7%
New York State			
	Total Regulated Site Energy (kBtu/dwelling unit)	Total Regulated Source Energy (kBtu/dwelling unit)	Total Energy Costs ($/dwelling unit)
Baseline	68021.3	101901.3	1663.3
2020 NYStretch Package 1	45411.7	72759.9	1238.8
2020 NYStretch Package 2	43601.5	70374.0	1203.0
Savings Package 1(%)	33.2%	28.6%	25.5%
Savings Package 2(%)	35.9%	30.9%	27.7%

Table A-10. Site Energy, Source Energy and Energy Cost Savings for the Multifamily Prototype

Climate Zone 4A-NYC			
	Total Regulated Site Energy (kBtu/dwelling unit)	Total Regulated Source Energy (kBtu/dwelling unit)	Total Energy Costs ($/dwelling unit)
2016 NYCECCC	27770.4	49534.6	947.0
2020 NYStretch Package 1	16834.5	31138.4	610.0
2020 NYStretch Package 2	16846.2	31080.4	607.8
Savings Package 1(%)	39.4%	37.1%	35.6%
Savings Package 2(%)	39.3%	37.3%	35.8%
Climate Zone 4A-balance			
	Total Regulated Site Energy (kBtu/dwelling unit)	Total Regulated Source Energy (kBtu/dwelling unit)	Total Energy Costs ($/dwelling unit)
2020 ECCC NYS	28554.6	50625.9	920.4
2020 NYStretch Package 1	17243.8	31725.9	586.8
2020 NYStretch Package 2	15460.2	30367.5	577.0
Savings Package 1(%)	39.6%	37.3%	36.2%
Savings Package 2(%)	45.9%	40.0%	37.3%

Table A-10 continued

Climate Zone 5A			
	Total Regulated Site Energy (kBtu/dwelling unit)	Total Regulated Source Energy (kBtu/dwelling unit)	Total Energy Costs ($/dwelling unit)
2020 ECCC NYS	32447.9	56132.8	984.2
2020 NYStretch Package 1	17994.0	32993.0	597.0
2020 NYStretch Package 2	18261.7	34423.4	631.6
Savings Package 1(%)	44.5%	41.2%	39.3%
Savings Package 2(%)	43.7%	38.7%	35.8%
New York State			
	Total Regulated Site Energy (kBtu/dwelling unit)	Total Regulated Source Energy (kBtu/dwelling unit)	Total Energy Costs ($/dwelling unit)
Baseline	29266.1	51637.4	943.4
2020 NYStretch Package 1	17306.4	31861.6	596.0
2020 NYStretch Package 2	16534.8	31550.1	599.0
Savings Package 1(%)	40.9%	38.3%	36.8%
Savings Package 2(%)	43.5%	38.9%	36.5%

Tables A-11 and A-12 summarize the savings in terms of energy costs and the simple payback for the two prototypes.

Table A-11. Energy Cost Savings and Simple Payback for the Single-family Prototype

Climate Design Zone	Single-family Package 1 (High-eff Furnace/HP + U-0.24 Windows)			Single-family Package 2 (High-eff Furnace/HP + 2 ACH50 + High-efficiency Fans)		
	Total Annual Energy Cost Savings ($/dwelling unit)	Total Incremental Costs ($/dwelling unit)	Simple Payback (Years)	Total Annual Energy Cost Savings ($/dwelling unit)	Total Incremental Costs ($/dwelling unit)	Simple Payback (Years)
4A-NYC	$361	$3,607	10.0	$360	$4,444	12.3
4A-balance	$395	$3,987	10.1	$460	$4,739	10.3
5A	$425	$3,510	8.3	$486	$4,155	8.5
6A	$462	$2,739	5.9	$456	$3,346	7.3
NY State	$428	$3,389	7.9	$471	$4,047	8.6

Table A-12. Energy Cost Savings and Simple Payback for the Multifamily Prototype

Climate Design Zone	Multifamily Package 1 (Higher-eff Water Heaters +High-eff Furnace/HP)			Multifamily Package 2 (Higher-eff Water Heaters + 2 ACH50 + 0.8 SRE HRVs)		
	Total Annual Energy Cost Savings ($/dwelling unit)	Total Incremental Costs ($/dwelling unit)	Simple Payback (Years)	Total Annual Energy Cost Savings ($/dwelling unit)	Total Incremental Costs ($/dwelling unit)	Simple Payback (Years)
4A-NYC	$337	$4,648	13.8	$339	$5,846	17.2
4A-balance	$334	$4,203	12.6	$343	$5,279	15.4
5A	$387	$4,081	10.5	$353	$4,263	12.1
6A	NA	NA	NA	NA	NA	NA
NY State	$347	$4,302	12.4	$344	$5,198	15.1

Finally, Tables A-13 and A-14 summarize the 10-yr Net Present Value (NPV) of energy savings and the 30-year LCC savings for the single-family and the multifamily units respectively. All economic parameters are maintained the same as the main analysis.

Table A-13. Cost-Effectiveness Results for the Single-family Prototype

CDZ	Single-family Package 1 (High-eff Furnace/HP + U-0.24 Windows)			Single-family Package 2 (High-eff Furnace/HP + 2 ACH50 + High-efficiency Fans)		
	Total First Year Incremental Costs ($/dwelling unit)	10-Year NPV of Cost Savings ($/dwelling unit)	30 Year LCC Savings ($/dwelling unit)	Total First Year Incremental Costs ($/dwelling unit)	10-Year NPV of Cost Savings ($/dwelling unit)	30 Year LCC Savings ($/dwelling unit)
4A-NYC	$3,607	$3,112	$137	$4,444	$3,737	$(741)
4A-balance	$3,987	$3,445	$696	$4,739	$4,589	$238
5A	$3,510	$3,753	$1,825	$4,155	$4,991	$2,275
6A	$2,739	$4,071	$2,974	$3,346	$4,481	$2,246
NY State	$3,389	$3,595	$1,408	$4,047	$4,449	$1,005

Table A-14. Cost-Effectiveness Results for the Multifamily Prototype

	Multifamily Package 1 (Higher-eff Water Heaters + High-eff Furnace/HP)			Multifamily Package 2 (Higher-eff Water Heaters + 2 ACH50 + 0.8SRE HRVs)		
CDZ	**Total First Year Incremental Costs ($/dwelling unit)**	**10-Year NPV of Cost Savings ($/dwelling unit)**	**30 Year LCC Savings ($/dwelling unit)**	**Total First Year Incremental Costs ($/dwelling unit)**	**10-Year NPV of Cost Savings ($/dwelling unit)**	**30 Year LCC Savings ($/dwelling unit)**
4A-NYC	$4,648	$3,077	$(2,246)	$5,846	$3,304	$(4,085)
4A-balance	$4,203	$3,226	$(1,346)	$5,279	$3,515	$(2,836)
5A	$4,081	$3,573	$(246)	$4,263	$3,449	$(935)
6A	NA	NA	NA	NA	NA	NA
NY State	$4,302	$3,292	$(1,279)	$5,198	$3,423	$(2,618)

A.6 Conclusions

The additional efficiency credits proposed in section R407 of the draft NYStretch Energy Code version dated January 2019 yield additional positive energy savings of 10–15% over the prescriptive and mandatory provisions of the 2020 NYStretch energy code. An evaluation of two least expensive package options for single-family and multifamily buildings indicates simple paybacks ranging from 8 to 17 years. While the 30-year LCC savings are positive for most single-family buildings, they are negative for multifamily buildings in all climate design zones. It is further noted that because the package combinations are chosen based on the lowest first costs and not optimized based on a LCC perspective, it is possible that some other combinations of the proposed options might be more cost-effective in terms of LCC savings, even if they are more expensive in terms of first costs.

Appendix B. Energy Savings for All Models

This section summarizes the energy cost savings for each model from the prescriptive and mandatory provisions of the 2020 NYStretch energy code over the 2016 New York City Energy Conservation Code (NYCECC) baseline in CDZ 4A-NYC and the 2020 Energy Conservation Construction Code of New York State (ECCC NYS) baseline elsewhere, along with the associated incremental costs, 10-year net present value (NPV) of energy cost savings including replacement costs and 30-year LCC savings.

Table B-1. Energy Cost Savings, Incremental Costs and Cost-Effectiveness Results for the Prescriptive and Mandatory Provisions of the 2020 NYStretch Energy Code

ID	CDZ	Electricity Savings ($)	Natural Gas Savings ($)	Fuel Oil Savings ($)	Total Energy Savings ($)	Incremental Costs ($)	10-yr NPV Energy Cost Savings ($)	30-yr LCC Savings ($)
SF_gasfurnace_crawlspace	4A-NYC	149.1	120.0	0.0	269.0	2048.5	2634.4	1262.4
SF_gasfurnace_heatedbsmt	4A-NYC	34.8	56.3	0.0	91.1	2048.5	1092.0	-1956.6
SF_gasfurnace_slab	4A-NYC	133.8	119.4	0.0	253.2	2048.5	2501.3	979.4
SF_gasfurnace_unheatedbsmt	4A-NYC	139.8	114.7	0.0	254.5	2048.5	2508.3	999.2
SF_hp_crawlspace	4A-NYC	621.0	0.0	0.0	621.0	2048.5	5479.4	7449.2
SF_hp_heatedbsmt	4A-NYC	388.3	0.0	0.0	388.3	2048.5	3532.0	3300.5
SF_hp_slab	4A-NYC	601.7	0.0	0.0	601.7	2048.5	5317.3	7103.9
SF_hp_unheatedbsmt	4A-NYC	601.6	0.0	0.0	601.6	2048.5	5317.0	7103.3
SF_oilfurnace_crawlspace	4A-NYC	141.3	0.0	375.7	517.1	2048.5	4662.7	5966.5
SF_oilfurnace_heatedbsmt	4A-NYC	35.3	0.0	172.9	208.2	2048.5	2049.5	260.4
SF_oilfurnace_slab	4A-NYC	126.9	0.0	372.7	499.6	2048.5	4516.4	5652.5
SF_oilfurnace_unheatedbsmt	4A-NYC	131.9	0.0	360.2	492.1	2048.5	4451.6	5505.9
SF_gasfurnace_crawlspace	4A-bal	113.9	180.4	0.0	294.3	2664.5	3509.4	1693.0
SF_gasfurnace_heatedbsmt	4A-bal	-2.5	97.5	0.0	95.0	2664.5	1772.6	-1920.0

Table B-1 continued

ID	CDZ	Electricity Savings ($)	Natural Gas Savings ($)	Fuel Oil Savings ($)	Total Energy Savings ($)	Incremental Costs ($)	10-yr NPV Energy Cost Savings ($)	30-yr LCC Savings ($)
SF_gasfurnace_slab	4A-bal	109.5	169.1	0.0	278.6	2664.5	3368.4	1404.5
SF_gasfurnace_unheatedbsmt	4A-bal	104.0	170.2	0.0	274.2	2664.5	3332.1	1326.1
SF_hp_crawlspace	4A-bal	569.5	0.0	0.0	569.5	2664.5	5660.9	6465.9
SF_hp_heatedbsmt	4A-bal	345.5	0.0	0.0	345.5	2664.5	3786.3	2472.4
SF_hp_slab	4A-bal	548.5	0.0	0.0	548.5	2664.5	5485.5	6092.3
SF_hp_unheatedbsmt	4A-bal	549.1	0.0	0.0	549.1	2664.5	5490.1	6102.2
SF_oilfurnace_crawlspace	4A-bal	107.6	0.0	433.1	540.7	2664.5	5481.6	6380.3
SF_oilfurnace_heatedbsmt	4A-bal	-0.9	0.0	229.7	228.8	2664.5	2842.6	618.9
SF_oilfurnace_slab	4A-bal	103.0	0.0	411.9	514.8	2664.5	5262.0	5897.8
SF_oilfurnace_unheatedbsmt	4A-bal	97.5	0.0	409.8	507.2	2664.5	5198.2	5760.5
SF_gasfurnace_crawlspace	5A	3.0	260.4	0.0	263.3	2326.0	2924.0	708.4
SF_gasfurnace_heatedbsmt	5A	-44.6	204.6	0.0	160.0	2326.0	2013.0	-1173.7
SF_gasfurnace_slab	5A	1.1	259.2	0.0	260.3	2326.0	2898.1	654.4
SF_gasfurnace_unheatedbsmt	5A	-0.3	255.8	0.0	255.5	2326.0	2854.7	565.7
SF_hp_crawlspace	5A	683.0	0.0	0.0	683.0	2326.0	6217.3	7997.7
SF_hp_heatedbsmt	5A	544.0	0.0	0.0	544.0	2326.0	5054.2	5519.9
SF_hp_slab	5A	694.3	0.0	0.0	694.3	2326.0	6312.2	8199.9
SF_hp_unheatedbsmt	5A	689.5	0.0	0.0	689.5	2326.0	6271.9	8114.2
SF_oilfurnace_crawlspace	5A	1.9	0.0	614.8	616.7	2326.0	5750.1	7422.9
SF_oilfurnace_heatedbsmt	5A	-41.9	0.0	480.7	438.7	2326.0	4242.1	4118.6
SF_oilfurnace_slab	5A	-0.8	0.0	619.4	618.5	2326.0	5766.2	7460.5
SF_oilfurnace_unheatedbsmt	5A	-1.2	0.0	604.4	603.2	2326.0	5635.4	7171.5
SF_gasfurnace_crawlspace	6A	-3.1	273.1	0.0	270.0	1931.5	2693.1	961.8
SF_gasfurnace_heatedbsmt	6A	-46.7	216.6	0.0	169.9	1931.5	1808.6	-863.1
SF_gasfurnace_slab	6A	-4.8	272.8	0.0	268.1	1931.5	2676.8	927.3
SF_gasfurnace_unheatedbsmt	6A	-6.4	268.8	0.0	262.4	1931.5	2626.3	823.9
SF_hp_crawlspace	6A	751.7	0.0	0.0	751.7	1931.5	6495.1	9348.3
SF_hp_heatedbsmt	6A	614.9	0.0	0.0	614.9	1931.5	5350.2	6909.3
SF_hp_slab	6A	766.6	0.0	0.0	766.6	1931.5	6619.8	9614.1

Table B-1 continued

ID	CDZ	Electricity Savings ($)	Natural Gas Savings ($)	Fuel Oil Savings ($)	Total Energy Savings ($)	Incremental Costs ($)	10-yr NPV Energy Cost Savings ($)	30-yr LCC Savings ($)
MF_gasfurnace_crawlspace	4A-NYC	84.4	58.8	0.0	143.2	1763.2	1530.6	-481.9
SF_hp_unheatedbsmt	6A	759.2	0.0	0.0	759.2	1931.5	6558.1	9482.6
SF_oilfurnace_crawlspace	6A	-4.3	0.0	644.1	639.8	1931.5	5650.3	7989.0
SF_oilfurnace_heatedbsmt	6A	-44.1	0.0	508.4	464.3	1931.5	4162.8	4727.4
SF_oilfurnace_slab	6A	-5.8	0.0	642.2	636.4	1931.5	5621.4	7926.3
SF_oilfurnace_unheatedbsmt	6A	-7.6	0.0	634.4	626.8	1931.5	5540.4	7748.3
MF_gasfurnace_heatedbsmt	4A-NYC	12.6	40.0	0.0	52.6	1763.2	756.5	-2111.2
MF_gasfurnace_slab	4A-NYC	86.1	57.4	0.0	143.5	1763.2	1531.9	-477.7
MF_gasfurnace_unheatedbsmt	4A-NYC	85.3	57.7	0.0	143.0	1763.2	1527.8	-486.6
MF_hp_crawlspace	4A-NYC	275.6	0.0	0.0	275.6	1763.2	2588.6	1833.8
MF_hp_heatedbsmt	4A-NYC	153.2	0.0	0.0	153.2	1763.2	1564.5	-348.0
MF_hp_slab	4A-NYC	274.8	0.0	0.0	274.8	1763.2	2582.3	1820.4
MF_hp_unheatedbsmt	4A-NYC	274.7	0.0	0.0	274.7	1763.2	2581.5	1818.7
MF_oilfurnace_crawlspace	4A-NYC	78.4	0.0	191.6	270.0	1763.2	2568.9	1922.9
MF_oilfurnace_heatedbsmt	4A-NYC	13.7	0.0	123.7	137.4	1763.2	1450.5	-506.1
MF_oilfurnace_slab	4A-NYC	79.9	0.0	186.6	266.4	1763.2	2538.5	1854.7
MF_oilfurnace_unheatedbsmt	4A-NYC	79.1	0.0	187.6	266.7	1763.2	2541.1	1861.0
MF_gasfurnace_crawlspace	4A-bal	66.3	81.0	0.0	147.2	1689.7	1796.9	316.7
MF_gasfurnace_heatedbsmt	4A-bal	1.0	56.6	0.0	57.6	1689.7	1026.4	-1299.2
MF_gasfurnace_slab	4A-bal	67.5	79.4	0.0	146.9	1689.7	1792.6	309.2
MF_gasfurnace_unheatedbsmt	4A-bal	66.5	80.0	0.0	146.5	1689.7	1789.7	302.4
MF_hp_crawlspace	4A-bal	245.9	0.0	0.0	245.9	1689.7	2554.4	2015.6
MF_hp_heatedbsmt	4A-bal	135.4	0.0	0.0	135.4	1689.7	1629.8	45.8

Table B-1 continued

ID	CDZ	Electricity Savings ($)	Natural Gas Savings ($)	Fuel Oil Savings ($)	Total Energy Savings ($)	Incremental Costs ($)	10-yr NPV Energy Cost Savings ($)	30-yr LCC Savings ($)
MF_hp_slab	4A-bal	245.2	0.0	0.0	245.2	1689.7	2548.9	2003.8
MF_hp_unheatedbsmt	4A-bal	245.3	0.0	0.0	245.3	1689.7	2549.2	2004.4
MF_oilfurnace_crawlspace	4A-bal	61.1	0.0	204.7	265.8	1689.7	2750.1	2572.3
MF_oilfurnace_heatedbsmt	4A-bal	2.3	0.0	134.8	137.1	1689.7	1663.2	209.1
MF_oilfurnace_slab	4A-bal	62.1	0.0	201.0	263.1	1689.7	2727.2	2521.2
MF_oilfurnace_unheatedbsmt	4A-bal	61.2	0.0	201.3	262.5	1689.7	2722.2	2510.6
MF_gasfurnace_crawlspace	5A	-27.5	139.8	0.0	112.3	1875.2	1382.0	-1453.7
MF_gasfurnace_heatedbsmt	5A	-62.4	124.4	0.0	62.0	1875.2	948.0	-2362.2
MF_gasfurnace_slab	5A	-27.6	138.2	0.0	110.6	1875.2	1365.9	-1486.3
MF_gasfurnace_unheatedbsmt	5A	-27.7	138.6	0.0	110.9	1875.2	1369.1	-1480.1
MF_hp_crawlspace	5A	283.8	0.0	0.0	283.8	1875.2	2699.5	1499.8
MF_hp_heatedbsmt	5A	211.0	0.0	0.0	211.0	1875.2	2091.0	203.4
MF_hp_slab	5A	281.2	0.0	0.0	281.2	1875.2	2678.4	1454.9
MF_hp_unheatedbsmt	5A	282.5	0.0	0.0	282.5	1875.2	2688.9	1477.3
MF_oilfurnace_crawlspace	5A	-24.0	0.0	342.5	318.5	1875.2	3039.1	2457.6
MF_oilfurnace_heatedbsmt	5A	-56.6	0.0	296.9	240.3	1875.2	2378.2	1018.3
MF_oilfurnace_slab	5A	-24.7	0.0	337.6	312.9	1875.2	2991.1	2351.8
MF_oilfurnace_unheatedbsmt	5A	-24.6	0.0	339.0	314.4	1875.2	3003.8	2380.0
SF_gasfurnace_crawlspace	4A-NYC	149.1	120.0	0.0	269.0	2048.5	2634.4	1262.4
SF_gasfurnace_heatedbsmt	4A-NYC	34.8	56.3	0.0	91.1	2048.5	1092.0	-1956.6
SF_gasfurnace_slab	4A-NYC	133.8	119.4	0.0	253.2	2048.5	2501.3	979.4
SF_gasfurnace_unheatedbsmt	4A-NYC	139.8	114.7	0.0	254.5	2048.5	2508.3	999.2
SF_hp_crawlspace	4A-NYC	621.0	0.0	0.0	621.0	2048.5	5479.4	7449.2
SF_hp_heatedbsmt	4A-NYC	388.3	0.0	0.0	388.3	2048.5	3532.0	3300.5
SF_hp_slab	4A-NYC	601.7	0.0	0.0	601.7	2048.5	5317.3	7103.9
SF_hp_unheatedbsmt	4A-NYC	601.6	0.0	0.0	601.6	2048.5	5317.0	7103.3

Table B-1 continued

ID	CDZ	Electricity Savings ($)	Natural Gas Savings ($)	Fuel Oil Savings ($)	Total Energy Savings ($)	Incremental Costs ($)	10-yr NPV Energy Cost Savings ($)	30-yr LCC Savings ($)
SF_oilfurnace_crawlspace	4A-NYC	141.3	0.0	375.7	517.1	2048.5	4662.7	5966.5
SF_oilfurnace_heatedbsmt	4A-NYC	35.3	0.0	172.9	208.2	2048.5	2049.5	260.4
SF_oilfurnace_slab	4A-NYC	126.9	0.0	372.7	499.6	2048.5	4516.4	5652.5
SF_oilfurnace_unheatedbsmt	4A-NYC	131.9	0.0	360.2	492.1	2048.5	4451.6	5505.9
SF_gasfurnace_crawlspace	4A-bal	113.9	180.4	0.0	294.3	2664.5	3509.4	1693.0
SF_gasfurnace_heatedbsmt	4A-bal	-2.5	97.5	0.0	95.0	2664.5	1772.6	-1920.0
SF_gasfurnace_slab	4A-bal	109.5	169.1	0.0	278.6	2664.5	3368.4	1404.5
SF_gasfurnace_unheatedbsmt	4A-bal	104.0	170.2	0.0	274.2	2664.5	3332.1	1326.1
SF_hp_crawlspace	4A-bal	569.5	0.0	0.0	569.5	2664.5	5660.9	6465.9
SF_hp_heatedbsmt	4A-bal	345.5	0.0	0.0	345.5	2664.5	3786.3	2472.4
SF_hp_slab	4A-bal	548.5	0.0	0.0	548.5	2664.5	5485.5	6092.3
SF_hp_unheatedbsmt	4A-bal	549.1	0.0	0.0	549.1	2664.5	5490.1	6102.2
SF_oilfurnace_crawlspace	4A-bal	107.6	0.0	433.1	540.7	2664.5	5481.6	6380.3
SF_oilfurnace_heatedbsmt	4A-bal	-0.9	0.0	229.7	228.8	2664.5	2842.6	618.9
SF_oilfurnace_slab	4A-bal	103.0	0.0	411.9	514.8	2664.5	5262.0	5897.8
SF_oilfurnace_unheatedbsmt	4A-bal	97.5	0.0	409.8	507.2	2664.5	5198.2	5760.5
SF_gasfurnace_crawlspace	5A	3.0	260.4	0.0	263.3	2326.0	2924.0	708.4
SF_gasfurnace_heatedbsmt	5A	-44.6	204.6	0.0	160.0	2326.0	2013.0	-1173.7
SF_gasfurnace_slab	5A	1.1	259.2	0.0	260.3	2326.0	2898.1	654.4
SF_gasfurnace_unheatedbsmt	5A	-0.3	255.8	0.0	255.5	2326.0	2854.7	565.7

Endnotes

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20 https://www.tax-brackets.org/newyorktaxtable

21 Draft NYStretch Energy Code-2019 dated January 2019

22 This observation is further explained in section A.3 Single-Family Prototype Packages.

23 https://aceee.org/sites/default/files/pdf/conferences/hwf/2017/Delforge_Session4B_HWF17_2.28.17.pdf

24 http://www.mnshi.umn.edu/kb/scale/hrverv.html

25 https://www.homewyse.com/costs/cost_of_heat_recovery_systems.html

26 https://efiling.energy.ca.gov/GetDocument.aspx?tn=74627&DocumentContentId=16036

27 http://ma-eeac.org/wordpress/wp-content/uploads/RES19_Task5_FinalReport_v3.0_clean.pdf

28 https://www.eia.gov/analysis/studies/buildings/equipcosts/pdf/full.pdf

29 https://neep.org/file/4475/download?token=ALT2qBvt

NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise, and support to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce reliance on fossil fuels. NYSERDA professionals work to protect the environment and create clean-energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York State since 1975.

To learn more about NYSERDA's programs and funding opportunities, visit nyserda.ny.gov or follow us on Twitter, Facebook, YouTube, or Instagram.

New York State Energy Research and Development Authority

17 Columbia Circle
Albany, NY 12203-6399

toll free: 866-NYSERDA
local: 518-862-1090
fax: 518-862-1091

info@nyserda.ny.gov
nyserda.ny.gov

State of New York
Andrew M. Cuomo, Governor

New York State Energy Research and Development Authority
Richard L. Kauffman, Chair | Alicia Barton, President and CEO

NYStretch Energy Code–2020

Adoption Guide and Model Resolution Language

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

1. Introduction

The 2020 Energy Conservation Construction Code of New York State (2020 ECCCNYS) will be the statewide minimum code for energy efficiency standards and requirements in New York State, authorized under the Energy Law of New York, and contained in Title 19, part 1240 of the New York Codes, Rules, and Regulations (cited as 19 NYCRR Part 1240). Under the New York State Energy Law, Article 11, ***local energy codes*** are permitted by law in New York State, as long as the local energy code is more stringent than the New York State energy code.[1]

NYStretch Energy Code 2020 (NYStretch) is a voluntary, above-code standard that can be adopted by a New York State municipality as a more stringent local energy code. Cost and savings analyses demonstrate that NYStretch will be 10 to 12% more efficient than the upcoming 2020 ECCCNYS. Municipalities may voluntarily adopt NYStretch to ensure all new construction and major renovation projects go above and beyond the minimum code requirements of the 2020 ECCCNYS.

This adoption guide provides an overview of the New York State law requirements, model resolution language, and New York State Department of State (NYSDOS) filing guidance to help facilitate NYStretch adoption. The guide and model resolution are provided for reference and example purposes only and do not constitute the provision of legal advice. Any questions regarding submission requirements for filing a local energy code should be directed to NYSDOS.

2. New York State Energy and Research Development Authority (NYSERDA) Support

Upon request, NYSERDA staff or Clean Energy Communities coordinators can provide support to communities or community groups interested in adopting NYStretch. This can include, but is not limited to, presentations to planning committees, elected officials or at public hearings, and assistance with preparing proposals. Contact codes@nyserda.ny.gov.

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[1] NY State Energy Conservation Construction Code Act § 11-109 (1) provides:

> *"Nothing in this article shall be construed as abrogating or impairing the power of any municipality or the secretary of state to enforce the provisions of any local building regulations or the state uniform fire prevention and building code, if such local building regulations are not inconsistent with the code. Nor shall anything in this article be construed as abrogating or impairing the power of any municipality to promulgate a local energy conservation construction code more stringent than the code, including but not limited to requirements for mandatory energy efficiency testing and rating."*

Local governments have the general power to enact building codes under NY Municipal Home Rule Law §10 and NY State Town Law §130(1).

3. Adopting NYStretch and filing with Department of State

The steps to adopt NYStretch require the same process as adopting any other local law or amendment, including adherence to the procedures detailed in Article 3 of the Municipal Home Rule Law. For detailed instructions on adopting a local law, NYSDOS provides a useful guidance document, entitled "*Adopting Local Laws in NY State,*" available at: https://www.dos.ny.gov/lg/publications/Adopting_Local_Laws_in_New_York_State.pdf

When a municipality decides to adopt NYStretch, NYDOS also requires a form and documentation be filed ***within 30 days of promulgation or adoption*** of the local energy code. The required documentation that must be submitted with the NYSDOS form "*Filing of More Stringent Local Energy Conservation Construction Code*" is as follows:

- **Exhibit A: NYStretch Energy Code 2020 (available at nyserda.ny.gov/stretchenergy2020)**
- **Exhibit B: a copy of the local energy conservation construction code promulgated or adopted by the Municipality, or any amendments or revisions to the same**
- **Exhibit C: A description of the provisions imposed by the local energy code**
- **Exhibit D: The cost-effectiveness analysis provided by NYSERDA demonstrating that the NYStretch is more stringent than the 2020 ECCCNYS**

If this NYSDOS form and documentation ***are not filed within 30 days*** of promulgation or adoption of the local code, the municipality ***will be unable*** to enforce the code until the State Fire Prevention & Building Code Council determines that the local code is more restrictive than the 2020 ECCCNYS.

4. SAMPLE DOCUMENTS

A. Model Energy Code Resolution: An example of a model resolution for a town or city to use to adopt NYStretch as a local energy code. Also available at nyserda.ny.gov/stretchenergy2020

B. NYSDOS Form: *Filing to the State Fire Prevention & Building Code Council of More Stringent Local Energy Conservation Construction Code.* A form-fillable pdf with instructions for filing the necessary document is available at https://www.dos.ny.gov/DCEA/pdf/Energy/Filing-of-a-Local-Energy-Conservation-Construction-Code-11-109.pdf

A. Sample Model Energy Code Resolution

Jurisdiction Name
City/Town, NY
[Municipal Governing Body] [Resolution Reference Number]
Resolution to Adopt Amendments to Article [# pertaining to e.g., Building Code, Building Energy Code, Energy Conservation, etc.] **[or "to Add provisions for a local energy code under Article #"] of the [Municipal] Code**

Information

Department:
[MUNICIPALITY] Attorney

Sponsors:
[Chief Executive of Municipality]

Functions:
None

Category:
Local Laws

Financial Impact

None.

Body

WHEREAS, to prevent a statewide patchwork of stricter energy codes, the New York State Energy Research and Development Authority (NYSERDA) developed the NYStretch Energy Code – 2020 (NYStretch);

WHEREAS, a stretch energy code is simply an energy code that is more stringent than the minimum base energy code that can be voluntarily adopted by local jurisdictions. NYStretch is a model stretch code that will be ten to twelve percent (10-12%) more efficient than the minimum requirements of the base energy code, the 2020 Energy Conservation Construction Code of New York State (2020 ECCCNYS);

WHEREAS, some New York State municipalities have adopted stricter energy standards to ensure reduced energy costs for its residents and businesses;

WHEREAS, under NY Energy Law § 11-109, the [Municipality] of [Name of Municipality] is authorized to adopt a local energy code more stringent that the 2020 ECCCNYS;

WHEREAS, [additional clauses entered by municipality as deemed necessary regarding introduction of NYStretch];

[next page]

WHEREAS, the [Municipal Governing Body] is considering [either "**amending provisions of Article** # [pertaining to e.g., Building Code, Building Energy Code, Energy Conservation Code, etc.]" or "**to add provisions for a local energy code under Article** #"] of the [Municipality] Code; and

WHEREAS, a public hearing was held on [DATE], at which time all persons either for or against said amendments were heard; and

WHEREAS, the [Municipal Governing Body] is declared Lead Agency for the purposes of environmental review with respect to the proposed resolution, in accordance with Article 8 of the Environmental Conservation Law of the State of New York, and the regulations promulgated thereunder at 6 NYCRR 617 (collectively, "SEQRA"); and

WHEREAS, the [Municipal Governing Body], as Lead Agency, has advised that the proposed action meets the criteria of a "Type II Action" under SEQRA; now, therefore, be it further

RESOLVED, that Local Law No. [#] of [YEAR] is hereby adopted as follows:

LOCAL LAW NO. [#] OF [YEAR]

A LOCAL LAW [either "**amending provisions of Article** # [pertaining to e.g., Building Code, Building Energy Code, Energy Conservation, etc.]" or "**adding provisions for a local energy code under Article** #"] of the [Municipality] Code;

BE IT ENACTED by the [Municipal Governing Body] of [Municipality] as follows:

[next page]

Section 1. Legislative Intent

The [Municipal Governing Body] of the [Name of Municipality] seeks to protect and promote the public health, safety, and welfare of its residents by mandating energy efficient building standards. On [DATE TBD 2020], the 2020 Energy Conservation Construction Code of New York State (2020 ECCCNYS), updated by the New York State Fire Prevention and Building Code Council, will become effective and must be complied with for residential and commercial buildings unless a more restrictive energy code is voluntarily adopted by a local jurisdiction. In 2019, the New York State Energy Research and Development Authority (NYSERDA) developed and published the NYStretch Energy Code 2020 (hereinafter referred to as NYStretch), a more energy efficient building code than the 2020 ECCCNYS. This proposed [Code Amendment] seeks to modify the [Municipality] Code to adopt NYStretch and to enact more restrictive regulations as they relate to new or substantially renovated buildings.

Section 2. Amendment

[Refer to the appropriate section in the Town or City Code where the building code, building energy code, or energy conservation code is adopted, or where the applicability of The New York State Uniform Fire Prevention and Building Code (in accordance with Article 18 of the Executive Law of the State of New York) and the Energy Conservation and Construction Code of New York State (per Article 11 of the Executive Law of the State of New York) are identified.]

[SECTION # IN MUNICIPALITY'S CODE]

Effective [DATE], the NYStretch Energy Code 2020, published by the New York State Energy Research and Development Authority (hereafter referred to as "NYStretch"), shall be applicable to all new construction and substantial renovations in the [Municipality] of [Name of Municipality].

Section 3. Authority

The proposed local law is enacted pursuant to New York Energy Law § 11-109(1), and Municipal Home Rule Law § 10 and in accordance with the procedures detailed in Municipal Home Rule § 20.

Section 4. Severability

If any section or subdivision, paragraph, clause, phrase of this law shall be adjudged invalid or held unconstitutional by any court of competent jurisdiction, any judgment made thereby shall not affect the validity of this law as a whole or any part thereof other than the part or provision so adjudged to be invalid or unconstitutional.

[next page]

Section 6. Effective Date

This local law shall take effect upon filing with the Secretary of State [i.e., within 30 days of adoption of NYStretch] pursuant to New York Energy Law § 11-109(1) and the Municipal Home Rule Law.

AND BE IT RESOLVED, that the [Municipality] Clerk is hereby directed to publish the following Notice of Adoption:

NOTICE OF ADOPTION

TAKE NOTICE that after a public hearing was held by the [Municipal Governing Body] of the [Name of Municipality] on [DATE], the [Municipal Governing Body], at its meeting on [DATE], adopted Local Law No. [#] of [YEAR] as follows: "A LOCAL LAW [either "**amending provisions of Article** # [pertaining to e.g., Building Code, Building Energy Code, Energy Conservation, etc.]" or "**adding provisions for a local energy code under Article** #"] of the [Municipality] Code."

SUMMARY OF LOCAL LAW

These code [amendments/provisions] make the [Municipality] Code consistent with revisions to the New York State Energy Conservation and Construction Code and adopt more stringent regulations as they relate to new construction or substantial renovation projects.

Copies of the proposed local law sponsored by [SPONSOR TITLE AND NAME] are on file in the [TOWN/CITY] Clerk's Office, Monday through Friday, from [BUSINESS HOURS].

BY ORDER OF THE [Municipal Governing Body]

[TOWN/CITY], NEW YORK

[NAME], [Municipality] CLERK

B. Sample NYSDOS FORM

NEW YORK STATE OF OPPORTUNITY. Building Standards and Codes

New York State
Department of State
Division of Building Standards
and Codes
One Commerce Plaza
99 Washington Avenue, Suite 1160
Albany, NY 12231-0001
Phone: (518) 474-4073
Fax: (518) 486-4487
www.dos.ny.gov

Filing to the State Fire Prevention & Building Code Council of More Stringent Local Energy Conservation Construction Code (Energy Code – Energy Law § 11-109)

INSTRUCTIONS TO FILER:
Complete this form to file a more stringent local energy conservation construction code than the State Energy Conservation Construction Code ("Energy Code") with the State Fire Prevention & Building Code Council ("Code Council") pursuant to Energy Law §11-109.

Please note that if the filing is submitted within thirty (30) days of the promulgation or adoption of the local code or amendments or revision thereof, then the Municipality may enforce such local code, amendment, or revision until and unless the Code Council determines that such local code, amendment, or revision is not more restrictive than the Energy Code. **If the filing is not submitted within such thirty (30) day time period, then the Municipality may not enforce such local code, amendment, or revision until and unless the Code Council determines that such local code, amendment, or revision is more restrictive than the Energy Code.**[1]

MUNICIPALITY INFORMATION:
This Filing relates to a local energy conservation construction code, or any amendment or revision thereof, promulgated or adopted by the following Municipality[2]: _____.

FILER INFORMATION:
This Filing is submitted by the Filer named below (the "Filer"):
☐ Filer is the Chief Executive Officer of the Municipality.
☐ The Municipality has no Chief Executive Officer. Filer is the Chairperson of the Legislative Body of the Municipality.
☐ Other (specify): _____
Name of Filer: _____
Title of Filer: ☐ Mayor ☐ Supervisor ☐ Chairperson of Legislative Body
☐ Other (specify) _____
Address: _____

Telephone Number: (____) ____-____ Fax Number: (____) ____-____ Email Address: _____

[1] *See* Energy Law §11-109(2).
[2] A "municipality" is a county, city, town, village, school district, or district corporation. *See* Energy Law §11-102(12).

1

DOS-2094-f (Rev.11/17) Page 1 of 2

LOCAL ENERGY CONSERVATION CONSTRUCTION CODE INFORMATION:
This Filing relates to the Municipality's local energy conservation construction code, or any amendments or revisions thereof, entitled: _____.

☐ A true and complete copy of the local energy conservation construction code, or any amendments or revisions thereof, is included herewith and labeled **Exhibit A**.

Date of promulgation or adoption of the Municipality's local energy conservation construction code, or any amendments or revisions thereof: _____.

ADDITIONAL DOCUMENTATION:
List here any additional documentation. The Department of State strongly recommends that the Municipality provide a detailed description of (1) the local energy conservation construction code promulgated or adopted by the Municipality, or any amendments or revisions thereof; (2) the corresponding provisions imposed by the Energy Code; and (3) the reasons why the Municipality believes the provisions of the local energy conservation construction code promulgated or adopted by the Municipality, or any amendments or revisions thereof, are higher or more restrictive than the Energy Code. However, do not fail to file a copy of the local energy conservation construction code, or any amendment or revision thereof, within thirty (30) days after promulgation or adoption of such local energy code, or any amendment or revision thereof.[3]

Exhibit B _____ (document name)
Exhibit C _____ (document name)
Exhibit D _____ (document name)

Dated: _____

_____
Signature of Filer

_____
Print or Type Name and Title of Filer

Please submit this Filing form, all exhibits, and any additional documentation to:

Gerard Hathaway, R.A.
Assistant Director for Code Development
NYS Department of State, Division of Building Standards and Codes
99 Washington Ave., Suite 1160
Albany, New York 12231

Or by email to: **Dos.sm.codes.codedevelopment@dos.ny.gov**.
When submitting petitions via email, type "***Local Energy Code:***" in the subject line followed by the name of the Municipality and the Local Law # or Ordinance #. (*Example*: ***Local Energy Code: Town of Anywhere, Local Law #6 of 2017***). **Electronic submissions are strongly encouraged.**

If you have questions concerning submission requirements, please call the Code Development Unit at (518) 486-6990, e-mail at **Gerard.Hathaway@dos.ny.gov** or fax at (518) 486-4487.

[3] Please consult with the Municipality's attorney when submitting a Filing more than thirty (30) days after promulgation or adoption of the local energy conservation construction code, or any amendment or revision thereof.

2

DOS-2094-f (Rev.11/17) Page 2 of 2

New York State Energy Research and Development Authority

17 Columbia Circle
Albany, NY 12203-6399

toll free: 866-NYSERDA
local: 518-862-1090
fax: 518-862-1091

info@nyserda.ny.gov
nyserda.ny.gov

CODE-adoption-bk-1-v1 9/19

Poughkeepsie Journal
PART OF THE USA TODAY NETWORK

Classified Ad Receipt
(For Info Only - NOT A BILL)

Customer: CITY OF BEACON

Address: 1 MUNICIPAL PLZ
BEACON NY 12508
USA

Ad No.: 0004118025
Pymt Method Invoice
Net Amt: $35.13
Run Times: 1
Run Dates: 03/19/20

Text of Ad:

CITY OF BEACON
CITY COUNCIL
NOTICE OF PUBLIC HEARING

PLEASE TAKE NOTICE that the Beacon City Council hereby schedules a public hearing for Monday, April 20, 2020 at 7:00 p.m. at City Hall, One Municipal Plaza, Beacon, New York 12508 to discuss a proposed Local Law to Create Chapter 106, Article 4 of the Code of the City of Beacon Regarding NY Stretch Code.

All interested persons and citizens shall have an opportunity to be heard on said proposals at the date, time and place aforesaid.

Amanda C. Caputo, Deputy City Clerk
Dated: March 17, 2020 4118025

City of Beacon Council Agenda
4/20/2020

Title:

Public Hearing to Discuss a Proposed Local Law to Amend Chapter 223, Section 41.18.E(7) of the Code of the City of Beacon Regarding Building Height in the Central Main Street District

Subject:

Background:

ATTACHMENTS:

Description	Type
Proposed Local Law to Amend Chapter 223 Section 41.18.E(7) of the Code of the City of Beacon Regarding Building Height in the CMS	Local Law
Memorandum from the City of Beacon Planning Board Regarding Building Height in the CMS District	Cover Memo/Letter
Proposed Local Law Referral to Dutchess County Planning and Development	Cover Memo/Letter
Memorandum from Dutchess County Planning and Development Regarding Building Height in the CMS District_April 2020	Cover Memo/Letter
Public Hearing Notice Confirmation Poughkeepsie Journal	Backup Material

DRAFT LOCAL LAW NO. ____ OF 2020

CITY COUNCIL
CITY OF BEACON

PROPOSED LOCAL LAW TO AMEND
CHAPTER 223, SECTION 41.18.E(7) OF THE CODE OF THE CITY OF BEACON

A LOCAL LAW to amend Chapter 223, Section 41.18.E(7) of the Code of the City of Beacon concerning building height special permits in the CMS District.

BE IT ENACTED by the City Council of the City of Beacon as follows:

Section 1. Chapter 223, Article IVD, Central Main Street (CMS) District, Section 41.18, Subsection E(7) of the Code of the City of Beacon is hereby amended as follows:

§ 223-41.18 Regulations.

....

E. Dimensional regulations. All new construction or enlargement of existing structures in the CMS District shall be subject to the following minimum and maximum dimensional regulations. These may be modified as provided in Subsection J(15).

....

(7) Except for parcels facing East Main Street, a special permit may be granted by the Planning Board for a fourth story only if the proposed fourth story contains ~~with~~ a stepback of at least 15 feet behind the facade along any street frontage. A fifteen-foot building stepback above 38 feet shall also be required for any side of a four-story building within 40 feet of a lot line abutting another zoning district. Except for parcels facing East Main Street, a special permit may also be granted for a four-story tower without a stepback at a corner facing an intersection and occupying no more than 25 feet of the corner frontage of the building. The City Council may waive or reduce the stepback requirements set forth herein upon a finding by the City Council that (i) such a waiver is warranted due to the special conditions of a site or the particular character or limited nature of the proposed development, and (ii) such a

waiver is consistent with the goals of promoting the public health, safety and general welfare of the community.

(a) For proposed buildings on CMS parcels in ~~or abutting~~ the Historic District and Landmark Overlay Zone, abutting an HDLO parcel, or having a property line frontage directly across a street from an HDLO parcel, any fourth story or corner tower shall require a special permit by the City Council. The City Council may limit the length of any such fourth floor or reduce a permitted building height to be no more than six feet higher than an existing building on an adjoining HDLO parcel for a distance of 30 feet along the frontage from the historic structure.

(b) All such building height special permits in the CMS District shall require a finding that there are no substantial detrimental effects on shadows, parking, traffic, or specific views adopted as important by the City Council or in the Comprehensive Plan Update, that the new building will be compatible with the historic character of adjacent buildings, and that the conditions and standards in § 223-18B(1)(a) through (d) have been met. The City Council or Planning Board shall have the right to require an applicant provide alternative plans or renderings in sufficient detail as requested.

(c) ~~Although not required,~~ All such building height special permits shall also require a specific public benefit as determined by the City Council or Planning Board, such as additional below-market-rate housing above what would be otherwise mandated in Article IVB, commercial uses included on an upper floor, additional parking spaces available for general public use, green building or renewable energy features beyond what is required by code, or ~~extra sidewalk width,~~ the construction and/or maintenance of public plaza space~~,~~ or green space ~~that is accessible to the public may be a positive factor for consideration during the special permit review process~~.

Section 2. Ratification, Readoption and Confirmation

Except as specifically modified by the amendments contained herein, Chapter 223, Section 41.18 of the City of Beacon are otherwise to remain in full force and effect and is otherwise ratified, readopted and confirmed.

Section 3. Numbering for Codification

It is the intention of the City of Beacon and it is hereby enacted that the provisions of this Local Law shall be included in the Code of the City of Beacon; that the sections and subsections of this Local Law may be re-numbered or re-lettered by the Codifier to accomplish such intention; that the Codifier shall make no substantive changes to this Local Law; that the word "Local Law" shall be changed to "Chapter," "Section" or other appropriate word as required for codification; and that any such rearranging of the

numbering and editing shall not affect the validity of this Local Law or the provisions of the Code affected thereby.

Section 4. Severability

The provisions of this Local Law are separable and if any provision, clause, sentence, subsection, word or part thereof is held illegal, invalid or unconstitutional, or inapplicable to any person or circumstance, such illegality, invalidity or unconstitutionality, or inapplicability shall not affect or impair any of the remaining provisions, clauses, sentences, subsections, words or parts of this Local Law or their petition to other persons or circumstances. It is hereby declared to be the legislative intent that this Local law would have been adopted if such illegal, invalid or unconstitutional provision, clause, sentence, subsection, word or part had not been included therein, and if such person or circumstance to which the Local Law or part hereof is held inapplicable had been specifically exempt there from.

Section 5. Effective Date

This local law shall take effect immediately upon filing with the Office of the Secretary of State.

Memorandum

Planning Board

TO: Mayor Randy Casale and City Council Members

FROM: Planning Board Chairman Gunn and Planning Board Members

RE: Local Law Amending the Chapter 223, Section 41.18E(7) concerning Building Height Special Permits

DATE: December 12, 2019

As requested, the Planning Board reviewed the Local Law Amending the Chapter 223, Section 41.18E(7) concerning Building Height Special Permits at their December 10th meeting. The City Planner reviewed proposed the changes, and explained a special permit can be granted for the addition of a fourth story, but the fourth story must include a fifteen-foot stepback. It was discussed that the local law proposes that there will be no opportunity to seek a variance from the Zoning Board of Appeals for the fifteen-foot stepback requirement. Members understood the law does not allow an applicant to seek a variance to reduce or eliminate the stepback. Although they agreed with the stepback requirement, they had concern that there is no mechanism for the smallest exception in the case of a unique circumstance. After a lengthy discussion, members supported the proposed amendment and suggested the City Council consider adding a provision that would reserve unto the Council the authority to grant a waiver from the stepback requirement, in whole or in part, under certain proscribed circumstances.

If you have any questions, please feel free to contact me.

Dutchess County Department of Planning and Development

Fax Info: To Jen Cocozza | Date 3/17/20 | # pgs 3 | Dept Planning & Dev. | From Collin Milone | Fax # | Phone # 845 838 5010

239 Planning/Zoning Referral – Exemption Communities

Please fill in this section

Municipality: City of Beacon

Referring Agency: ☐ Planning Board ☐ Zoning Board of Appeals ☒ Municipal Board

Tax Parcel Number(s):

Project Name: Proposed Local Law to Amend Chapter 223, Section 41.18E(7) of the Code of the City of Beacon Regarding Building Height in the Central Main Street zone

Applicant:

Address of Property:

Parcel(s) within 500 feet of:

- ☐ State Road _____
- ☐ County Road _____
- ☐ State Property (w/public building or recreation area)
- ☐ County Property (w/public building or recreation area)
- ☐ Municipal Boundary
- ☐ Farm operation in an Agricultural District

Actions Requiring 239 Review

- ☐ Comprehensive/Master Plans
- ☐ Zoning Amendments (standards, uses, definitions, district regulations, etc.)
- ☐ Rezonings involving all map changes
- ☒ Other Local Laws associated with zoning (wetlands, historic preservation, affordable housing, architectural review, etc.)
- ☐ Site Plans (all)
- ☐ Special Permits for all non-residential uses
- ☐ Use Variances for all non-residential uses
- ☐ Area Variances for all non-residential uses

Exempt Actions:* 239 Review is NOT Required

- Administrative Amendments (fees, procedures, penalties, etc.)
- Special Permits for residential uses (accessory apts, home occupations, etc.)
- Use Variances for residential uses
- Area Variances for residential uses
- Renewals/Extension of Site Plans or Special Permits that have no changes from previous approvals
- Subdivisions / Lot Line Adjustments
- Interpretations

☐ Exempt Action submitted for informal review

Date Response Requested (if less than 30 days): April 16, 2020

If subject of a previous referral, please note County referral number(s):

** These actions are only exempt in municipalities that signed an intermunicipal agreement with Dutchess County to that effect.*

FOR COUNTY OFFICE USE ONLY

Response from Dutchess County Department of Planning and Development

No Comments:

- ☐ Matter of Local Concern
- ☐ No Jurisdiction
- ☐ No Authority
- ☐ Project Withdrawn
- ☐ Exempt from 239 Review

Comments Attached:

- ☐ Local Concern with Comments
- ☐ Conditional
- ☐ Denial
- ☐ Incomplete — *municipality must resubmit to County*
- ☐ Incomplete with Comments — *municipality must resubmit to County*
- ☐ Informal Comments Only (Action Exempt from 239 Review)

Date Submitted:	Notes:	☐ Major Project
Date Received:		
Date Requested:		Referral #:
Date Required:	☐ Also mailed hard copy	
Date Response Faxed:		Reviewer: _____

Dutchess County Department of Planning and Development

Fax Info: To Jen Cocozza | Date 3/17/20 # pgs 3 | Dept Planning & Dev. | From Collin Milone | Fax # | Phone # 845 838 5010

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Address of Property:

Parcel(s) within 500 feet of:

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- ☐ County Road _____
- ☐ State Property (w/public building or recreation area)
- ☐ County Property (w/public building or recreation area)
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- ☐ Farm operation in an Agricultural District

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- ☐ Use Variances for all non-residential uses
- ☐ Area Variances for all non-residential uses

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- Special Permits for residential uses (accessory apts, home occupations, etc.)
- Use Variances for residential uses
- Area Variances for residential uses
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- Subdivisions / Lot Line Adjustments
- Interpretations

☐ Exempt Action submitted for informal review

Date Response Requested (if less than 30 days): ~~April~~ 16, 2020

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FOR COUNTY OFFICE USE ONLY

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- ☐ Incomplete — *municipality must resubmit to County*
- ☐ Incomplete with Comments — *municipality must resubmit to County*
- ☐ Informal Comments Only (Action Exempt from 239 Review)

Date Submitted: 3/17	Notes:	☐ Major Project	
Date Received: 3/17		Referral #: ZR20-097	
Date Requested: 4/16			
Date Required: 4/16	☐ Also mailed hard copy	Reviewer: Jennifer Morgan	
Date Response ~~Faxed~~ emailed 4/14			

Poughkeepsie Journal
PART OF THE USA TODAY NETWORK

Classified Ad Receipt
(For Info Only - NOT A BILL)

Customer: CITY OF BEACON

Address: 1 MUNICIPAL PLZ
BEACON NY 12508
USA

Ad No.: 0004118065
Pymt Method Invoice
Net Amt: $35.53
Run Times: 1
Run Dates: 03/19/20

Text of Ad:

CITY OF BEACON
CITY COUNCIL
NOTICE OF PUBLIC HEARING

PLEASE TAKE NOTICE that the Beacon City Council hereby schedules a public hearing for Monday, April 20, 2020 at 7:00 p.m. at City Hall, One Municipal Plaza, Beacon, New York 12508 to discuss a Proposed Local Law to Amend Chapter 223, Section 41.18.E(7) of the Code of the City of Beacon Regarding Building Height.

All interested persons and citizens shall have an opportunity to be heard on said proposals at the date, time and place aforesaid.

Amanda C. Caputo, Deputy City Clerk
Dated: March 17, 2020
4118065

City of Beacon Council Agenda
4/20/2020

Title:

Public Hearing to Discuss a Local Law to Amend Chapter 223, Section 61.3 of the Code of the City of Beacon Regarding Noticing Public Hearings

Subject:

Background:

ATTACHMENTS:

Description	Type
Proposed Local Law to Amend Chapter 223 Section 61.3 of the Code of the City of Beacon Regarding Noticing Public Hearings	Local Law
Memorandum from the City of Beacon Planning Board Regarding Noticing Public Hearings	Cover Memo/Letter
New York State Comparison Chart: Mailing Requirements for Public Hearing Notices	Backup Material
Public Hearing Notice Confirmation Poughkeepsie Journal	Backup Material

DRAFT LOCAL LAW NO. ____ OF 2020

CITY COUNCIL
CITY OF BEACON

PROPOSED LOCAL LAW TO AMEND
CHAPTER 223, SECTION 61.3 OF THE CODE OF THE CITY OF BEACON

A LOCAL LAW to amend Chapter 223, Section 61.3 of the Code of the City of Beacon concerning the requirements for public notices.

BE IT ENACTED by the City Council of the City of Beacon as follows:

Section 1. Chapter 223, Section 61.3 of the Code of the City of Beacon entitled "Public notice signs" is hereby amended as follows:

§ 223-61.3 Hearing notice requirements.

Prior to any public hearing required for applications for approval of a site development plan, special permit, subdivision, or any public hearing before the Board of Appeals, the applicant shall comply with the following notice requirements at its sole cost and expense:

A. The City shall submit a notice of public hearing to the official City newspaper and one additional local newspaper for publication at least five days before such hearing. The applicant shall reimburse the City for the cost of such publications.

B. Notice of hearing shall be sent by the applicant, by certified mail (return receipts not required) to all property owners within a distance of 250 feet of any boundary of the subject property for all single-, two- and three-family properties and to all property owners within a distance of 500 feet of any boundary of the subject property for all multifamily, non-residentially zoned and nonresidential uses. Notice shall be provided to properties owners on both sides of the street on which the subject property fronts, to the adjoining property owner or owners to the rear of the property affected, and to all non-owner occupants of the property affected at least 10 days before the hearing. For purposes of notice, a property shall be deemed to have non-owner occupants when the

primary owner mailing address on file with the City of Beacon Tax Assessor is different than the property address. In such case, a notice shall be mailed to the property addressed to the occupant, and if a multifamily dwelling, then to all individual dwelling units on the property. Prior to the public hearing, the applicant shall submit to the secretary of the applicable board a signed affidavit of mailing setting forth details of the mailing, including date of mailing, names and addresses to whom the mailing was sent, and a copy of the notice of hearing~~, and the certified mail receipts~~.

C. Public notice signs.

(1) The applicant shall post one notification sign on the subject property, or in the case of a corner lot post a notification sign on all abutting streets, no later than 14 days prior to the initial public hearing and any continued public hearing thereafter. The applicant shall update said sign at least 14 days prior to every public hearing at which the applicant's matter will be heard. For matters before the City Council, the applicant shall post the required sign(s) no later than 10 days prior to the public hearing and shall update said sign at least 10 prior to every public hearing before the City Council in which the applicant's matter will be heard. The Building Inspector may require, in his or her discretion, the applicant to post an additional public notice sign, based on topography of the surrounding land, parcel size and shape, or any other factors the Building Inspector, in his or her discretion, feels may impact effective public notice.

(2) Such sign shall be at least two feet by three feet in size, consist of sturdy and serviceable material containing a white background with black letters and be placed in a location visible from the most commonly traveled street or highway upon which the property fronts, or in the case of a corner lot on all streets, but in no case more than 20 feet back from the front lot line. Such sign shall read as follows, in legible lettering with the heading at least five inches in height and the content at least two inches in height:

PUBLIC NOTICE A PUBLIC HEARING FOR A [application type] APPLICATION WILL BE HELD BY THE CITY OF BEACON [City Council, Planning Board, or Zoning Board of Appeals] ON [insert date] AT [insert time] P.M. AT THE CITY OF BEACON CITY HALL, 1 MUNICIPAL PLAZA, BEACON, NY ADDITIONAL INFORMATION IS AVAILABLE AT THE BEACON BUILDING DEPARTMENT (845) 838-5020

(3) In the event that the applicant shall appear before more than one board, the sign shall be appropriately revised to reflect the time and place of each board's meeting. At least two working days before the public hearing, the applicant shall also submit to the secretary of the applicable board a signed affidavit certifying to the fact and date of said posting.

(4) The applicant shall, in good faith, maintain the public notice sign in good condition throughout the posting period.

(5) The applicant shall remove the notification sign within five days of the adoption of any resolution concerning the application.

Section 2. Ratification, Readoption and Confirmation

Except as specifically modified by the amendments contained herein, Chapter 223 Section 61.3 of the City of Beacon are otherwise to remain in full force and effect and is otherwise ratified, readopted and confirmed.

Section 3. Numbering for Codification

It is the intention of the City of Beacon and it is hereby enacted that the provisions of this Local Law shall be included in the Code of the City of Beacon; that the sections and subsections of this Local Law may be re-numbered or re-lettered by the Codifier to accomplish such intention; that the Codifier shall make no substantive changes to this Local Law; that the word "Local Law" shall be changed to "Chapter," "Section" or other appropriate word as required for codification; and that any such rearranging of the numbering and editing shall not affect the validity of this Local Law or the provisions of the Code affected thereby.

Section 4. Severability

The provisions of this Local Law are separable and if any provision, clause, sentence, subsection, word or part thereof is held illegal, invalid or unconstitutional, or inapplicable to any person or circumstance, such illegality, invalidity or unconstitutionality, or inapplicability shall not affect or impair any of the remaining provisions, clauses, sentences, subsections, words or parts of this Local Law or their petition to other persons or circumstances. It is hereby declared to be the legislative intent that this Local law would have been adopted if such illegal, invalid or unconstitutional provision, clause, sentence, subsection, word or part had not been included therein, and if such person or circumstance to which the Local Law or part hereof is held inapplicable had been specifically exempt there from.

Section 5. Effective Date

This local law shall take effect immediately upon filing with the Office of the Secretary of State.

TO: Mayor Lee Kyriacou and City Council Members

FROM: Etha Grogan for Planning Board Chairman Gunn and Planning Board Members

RE: City Council request to review Proposed Local Law regarding Noticing of Public Hearings

DATE: April 15, 2020

At the April 14, 2020 Planning Board meeting, members reviewed proposed amendments to Chapter 223, Section 61.3 regarding Noticing of Public Hearings as requested. A comprehensive review and discussion about the proposed amendments took place with City Attorney Jennifer Gray.

Members discussed adding language to the local law to authorize the approval authority to waive or modify certain public notice requirements if warranted by the circumstances. For example, the approval authority should have discretion to modify the public hearing requirements not otherwise required by State law in the event an applicant misses the deadline for posting a public notice sign by a day or two. Otherwise, this de minimus variation would require the public hearing to be delayed for a month until the next Planning Board meeting. Members also questioned why the deadline for sign posting would be different for each board, as proposed in the local law. The current deadline for posting public notice signage is 14 days prior to the public hearing. That is also the submission deadline for applications before the Planning Board. Practically speaking, this means that on that date the Applicants are submitting their materials to the Building Department, the Building Department is preparing signs for pick up by the Applicant, and the Applicant is posting the signs all on the same day. If the Applicant is unable to post the sign that day the public hearing cannot open two weeks later. For these reasons, the Planning Board discussed making the sign posting deadline consistent with the proposed deadline for applications before the City Council – 10 days prior to the public hearing. Lastly, the Planning Board was curious about the Council's intent to increase the notification radius for certain types of applications. The Board recommended clarification of the language because as drafted it could be construed to mean the notice radius is based on the classification of the recipient of the notice, not the classification of the application for the subject property.

The Planning Board's discussion resulted in the following recommendations:

1. The deadline for public notice sign posting should be changed to 10 days for applications for all boards.
2. Add the following waiver provision: "Modifications to notification requirements. The approval authority may modify or waive the notification requirements as described herein unless required elsewhere by county or state law."
3. Clarify language in Section 223-61.3(B) to make clear that the classification of the application for the subject property determines the public notice radius – not the classification of the recipient.

After careful consideration of the purpose of proposed amendments, members recommended the aforementioned items should be considered when the matter is addressed by the City Council. Should you have any questions or require additional information, please feel free to contact me.

New York State
Comparison Chart
Mailing Requirements for Public Hearing Notices

Municipality	**Notice Radius**	**Required Mailing Options**
City of Beacon	**250** feet	Certified Mail, Return Receipts required
City of Newburgh	**500** feet (Site Plan and Variance applications) **300** feet (Subdivision and Special Permit applications)	Regular Mail
City of Middletown	**300** feet, or such other distance as deemed advisable	Mailed by postal card or other means
City of Amsterdam	**200** feet, or such additional distance as the Planning Commission or ZBA may deem advisable	Regular Mail
City of Poughkeepsie	**200** feet	Certified Mail
City of Yonkers	**200** feet	Registered or Certified Mail
City of New Rochelle	**250** feet	Certified mail, return receipt requested
City of Peekskill	**250** feet	Certified or registered mail, return receipt requested
City of Mount Vernon	At a minimum, the applicant shall notify all property owners within **250** feet of any boundary of the property which is the subject of an application for all single-, two- and three-family properties and must notify any property owners within **500** feet of any boundary of the property which is the subject of an application for all multifamily, non-residentially zoned and nonresidential uses.	Registered or certified mail, return, receipt requested.

Village of Mamaroneck	**200** feet (Subdivision and site plan applications) **400** feet (except fences and boat storage public hearings are **200** feet)(Variance applications only)	Personally or by certified mail, return receipt requested Regular mail
Town of Pound Ridge	**500** feet (Site Plan and special permit applications, no mailing required for variance applications) **1,000** feet (Subdivision applications)	Certified Mail, return receipt requested Certified Mail
Town of North Castle	**250** feet	First Class Mail
Town of North Salem	**500** feet (Subdivisions and Site Plan applications) **200** feet (Special Permit and Variance applications)	Certified or Registered Mail for subdivision and site plan applications Certified mail return receipt requested for special permit and variance applications
Town of Fishkill	**500** feet	First class mail
Town of East Fishkill	**500** feet, except in the case of dimensional variance, in which case the notice shall be mailed to owners of property within **250** feet.	First class and certified mail, return receipt requested

Poughkeepsie Journal
PART OF THE USA TODAY NETWORK

Classified Ad Receipt
(For Info Only - NOT A BILL)

Customer: CITY OF BEACON

Address: 1 MUNICIPAL PLZ
BEACON NY 12508
USA

Ad No.: 0004118046
Pymt Method Invoice
Net Amt: $34.32
Run Times: 1
Run Dates: 03/19/20

Text of Ad:

CITY OF BEACON
CITY COUNCIL
NOTICE OF PUBLIC HEARING

PLEASE TAKE NOTICE that the Beacon City Council hereby schedules a public hearing for Monday, April 20, 2020 at 7:00 p.m. at City Hall, One Municipal Plaza, Beacon, New York 12508 to discuss noticing public hearings.

All interested persons and citizens shall have an opportunity to be heard on said proposals at the date, time and place aforesaid.

Amanda C. Caputo, Deputy City Clerk
Dated: March 17, 2020
4118046

City of Beacon Council Agenda
4/20/2020

Title:

Public Hearing to Discuss a Proposed Local Law to Amend Chapter 211, Article II, Section 10 and 12 and Article III, Section 15 of the Code of the City of Beacon Regarding Vehicles and Transportation

Subject:

Background:

ATTACHMENTS:

Description	Type
Proposed Local Law to Amend Chapter 211, Article II, Section 10 and 12 and Article III, Section 15 of the Code of the City of Beacon	Local Law
Memorandum from the City Administrator Regarding Parking and Traffic Safety	Cover Memo/Letter
Public Hearing Notice Confirmation Poughkeepsie Journal	Backup Material

CITY COUNCIL
CITY OF BEACON

LOCAL LAW TO AMEND CHAPTER 211, ARTICLE II, SECTIONS 10 AND 12, AND ARTICLE III, SECTION 15 OF THE CODE OF THE CITY OF BEACON

A LOCAL LAW to amend Chapter 211, Article II, Sections 10 and 12, and Article III Section 15 of the Code of the City of Beacon concerning installation of stop signs, trucks over certain weights excluded and no parking zones.

BE IT ENACTED by the City Council of the City of Beacon as follows:

Section 1. Chapter 211, Article II, Section 10, Subsection B of the Code of the City of Beacon is hereby amended to install stop signs as follows:

§ 211-10. Stop intersections.

…

B. Schedule VII: Stop intersections. In accordance with the provisions of Subsection **A**, described intersections are hereby designated as stop intersections, and stop signs shall be installed as follows:

Stop Sign on	Direction of Travel	At intersection of
Pearse Place	Northwest	Phillips Street
Phillips Street	Both	Schofield Place
Roundtree Court	Northeast	Liberty Street
Roundtree Court	Northeast	Roundtree Court
Roundtree Court	Northwest	Roundtree Court
Schofield Place	Northwest	Phillips Street

Section 2. Chapter 211, Article II, Section 12, Subsection B of the Code of the City of Beacon is hereby amended as follows:

§ 211-12. Trucks over certain weights excluded.

…

B. Schedule IX: Trucks Over Certain Weights Excluded. In accordance with the provision of Subsection **A**, all commercial vehicles, including but not limited to trucks, tractors and tractor trailer combinations, are hereby excluded from the following streets or parts of streets, except for the pickup and delivery of materials on such streets:

Name of Street	Location
~~Wolcott Avenue~~	~~Entire length~~

Section 3. Chapter 211, Article III, Section 15, Subsection B of the Code of the City of Beacon is hereby amended to restrict parking as follows:

§ 211-15. Parking, stopping and standing prohibited at all times.

…

B. Schedule X: Parking, Stopping and Standing Prohibited at All Times. In accordance with the provisions of Subsection A, no person shall park, stop or stand at any time upon any of the following described streets or parts of streets:

Name of Street	Side	Location
Roundtree Court	Northwest	From the easternmost point of the north parking lot to a point 110 feet east.

Section 4. Ratification, Readoption and Confirmation

Except as specifically modified by the amendments contained herein, Chapter 211, Article II, Sections 10 and 12, and Article III, Section 15 of the Code of the City of Beacon are otherwise to remain in full force and effect and are otherwise ratified, readopted and confirmed.

Section 5. Numbering for Codification

It is the intention of the City of Beacon and it is hereby enacted that the provisions of this Local Law shall be included in the Code of the City of Beacon; that the sections and subsections of this Local Law may be re-numbered or re-lettered by the Codifier to accomplish such intention; that the Codifier shall make no substantive changes to this Local Law; that the word " Local Law" shall be changed to " Chapter," " Section" or other appropriate word as required for codification; and that any such rearranging of the numbering and editing shall not affect the validity of this Local Law or the provisions of the Code affected thereby.

Section 6. Severability.

If any clause, sentence, paragraph, subdivision, section, or part of this chapter or the application thereof to any person, individual, corporation, firm, partnership, entity, or circumstance shall be adjudged by any court of competent jurisdiction to be invalid or unconstitutional, such order or judgment shall not affect, impair, or invalidate the remainder thereof, but shall be confined in its operation to the clause, sentence, paragraph, subdivision, section, or part of this chapter, or in its application to the person, individual, corporation, firm, partnership, entity, or circumstance directly involved in the controversy in which such order or judgment shall be rendered.

Section 7. Effective date.

This chapter shall take effect immediately upon filing with the Office of the Secretary of State of the State of New York.

CITY OF BEACON
New York

TRAFFIC SAFETY COMMITTEE 845-838-5010

MEMORANDUM

TO: **Mayor Kyriacou and Members of the City Council**

FROM: **Anthony Ruggiero, MPA, City Administrator**

RE: **Proposed Changes to the City Code Chapter 211, Vehicles and Traffic**

DATE: **April 20, 2020**

The Parking and Traffic and Safety Committee (the "Committee") reviewed a number of traffic and safety related issues and make the following recommendations to the City Council.

1. Codify an existing stop sign on the northeast comer of Rende Place and Phillips Street on Rende Place.
2. Codify an existing stop sign on the northeast comer of Pearse Place and Phillips Street on Pearse Place.
3. Codify an existing stop sign on the northeast comer of Schofield Place and Phillips Street on Schofield Place.
4. Codify existing stop signs on the northwest and southeast comers of Phillips Street at Schofield Place.
5. Codify an existing stop sign on the southeast comer of Roundtree Court and Liberty Street on Roundtree Court.
6. Roundtree Court intersects with itself. There are two existing stop signs at this intersection of Roundtree Court and Roundtree Court. Please see the map attached. The Parking and Traffic Safety Committee recommends to codify them both.
7. Members of the Metra Homeowners Association requested multiple No Parking Zones on Roundtree Court. After reviewing the parking situation on Roundtree Court, the Committee recommends to create a No Parking Zone on Roundtree Court on the northwest side of the street from the eastern most point of the north parking lot to a point 110 feet east. Doing so would eliminate about five parking spaces. Roundtree Court has

ample parking thanks to existing on-street parking and two parking lots. Please see the map attached.

8. Remove Wolcott Avenue from City Code Section 211-12 B. Doing so would allow trucks to drive on Wolcott Avenue.

Poughkeepsie Journal
PART OF THE USA TODAY NETWORK

Classified Ad Receipt
(For Info Only - NOT A BILL)

Customer: CITY OF BEACON

Address: 1 MUNICIPAL PLZ
BEACON NY 12508
USA

Ad No.: 0004118013
Pymt Method Invoice
Net Amt: $35.94
Run Times: 1
Run Dates: 03/19/20

Text of Ad:

CITY OF BEACON
CITY COUNCIL
NOTICE OF PUBLIC HEARING

PLEASE TAKE NOTICE that the Beacon City Council hereby schedules a public hearing for Monday, April 20, 2020 at 7:00 p.m. at City Hall, One Municipal Plaza, Beacon, New York 12508 to discuss a proposed Local Law to Amend Chapter 211 Article II Section 10 and 12 and Article III Section 15 of the Code of the City of Beacon Regarding Parking and Traffic.

All interested persons and citizens shall have an opportunity to be heard on said proposals at the date, time and place aforesaid.

Amanda C. Caputo, Deputy City Clerk
Dated: March 17, 2020
4118013

City of Beacon Council Agenda
4/20/2020

Title:

Resolution Adopting the New York Stretch Energy Code 2020

Subject:

Background:

ATTACHMENTS:

Description	Type
Resolution Adopting New York State Stretch Energy Code 2020	Resolution

CITY OF BEACON CITY COUNCIL

RESOLUTION NO.___OF 2020

ADOPTING THE NEW YORK STRETCH ENERGY CODE – 2020

WHEREAS, to prevent a statewide patchwork of stricter energy codes, the New York State Energy Research and Development Authority (NYSERDA) developed the NYStretch Energy Code – 2020 (NYStretch);

WHEREAS, a stretch energy code is simply an energy code that is more stringent than the minimum base energy code that can be voluntarily adopted by local jurisdictions. NYStretch is a model stretch code that will be ten to twelve percent (10-12%) more efficient than the minimum requirements of the base energy code, the 2020 Energy Conservation Construction Code of New York State (2020 ECCCNYS);

WHEREAS, some New York State municipalities have adopted stricter energy standards to ensure reduced energy costs for its residents and businesses;

WHEREAS, under NY Energy Law §11-109, the City Council of the City of Beacon is authorized to adopt a local energy code more stringent that the 2020 ECCCNYS;

WHEREAS, the City Council of the City of Beacon finds that the City of Beacon will benefit from adoption of the NY Stretch Energy Code - 2020, which requires greater efficiency, where greater energy efficiency will be required in the future; and

WHEREAS, the City Council of the City of Beacon wishes to amend Chapter 106, Energy Conservation, to add Article IV to the City of Beacon City Code; and

WHEREAS, a public hearing was held on April 20, 2020, at which time all persons interested were provided an opportunity to be heard; and

WHEREAS, the City Council of the City of Beacon is declared Lead Agency for the purposes of environmental review with respect to the proposed resolution, in accordance with Article 8 of the Environmental Conservation Law of the State of New York, and the regulations promulgated thereunder at 6 NYCRR 617 (collectively, "SEQRA"); and

WHEREAS, the City Council of the City of Beacon, as Lead Agency, has advised that the proposed action meets the criteria of a "Type II Action" under SEQRA.

NOW THEREFORE BE IT RESOLVED, that the City Council of the City of Beacon hereby approves and adopts Local Law No. __ of 2020 adopting the NYStretch Energy Code - 2020.

City of Beacon Council Agenda
4/20/2020

Title:

Resolution Setting a Public Hearing to Discuss a Proposed Local Law to Create Section 223-26.5 and Amend Section 223-63 of the Code of the City of Beacon Regarding Short Term Rentals for May 18, 2020

Subject:

Background:

ATTACHMENTS:

Description	Type
Resolution Setting a Public Hearing to Discuss a Proposed Local Law to Create Section 223-26.5 and Amend Section 223-63 of the Code of the City of Beacon Regarding Short Term Rentals for May 18, 2020	Resolution
Proposed Local Law to Create Section 223-26.5 and Amend Section 223-63 of the Code of the City of Beacon	Local Law
Full Environmental Assessment Form Part 1	EAF
Full Environmental Assessment Form Part 2	EAF
Full Environmental Assessment Form Part 3	EAF

CITY OF BEACON
CITY COUNCIL

Resolution No. _____ of 2020

RESOLUTION TO SET A PUBLIC HEARING AND REFER A LOCAL LAW CONCERNING SHORT-TERM RENTALS TO THE CITY OF BEACON PLANNING BOARD AND DUTCHESS COUNTY PLANNING BOARD

WHEREAS, a Local Law to create Section 223-26.5 and amend Section 223-63 of the Code of the City of Beacon concerning Short-Term Rentals has been introduced; and

WHEREAS, the Local Law regulates short-term rentals in the City of Beacon to protect the health, safety and welfare of the City and its residents.

NOW, THEREFORE BE IT RESOLVED, that the City Council of the City of Beacon hereby refers the Local Law to the City of Beacon Planning Board and Dutchess County Planning Board for report and recommendation.

BE IT FURTHER RESOLVED, City Council of the City of Beacon hereby sets a public hearing to receive comment on the proposed Local Law concerning Short-Term Rentals for May 18, 2020.

Resolution No.___of 2020			**Date:__April 20, 2020**				
☐ **Amendments**						☐ **2/3 Required**	
☐ **Not on roll call.**			☐ **On roll call**			☐ **3/4 Required**	
Motion	Second	Council Member	Yes	No	Abstain	Reason	Absent
		Terry Nelson					
		Jodi McCredo					
		George Mansfield					
		Amber Grant					
		Air Rhodes					
		Dan Aymar-Blair					
		Mayor Lee Kyriacou					
		Motion Carried					

Draft: 4/16/20

DRAFT LOCAL LAW NO. ____ OF 2020

CITY COUNCIL
CITY OF BEACON

PROPOSED LOCAL LAW TO CREATE SECTION 223-26.5 AND AMEND SECTION 223-63 OF THE CODE OF THE CITY OF BEACON

A LOCAL LAW to create Section 223-26.5 and amend Section 223-63 of the Code of the City of Beacon concerning Short-Term Rentals.

BE IT ENACTED by the City Council of the City of Beacon as follows:

SECTION 1. Chapter 223, Article III, Section 26.5 entitled "Short-Term Rentals," of the Code of the City of Beacon is hereby created as follows.

§ 223-26.5 Short-Term Rentals

A. Findings. The City Council of the City of Beacon has determined it is in the best interest of the City and its residents to regulate short-term rentals. The City Council recognizes the benefits of short-term rentals to allow home-owners to supplement their income to defray the cost of housing and to provide lodging for visitors to the City. However, in order to protect the health, safety and welfare of the City and its residents, it is necessary to restrict the rental of homes for terms shorter than 30 consecutive days, a practice which is growing in popularity with the advent of internet and social media-based programs that connect property owners and persons seeking short-term rentals. In addition, studies have shown that short-term rentals are linked to increases in rent and housing costs because rental units are taken off the market and used as short-term rentals. Units are going to short-term renters rather than to permanent residents which results in a decrease in available housing stock within the City of Beacon. The City Council believes that the restrictions and requirements imposed herein further those objectives and the protection of the health, safety and welfare of the City and its residents.

B. Definitions. As used in this section, the following words shall have the meanings indicated:

OWNER

An individual or group of individuals who are in possession of and have a fee interest in real property. The term "owner" shall include a corporation, limited-liability company, partnership, association, trustee, or other business entity.

OWNER-OCCUPIED

A one-family or two-family house used by the owner or tenant as his or her or their domicile or principal residence. All owners of the business entity must use the premise as his or her or their domicile or principal residence. When a property is titled in the name of a trustee, the owner-occupied requirement shall be satisfied if the grantor or grantee is the occupant of the property.

SHORT-TERM RENTAL

An entire dwelling unit, or a room or group of rooms or other living or sleeping space, made available to rent, lease or otherwise assigned for a tenancy of less than 30 consecutive days. The term "short-term rental" does not include multifamily dwelling buildings, dormitories, hotel or motel rooms, bed and breakfast inns or lodging houses, as permitted and regulated by the City of Beacon Zoning Ordinance.

C. Permit required. It shall be unlawful to use, establish, maintain, operate, occupy, rent or lease any property as a short-term rental without first having obtained a short-term rental permit.

D. Only one-family homes, two-family homes or accessory apartment units may be used as short-term rentals subject to the requirements set forth in this section. Short-term rentals shall be permitted in all zoning districts within the City of Beacon.

E. Permit application.

(1) An application for a short-term rental permit shall be filed before the dwelling unit, or a room or group of rooms or other living or sleeping space within a dwelling unit, or any other space is advertised for short-term rental, and if the spaces are not advertised, then such permit shall be obtained before said space is leased or rented.

(2) Issuance of a short-term rental permit requires submission of an application to the Building Department and payment of the processing fee set forth in the City fee schedule.

(3) If a tenant seeks a short-term rental permit, the tenant's application shall be signed by the landlord.

(4) The form and content of the permit applications shall be as determined from time to time by the Building Department and shall contain such information and materials as the Building Department deems necessary to determine the sufficiency of the application. Such application shall contain, at a minimum:

(i) Proof of receipt of New York State STAR Credit or STAR property tax exemption for the short-term rental property; and

(ii) Copy of utility bill in owner's name.

(iii) (a) The property address; (b) the total number of dwelling units located within the building; (c) the total number of bedrooms and bathrooms inside the building; (d) the total number of dwelling units and individual bedrooms proposed for short-term rental use; (e) the location of each such dwelling unit or individual bedroom within the building; and (f) the number of persons to be accommodated in each short-term rental area; and

(iv) A signed and notarized certification in a form acceptable to the City Clerk by each property owner attesting to the fact that (a) the owner resides at the property and it is the owner's domicile (primary residence); (b) that the property is fit for human habitation and safe; (c) that the property owner will comply with all of the conditions and restrictions of the permit; (d) that no portion of the area used for short-term rentals will utilize a cellar or attic, or any portion thereof, as habitable space unless it meets the requirements of the International Fire, Residential and Building Codes or successor law; (e) that the property is in compliance with all the provisions of this Article, the applicable provisions of the City Code, the International Series of Codes and the New York State Code Supplement; and (f) the required building permits and certificates of occupancy are in place for all existing structures on the property if applicable; and

(v) Such other information as the City may require to prove the property is owner-occupied and safe for renters.

(vi) If a property owner or tenant plans to rent the entire dwelling unit, the short-term rental application shall include the name and contact information of an agent with the right to enter and maintain possession of the dwelling. Such agent must be available twenty-four (24) hours a day to respond to tenant and neighborhood concerns and be capable of responding within two hours of notification from the City; and

(5) All permits issued pursuant to this section shall be for a period of two years and shall be renewable for subsequent two-year terms upon application, conformance with this section and payment of the permit fee.

(6) If the status of the information changes during the course of any calendar year, it is the responsibility of the owner to submit such changes to the Building Department in writing within 30 days of the occurrence of such change. Failure to do so shall be deemed a violation of this section.

F. Inspection. The property shall be inspected by the Building Department at the time of the initial application and prior to any permit renewal, to determine whether the property remains in compliance with the section and all other applicable provisions of the City Code, the International Series of Codes and New York State Code Supplement. If the Building Inspector determines that the short-term rental space is not in compliance, the owner shall cease use of the dwelling unit as a short-term rental until all noncomplying elements have been corrected and the owner shall apply for reinspection with the Building Department, subject to an additional fee.

G. Owner-occupancy. It shall be unlawful to use, establish, maintain operate, occupy, rent or lease any property as a short-term rental if the property is not owner-occupied. The property used as a short-term rental shall be the principal residence of the owner, tenant, grantor or grantee at all times during the term of the permit.

H. All short term rentals shall comply with the following standards:

(1) If a property owner or tenant is renting out the entire dwelling unit, the property owner must engage the services of an agent with the right to enter and maintain possession of the dwelling. This agent must be available twenty-four (24) hours a day to respond to tenant and neighborhood concerns and be capable of responding within two hours of notification from the City.

(2) No owner shall offer or use any part of the property as a short-term rental not approved for residential use, including but not limited to, vehicles parked on the property, a storage shed, recreation room, trailer, garage, or any temporary structure such as a tent.

(3) A short-term rental property shall not be rented for any commercial purpose, or any other purpose not expressly permitted under this section, such as concerts or weddings.

(4) Short-term rental of an entire dwelling units is limited to 100 days in any one calendar year. A rental day shall be deemed to mean any day that the property is occupied for rental overnight.

(5) If a property owner advertises their rental, the short-term rental permit number must be included in the listing.

(6) All guests are subject to the provisions of Code of the City of Beacon. The property owner or tenant is responsible for informing each guest of these provisions.

I. Presumptive Evidence. The presence or existence of the following shall create a rebuttable presumption that a property is being utilized as a short-term rental:

(1) The property is offered for lease or rent on a short-term rental website, including but not limited to Airbnb, HomeAway, VRBO and similar websites; or

(2) The property is offered for lease or rent by the use of any other advertising mechanism for a period of less than 30 days.

J. A list of all short-term rental units located in the City of Beacon shall be maintained on the City's website and a hard copy shall be available for review in the City Building Department. Such list shall be updated every six months.

K. Revocation of a permit.

(1) The grounds upon which a permit can be revoked shall include but shall not be limited to:

(i) The permit was issued in error, or issued in whole or in part as a result of a false, untrue, or misleading statement on the permit application or other document submitted for filing, including but not limited to the schematic or certification; or

(ii) A short-term rental permit has been issued and the owner fails to continue to occupy the premises on a continuous basis as his or her primary residence; or

(iii) Use of the property as a short-term rental creates a hazard or public nuisance or other condition which negatively impacts the use and/or enjoyment of surrounding properties, or threatens the peace and good order, or quality of life in the surrounding community.

(iv) Failure to comply or violating the conditions of the permit.

(2) Any permit issued pursuant to this section may be revoked or suspended by the Building Inspector, after written notice to the owner. Written notice shall be served by registered or certified mail, return receipt requested, and by regular mail, to the applicant at the address shown on the application. The notice shall describe the reasons why the City is revoking the permit.

L. Appeals

(1) Upon the denial, suspension or revocation of a permit, the applicant may, within 10 business days after receiving written notice, file a request, for a hearing before the Zoning Board of Appeals. Such request shall be filed with the Zoning Board of Appeals Secretary. Notice of the date, place and time of the hearing shall be given in writing by mail to the applicant at the address shown on the application. In the event that demand for a hearing is not made within the prescribed time or in the event that the applicant does not timely appear for the hearing, the Building Inspector's decision shall be final and conclusive.

(2) The hearing shall commence no later than 30 days after the date on which the request was filed.

(3) The applicant shall be given an opportunity to present evidence why such denial of application, or such suspension or revocation of the permit, shall be modified or withdrawn. The Building Inspector or his or her designated agent may also present evidence. Upon consideration of the evidence presented, the Zoning Board of Appeals shall sustain, modify or reverse the decision of the Building Inspector or his or her designated agent.

(4) In the event the applicant is not satisfied with the decision of the Zoning Board of Appeals, such aggrieved party may file an Article 78 proceeding under the New York Civil Practice Law and Rules. The Article 78 proceeding must be filed within 30 days of the filing of the Hearing Officer's decision with the City Clerk of the City of Beacon and service of the same upon the applicant.

M. Violations. A violation of any provision of this chapter is an offense, punishable as provided for in **§ 1-3, General penalty**. When a person has received written notice from the Building Inspector or has been served with a summons and complaint in an action to enjoin continuance of any violation, each day in excess of 10 days thereafter that he shall continue to be guilty of such violation shall constitute an additional, separate and distinct offense.

SECTION 2. The following definitions listed in Chapter 223, Article VI, Section 63 entitled "Definitions," of the Code of the City of Beacon are hereby amended as follows.

DWELLING

A detached building designed or used exclusively as living quarters for one or more families. The term shall not be deemed to include "automobile court," motel," "boarding- or rooming house," "house trailer~~,~~" ~~"tourist home"~~ or "tent."

HOME OCCUPATION

An accessory use of a character customarily conducted entirely within a dwelling by the residents thereof using only customary home and home-scale equipment, including but not limited to typewriters, computers, fax machines, small-scale photocopiers, scanners, small-scale printers, file cabinets, drafting equipment and postage meters, which use is clearly incidental and secondary to the use of the residence for dwelling purposes, does not change the character thereof, does not have any exterior evidence of such secondary use other than a small nameplate not over one square foot in area, and does not involve the keeping of stock-in-trade. Home offices and artist studios meeting the criteria above shall be considered home occupations. However, the conducting of a tattoo and/or body piercing parlor, clinic, hospital, barbershop, beauty parlor, photographer's salon, tearoom, ~~tourist home~~ short-term rental, real estate office, animal hospital, dancing instruction, band instrument instruction in groups, convalescent home, funeral home, stores of any kind or any similar use shall not be deemed to be a home occupation. Any instruction of a musical instrument shall be limited to one pupil at a time. Home occupations are regulated in accordance with § **223-17.1** of this chapter.

HOTEL

A building, or portion thereof, containing rooms occupied primarily by transient guests, who are lodged with or without meals, and in which there may be provided such services as are accessory and incidental to the use thereof as a temporary residence, such as dining, recreational facilities, public rooms and meeting rooms, and gift shops. The term "hotel" shall not include bed-and-breakfast establishment, boardinghouse, rooming house, ~~tourist home~~ short-term rental or single-room-occupancy building for the purposes of this chapter.

SHORT-TERM RENTAL

An entire dwelling unit, or a room or group of rooms or other living or sleeping space, made available to rent, lease or otherwise assigned for a tenancy of less than 30 consecutive days. The term "short-term rental" does not include multifamily dwelling buildings, dormitories, hotel or motel rooms, bed and breakfast inns or lodging houses, as permitted and regulated by the City of Beacon Zoning Ordinance.

~~**TOURIST HOME**~~

~~A dwelling, except a hotel, boardinghouse or rooming house, as defined elsewhere in this chapter, in which overnight accommodations are provided or offered for transient guests.~~

SECTION 3. Chapter 223 Attachment 1 Code of the City of Beacon, entitled "Section 223-17, City of Beacon Schedule of Use Regulations for Residential Districts" shall be amended to add the following Permitted Accessory Use:

13. Short-Term Rentals on single-family properties, as provided in § 223-26.5.

SECTION 4. Ratification, Readoption and Confirmation

Except as specifically modified by the amendments contained herein, Chapter 223 of the City of Beacon Code is otherwise to remain in full force and effect and is otherwise ratified, readopted and confirmed.

SECTION 5. Severability

The provisions of this Local Law are separable and if any provision, clause, sentence, subsection, word or part thereof is held illegal, invalid or unconstitutional, or inapplicable to any person or circumstance, such illegality, invalidity or unconstitutionality, or inapplicability shall not affect or impair any of the remaining provisions, clauses, sentences, subsections, words or parts of this Local Law or their petition to other persons or circumstances. It is hereby declared to be the legislative intent that this Local law would have been adopted if such illegal, invalid or unconstitutional provision, clause, sentence, subsection, word or part had not been included therein, and if such person or circumstance to which the Local Law or part hereof is held inapplicable had been specifically exempt there from.

SECTION 6. Effective Date

This local law shall take effect immediately upon filing with the Office of the Secretary of State. Any short-term rental, as defined herein, in existence prior to adoption of this local law shall have 45 days to file an application to obtain a short-term rental permit. Any short-term rental existing prior to the effective date that (a) does not meet the definition of short-term rental or (b) is a short-term rental, as defined, and does not file an application within 45 days of the effective date is deemed to be in violation of this local law and subject to enforcement.

Instructions for Completing Part 1

Part 1 is to be completed by the applicant or project sponsor. Responses become part of the application for approval or funding, are subject to public review, and may be subject to further verification.

Complete Part 1 based on information currently available. If additional research or investigation would be needed to fully respond to any item, please answer as thoroughly as possible based on current information; indicate whether missing information does not exist, or is not reasonably available to the sponsor; and, when possible, generally describe work or studies which would be necessary to update or fully develop that information.

Applicants/sponsors must complete all items in Sections A & B. In Sections C, D & E, most items contain an initial question that must be answered either "Yes" or "No". If the answer to the initial question is "Yes", complete the sub-questions that follow. If the answer to the initial question is "No", proceed to the next question. Section F allows the project sponsor to identify and attach any additional information. Section G requires the name and signature of the applicant or project sponsor to verify that the information contained in Part 1is accurate and complete.

A. Project and Applicant/Sponsor Information.

Name of Action or Project: Proposed Local Law Regulating Short-Term Rentals		
Project Location (describe, and attach a general location map): City of Beacon		
Brief Description of Proposed Action (include purpose or need): The City has prepared a proposed local law to create Chapter 223, Article III, Section 26.5 entitled "Short-Term Rentals." The City Council of the City of Beacon has determined it is in the best interest of the City and its residents to regulate short-term rentals. A short-term rental is an entire dwelling unit, or a room or group of rooms or other living or sleeping space, made available to rent, lease or otherwise assigned for a tenancy of less than 30 consecutive days. The term "short-term rental" does not include multifamily dwelling buildings, dormitories, hotel or motel rooms, bed and breakfast inns or lodging houses, as permitted and regulated by the City of Beacon Zoning Ordinance. Property owners and tenants, including corporations, limited-liability companies, partnerships, associations, trustees or other business entities must obtain a short-term rental permit from the City of Beacon to operate a short-term rental. The practice of renting a home or a room for less than 30 days is growing in popularity with the advent of internet and social-media based programs. The City Council believes that the restrictions and requirements imposed by the local law will protect the City's housing stock and protect the health, safety and welfare of the City and its residents.		
Name of Applicant/Sponsor: City of Beacon	Telephone: 845-838-5000 E-Mail: Mayor@cityofbeacon.org	
Address: 1 Municicipal Plaza		
City/PO: Beacon	State: NY	Zip Code: 12509
Project Contact (if not same as sponsor; give name and title/role):	Telephone: E-Mail:	
Address:		
City/PO:	State:	Zip Code:
Property Owner (if not same as sponsor):	Telephone: E-Mail:	
Address:		
City/PO:	State:	Zip Code:

B. Government Approvals

B. Government Approvals, Funding, or Sponsorship. ("Funding" includes grants, loans, tax relief, and any other forms of financial assistance.)

Government Entity	If Yes: Identify Agency and Approval(s) Required	Application Date (Actual or projected)
a. City Counsel, Town Board, or Village Board of Trustees ☑Yes ☐No	City Council- Legislative approval of local law.	Public Hearing on June 1
b. City, Town or Village Planning Board or Commission ☐Yes ☐No		
c. City, Town or Village Zoning Board of Appeals ☐Yes ☐No		
d. Other local agencies ☐Yes ☐No		
e. County agencies ☐Yes ☐No		
f. Regional agencies ☐Yes ☐No		
g. State agencies ☐Yes ☐No		
h. Federal agencies ☐Yes ☐No		

i. Coastal Resources.

i. Is the project site within a Coastal Area, or the waterfront area of a Designated Inland Waterway? ☐Yes ☑No

ii. Is the project site located in a community with an approved Local Waterfront Revitalization Program? ☑Yes ☐No

iii. Is the project site within a Coastal Erosion Hazard Area? ☐Yes ☑No

C. Planning and Zoning

C.1. Planning and zoning actions.

Will administrative or legislative adoption, or amendment of a plan, local law, ordinance, rule or regulation be the only approval(s) which must be granted to enable the proposed action to proceed? ☑Yes ☐No

- **If Yes,** complete sections C, F and G.
- **If No,** proceed to question C.2 and complete all remaining sections and questions in Part 1

C.2. Adopted land use plans.

a. Do any municipally- adopted (city, town, village or county) comprehensive land use plan(s) include the site where the proposed action would be located? ☑Yes ☐No

If Yes, does the comprehensive plan include specific recommendations for the site where the proposed action would be located? ☐Yes ☑No

b. Is the site of the proposed action within any local or regional special planning district (for example: Greenway; Brownfield Opportunity Area (BOA); designated State or Federal heritage area; watershed management plan; or other?) ☐Yes ☑No

If Yes, identify the plan(s):

_____

_____

_____

c. Is the proposed action located wholly or partially within an area listed in an adopted municipal open space plan, or an adopted municipal farmland protection plan? ☐Yes ☑No

If Yes, identify the plan(s):

_____

_____

_____

C.3. Zoning

a. Is the site of the proposed action located in a municipality with an adopted zoning law or ordinance. ☑ Yes ☐ No
If Yes, what is the zoning classification(s) including any applicable overlay district?
The law permits short-term rentals in one-family homes, two-family homes or accessory apartment units in all zoning districts within the City of Beacon.

b. Is the use permitted or allowed by a special or conditional use permit? ☐ Yes ☑ No

c. Is a zoning change requested as part of the proposed action? ☐ Yes ☑ No
If Yes,
i. What is the proposed new zoning for the site? _____

C.4. Existing community services.

a. In what school district is the project site located? Beacon City School District

b. What police or other public protection forces serve the project site?
Beacon Police Department

c. Which fire protection and emergency medical services serve the project site?
Dutchess County Emergency Response Unit, Mase Hook and Ladder, BEacon Engine Station 1, and Lewis Tompkins Hose Station 2

d. What parks serve the project site?
The proposed local-law permits short-term rentals in every Zoning District within the City of Beacon. The City maintains six parks that may possibly be used by short-term rental properties.

D. Project Details

D.1. Proposed and Potential Development

a. What is the general nature of the proposed action (e.g., residential, industrial, commercial, recreational; if mixed, include all components)?
_____

b. a. Total acreage of the site of the proposed action? _____ acres
b. Total acreage to be physically disturbed? _____ acres
c. Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor? _____ acres

c. Is the proposed action an expansion of an existing project or use? ☐ Yes ☐ No
i. If Yes, what is the approximate percentage of the proposed expansion and identify the units (e.g., acres, miles, housing units, square feet)? % _____ Units: _____

d. Is the proposed action a subdivision, or does it include a subdivision? ☐ Yes ☐ No
If Yes,
i. Purpose or type of subdivision? (e.g., residential, industrial, commercial; if mixed, specify types)
_____
ii. Is a cluster/conservation layout proposed? ☐ Yes ☐ No
iii. Number of lots proposed? _____
iv. Minimum and maximum proposed lot sizes? Minimum _____ Maximum _____

e. Will the proposed action be constructed in multiple phases? ☐ Yes ☐ No
i. If No, anticipated period of construction: _____ months
ii. If Yes:
- Total number of phases anticipated _____
- Anticipated commencement date of phase 1 (including demolition) _____ month _____ year
- Anticipated completion date of final phase _____ month _____year
- Generally describe connections or relationships among phases, including any contingencies where progress of one phase may determine timing or duration of future phases: _____

f. Does the project include new residential uses? ☐Yes ☐No

If Yes, show numbers of units proposed.

	One Family	Two Family	Three Family	Multiple Family (four or more)
Initial Phase	_____	_____	_____	_____
At completion of all phases	_____	_____	_____	_____

g. Does the proposed action include new non-residential construction (including expansions)? ☐Yes ☐No

If Yes,

i. Total number of structures _____

ii. Dimensions (in feet) of largest proposed structure: _____height; _____width; and _____ length

iii. Approximate extent of building space to be heated or cooled: _____ square feet

h. Does the proposed action include construction or other activities that will result in the impoundment of any liquids, such as creation of a water supply, reservoir, pond, lake, waste lagoon or other storage? ☐Yes ☐No

If Yes,

i. Purpose of the impoundment: _____

ii. If a water impoundment, the principal source of the water: ☐ Ground water ☐ Surface water streams ☐Other specify:

_____

iii. If other than water, identify the type of impounded/contained liquids and their source.

_____

iv. Approximate size of the proposed impoundment. Volume: _____ million gallons; surface area: _____ acres

v. Dimensions of the proposed dam or impounding structure: _____ height; _____ length

vi. Construction method/materials for the proposed dam or impounding structure (e.g., earth fill, rock, wood, concrete):

_____

D.2. Project Operations

a. Does the proposed action include any excavation, mining, or dredging, during construction, operations, or both? (Not including general site preparation, grading or installation of utilities or foundations where all excavated materials will remain onsite) ☐Yes ☐No

If Yes:

i .What is the purpose of the excavation or dredging? _____

ii. How much material (including rock, earth, sediments, etc.) is proposed to be removed from the site?

- Volume (specify tons or cubic yards): _____
- Over what duration of time? _____

iii. Describe nature and characteristics of materials to be excavated or dredged, and plans to use, manage or dispose of them.

_____

_____

iv. Will there be onsite dewatering or processing of excavated materials? ☐Yes ☐No

If yes, describe. _____

_____

v. What is the total area to be dredged or excavated? _____acres

vi. What is the maximum area to be worked at any one time? _____ acres

vii. What would be the maximum depth of excavation or dredging? _____ feet

viii. Will the excavation require blasting? ☐Yes ☐No

ix. Summarize site reclamation goals and plan: _____

_____

_____

b. Would the proposed action cause or result in alteration of, increase or decrease in size of, or encroachment into any existing wetland, waterbody, shoreline, beach or adjacent area? ☐Yes ☐No

If Yes:

i. Identify the wetland or waterbody which would be affected (by name, water index number, wetland map number or geographic description): _____

_____

ii. Describe how the proposed action would affect that waterbody or wetland, e.g. excavation, fill, placement of structures, or alteration of channels, banks and shorelines. Indicate extent of activities, alterations and additions in square feet or acres:

_____

_____

_____

_____

iii. Will the proposed action cause or result in disturbance to bottom sediments? ☐Yes ☐No

If Yes, describe: _____

iv. Will the proposed action cause or result in the destruction or removal of aquatic vegetation? ☐Yes ☐No

If Yes:

- acres of aquatic vegetation proposed to be removed: _____
- expected acreage of aquatic vegetation remaining after project completion: _____
- purpose of proposed removal (e.g. beach clearing, invasive species control, boat access): _____

_____

- proposed method of plant removal: _____
- if chemical/herbicide treatment will be used, specify product(s): _____

v. Describe any proposed reclamation/mitigation following disturbance: _____

_____

c. Will the proposed action use, or create a new demand for water? ☐Yes ☐No

If Yes:

i. Total anticipated water usage/demand per day: _____ gallons/day

ii. Will the proposed action obtain water from an existing public water supply? ☐Yes ☐No

If Yes:

- Name of district or service area: _____
- Does the existing public water supply have capacity to serve the proposal? ☐Yes ☐No
- Is the project site in the existing district? ☐Yes ☐No
- Is expansion of the district needed? ☐Yes ☐No
- Do existing lines serve the project site? ☐Yes ☐No

iii. Will line extension within an existing district be necessary to supply the project? ☐Yes ☐No

If Yes:

- Describe extensions or capacity expansions proposed to serve this project: _____

_____

- Source(s) of supply for the district: _____

iv. Is a new water supply district or service area proposed to be formed to serve the project site? ☐Yes ☐No

If, Yes:

- Applicant/sponsor for new district: _____
- Date application submitted or anticipated: _____
- Proposed source(s) of supply for new district: _____

v. If a public water supply will not be used, describe plans to provide water supply for the project: _____

_____

vi. If water supply will be from wells (public or private), what is the maximum pumping capacity: _____ gallons/minute.

d. Will the proposed action generate liquid wastes? ☐Yes ☐No

If Yes:

i. Total anticipated liquid waste generation per day: _____ gallons/day

ii. Nature of liquid wastes to be generated (e.g., sanitary wastewater, industrial; if combination, describe all components and approximate volumes or proportions of each): _____

_____

_____

iii. Will the proposed action use any existing public wastewater treatment facilities? ☐Yes ☐No

If Yes:

- Name of wastewater treatment plant to be used: _____
- Name of district: _____
- Does the existing wastewater treatment plant have capacity to serve the project? ☐Yes ☐No
- Is the project site in the existing district? ☐Yes ☐No
- Is expansion of the district needed? ☐Yes ☐No

- Do existing sewer lines serve the project site? ☐Yes ☐No
- Will a line extension within an existing district be necessary to serve the project? ☐Yes ☐No

If Yes:

- Describe extensions or capacity expansions proposed to serve this project: _____

_____

_____

iv. Will a new wastewater (sewage) treatment district be formed to serve the project site? ☐Yes ☐No

If Yes:

- Applicant/sponsor for new district: _____
- Date application submitted or anticipated: _____
- What is the receiving water for the wastewater discharge? _____

v. If public facilities will not be used, describe plans to provide wastewater treatment for the project, including specifying proposed receiving water (name and classification if surface discharge or describe subsurface disposal plans):

_____

_____

vi. Describe any plans or designs to capture, recycle or reuse liquid waste: _____

_____

_____

e. Will the proposed action disturb more than one acre and create stormwater runoff, either from new point sources (i.e. ditches, pipes, swales, curbs, gutters or other concentrated flows of stormwater) or non-point source (i.e. sheet flow) during construction or post construction? ☐Yes ☐No

If Yes:

i. How much impervious surface will the project create in relation to total size of project parcel?

_____ Square feet or _____ acres (impervious surface)

_____ Square feet or _____ acres (parcel size)

ii. Describe types of new point sources. _____

_____

iii. Where will the stormwater runoff be directed (i.e. on-site stormwater management facility/structures, adjacent properties, groundwater, on-site surface water or off-site surface waters)?

_____

_____

- If to surface waters, identify receiving water bodies or wetlands: _____

_____

_____

- Will stormwater runoff flow to adjacent properties? ☐Yes ☐No

iv. Does the proposed plan minimize impervious surfaces, use pervious materials or collect and re-use stormwater? ☐Yes ☐No

f. Does the proposed action include, or will it use on-site, one or more sources of air emissions, including fuel combustion, waste incineration, or other processes or operations? ☐Yes ☐No

If Yes, identify:

i. Mobile sources during project operations (e.g., heavy equipment, fleet or delivery vehicles)

_____

ii. Stationary sources during construction (e.g., power generation, structural heating, batch plant, crushers)

_____

iii. Stationary sources during operations (e.g., process emissions, large boilers, electric generation)

_____

g. Will any air emission sources named in D.2.f (above), require a NY State Air Registration, Air Facility Permit, or Federal Clean Air Act Title IV or Title V Permit? ☐Yes ☐No

If Yes:

i. Is the project site located in an Air quality non-attainment area? (Area routinely or periodically fails to meet ambient air quality standards for all or some parts of the year) ☐Yes ☐No

ii. In addition to emissions as calculated in the application, the project will generate:

- _____Tons/year (short tons) of Carbon Dioxide (CO_2)
- _____Tons/year (short tons) of Nitrous Oxide (N_2O)
- _____Tons/year (short tons) of Perfluorocarbons (PFCs)
- _____Tons/year (short tons) of Sulfur Hexafluoride (SF_6)
- _____Tons/year (short tons) of Carbon Dioxide equivalent of Hydroflourocarbons (HFCs)
- _____Tons/year (short tons) of Hazardous Air Pollutants (HAPs)

h. Will the proposed action generate or emit methane (including, but not limited to, sewage treatment plants, landfills, composting facilities)? ☐Yes ☐No

If Yes:

i. Estimate methane generation in tons/year (metric): _____

ii. Describe any methane capture, control or elimination measures included in project design (e.g., combustion to generate heat or electricity, flaring): _____

_____

i. Will the proposed action result in the release of air pollutants from open-air operations or processes, such as quarry or landfill operations? ☐Yes ☐No

If Yes: Describe operations and nature of emissions (e.g., diesel exhaust, rock particulates/dust):

_____

_____

j. Will the proposed action result in a substantial increase in traffic above present levels or generate substantial new demand for transportation facilities or services? ☐Yes ☐No

If Yes:

i. When is the peak traffic expected (Check all that apply): ☐ Morning ☐ Evening ☐Weekend ☐ Randomly between hours of _____ to _____.

ii. For commercial activities only, projected number of truck trips/day and type (e.g., semi trailers and dump trucks): _____

_____

iii. Parking spaces: Existing _____ Proposed _____ Net increase/decrease _____

iv. Does the proposed action include any shared use parking? ☐Yes ☐No

v. If the proposed action includes any modification of existing roads, creation of new roads or change in existing access, describe:

_____

vi. Are public/private transportation service(s) or facilities available within ½ mile of the proposed site? ☐Yes ☐No

vii Will the proposed action include access to public transportation or accommodations for use of hybrid, electric or other alternative fueled vehicles? ☐Yes ☐No

viii. Will the proposed action include plans for pedestrian or bicycle accommodations for connections to existing pedestrian or bicycle routes? ☐Yes ☐No

k. Will the proposed action (for commercial or industrial projects only) generate new or additional demand for energy? ☐Yes ☐No

If Yes:

i. Estimate annual electricity demand during operation of the proposed action: _____

_____

ii. Anticipated sources/suppliers of electricity for the project (e.g., on-site combustion, on-site renewable, via grid/local utility, or other):

_____

iii. Will the proposed action require a new, or an upgrade, to an existing substation? ☐Yes ☐No

l. Hours of operation. Answer all items which apply.

i. During Construction:

- Monday - Friday: _____
- Saturday: _____
- Sunday: _____
- Holidays: _____

ii. During Operations:

- Monday - Friday: _____
- Saturday: _____
- Sunday: _____
- Holidays: _____

m. Will the proposed action produce noise that will exceed existing ambient noise levels during construction, operation, or both? ☐ Yes ☐ No

If yes:

i. Provide details including sources, time of day and duration:

_____

_____

ii. Will the proposed action remove existing natural barriers that could act as a noise barrier or screen? ☐ Yes ☐ No

Describe: _____

_____

n. Will the proposed action have outdoor lighting? ☐ Yes ☐ No

If yes:

i. Describe source(s), location(s), height of fixture(s), direction/aim, and proximity to nearest occupied structures:

_____

_____

ii. Will proposed action remove existing natural barriers that could act as a light barrier or screen? ☐ Yes ☐ No

Describe: _____

_____

o. Does the proposed action have the potential to produce odors for more than one hour per day? ☐ Yes ☐ No

If Yes, describe possible sources, potential frequency and duration of odor emissions, and proximity to nearest occupied structures: _____

_____

_____

p. Will the proposed action include any bulk storage of petroleum (combined capacity of over 1,100 gallons) or chemical products 185 gallons in above ground storage or any amount in underground storage? ☐ Yes ☐ No

If Yes:

i. Product(s) to be stored _____

ii. Volume(s) _____ per unit time _____ (e.g., month, year)

iii. Generally, describe the proposed storage facilities:_____

_____

q. Will the proposed action (commercial, industrial and recreational projects only) use pesticides (i.e., herbicides, insecticides) during construction or operation? ☐ Yes ☐ No

If Yes:

i. Describe proposed treatment(s):

_____

_____

_____

_____

ii. Will the proposed action use Integrated Pest Management Practices? ☐ Yes ☐ No

r. Will the proposed action (commercial or industrial projects only) involve or require the management or disposal of solid waste (excluding hazardous materials)? ☐ Yes ☐ No

If Yes:

i. Describe any solid waste(s) to be generated during construction or operation of the facility:

- Construction: _____ tons per _____ (unit of time)
- Operation : _____ tons per _____ (unit of time)

ii. Describe any proposals for on-site minimization, recycling or reuse of materials to avoid disposal as solid waste:

- Construction: _____

  _____
- Operation: _____

  _____

iii. Proposed disposal methods/facilities for solid waste generated on-site:

- Construction: _____

  _____
- Operation: _____

  _____

s. Does the proposed action include construction or modification of a solid waste management facility? ☐ Yes ☐ No

If Yes:

i. Type of management or handling of waste proposed for the site (e.g., recycling or transfer station, composting, landfill, or other disposal activities): _____

ii. Anticipated rate of disposal/processing:

- _____ Tons/month, if transfer or other non-combustion/thermal treatment, or
- _____ Tons/hour, if combustion or thermal treatment

iii. If landfill, anticipated site life: _____ years

t. Will the proposed action at the site involve the commercial generation, treatment, storage, or disposal of hazardous waste? ☐ Yes ☐ No

If Yes:

i. Name(s) of all hazardous wastes or constituents to be generated, handled or managed at facility: _____

_____

_____

ii. Generally describe processes or activities involving hazardous wastes or constituents: _____

_____

_____

iii. Specify amount to be handled or generated _____ tons/month

iv. Describe any proposals for on-site minimization, recycling or reuse of hazardous constituents: _____

_____

_____

v. Will any hazardous wastes be disposed at an existing offsite hazardous waste facility? ☐ Yes ☐ No

If Yes: provide name and location of facility: _____

_____

If No: describe proposed management of any hazardous wastes which will not be sent to a hazardous waste facility:

_____

_____

E. Site and Setting of Proposed Action

E.1. Land uses on and surrounding the project site

a. Existing land uses.

i. Check all uses that occur on, adjoining and near the project site.

☐ Urban ☐ Industrial ☐ Commercial ☐ Residential (suburban) ☐ Rural (non-farm)
☐ Forest ☐ Agriculture ☐ Aquatic ☐ Other (specify): _____

ii. If mix of uses, generally describe:

_____

_____

b. Land uses and covertypes on the project site.

Land use or Covertype	Current Acreage	Acreage After Project Completion	Change (Acres +/-)
• Roads, buildings, and other paved or impervious surfaces			
• Forested			
• Meadows, grasslands or brushlands (non-agricultural, including abandoned agricultural)			
• Agricultural (includes active orchards, field, greenhouse etc.)			
• Surface water features (lakes, ponds, streams, rivers, etc.)			
• Wetlands (freshwater or tidal)			
• Non-vegetated (bare rock, earth or fill)			
• Other Describe: _____ _____			

c. Is the project site presently used by members of the community for public recreation? ☐Yes ☐No

i. If Yes: explain: _____

d. Are there any facilities serving children, the elderly, people with disabilities (e.g., schools, hospitals, licensed day care centers, or group homes) within 1500 feet of the project site? ☐Yes ☐No

If Yes,

i. Identify Facilities:

_____

_____

e. Does the project site contain an existing dam? ☐Yes ☐No

If Yes:

i. Dimensions of the dam and impoundment:

- Dam height: _____ feet
- Dam length: _____ feet
- Surface area: _____ acres
- Volume impounded: _____ gallons OR acre-feet

ii. Dam's existing hazard classification: _____

iii. Provide date and summarize results of last inspection:

_____

_____

f. Has the project site ever been used as a municipal, commercial or industrial solid waste management facility, or does the project site adjoin property which is now, or was at one time, used as a solid waste management facility? ☐Yes ☐No

If Yes:

i. Has the facility been formally closed? ☐Yes ☐ No

- If yes, cite sources/documentation: _____

ii. Describe the location of the project site relative to the boundaries of the solid waste management facility:

_____

_____

iii. Describe any development constraints due to the prior solid waste activities: _____

_____

g. Have hazardous wastes been generated, treated and/or disposed of at the site, or does the project site adjoin property which is now or was at one time used to commercially treat, store and/or dispose of hazardous waste? ☐Yes ☐No

If Yes:

i. Describe waste(s) handled and waste management activities, including approximate time when activities occurred:

_____

_____

h. Potential contamination history. Has there been a reported spill at the proposed project site, or have any remedial actions been conducted at or adjacent to the proposed site? ☐Yes ☐ No

If Yes:

i. Is any portion of the site listed on the NYSDEC Spills Incidents database or Environmental Site Remediation database? Check all that apply: ☐Yes ☐No

☐ Yes – Spills Incidents database Provide DEC ID number(s): _____

☐ Yes – Environmental Site Remediation database Provide DEC ID number(s): _____

☐ Neither database

ii. If site has been subject of RCRA corrective activities, describe control measures:_____

_____

_____

iii. Is the project within 2000 feet of any site in the NYSDEC Environmental Site Remediation database? ☐Yes ☐No

If yes, provide DEC ID number(s): _____

iv. If yes to (i), (ii) or (iii) above, describe current status of site(s):

_____

_____

v. Is the project site subject to an institutional control limiting property uses? ☐ Yes ☐ No

- If yes, DEC site ID number: _____
- Describe the type of institutional control (e.g., deed restriction or easement): _____
- Describe any use limitations: _____
- Describe any engineering controls: _____
- Will the project affect the institutional or engineering controls in place? ☐ Yes ☐ No
- Explain: _____

_____

_____

E.2. Natural Resources On or Near Project Site

a. What is the average depth to bedrock on the project site? _____ feet

b. Are there bedrock outcroppings on the project site? ☐ Yes ☐ No
If Yes, what proportion of the site is comprised of bedrock outcroppings? _____%

c. Predominant soil type(s) present on project site: _____ _____%
_____ _____%
_____ _____%

d. What is the average depth to the water table on the project site? Average: _____ feet

e. Drainage status of project site soils: ☐ Well Drained: _____% of site
☐ Moderately Well Drained: _____% of site
☐ Poorly Drained _____% of site

f. Approximate proportion of proposed action site with slopes: ☐ 0-10%: _____% of site
☐ 10-15%: _____% of site
☐ 15% or greater: _____% of site

g. Are there any unique geologic features on the project site? ☐ Yes ☐ No
If Yes, describe: _____

_____

h. Surface water features.

i. Does any portion of the project site contain wetlands or other waterbodies (including streams, rivers, ponds or lakes)? ☐ Yes ☐ No

ii. Do any wetlands or other waterbodies adjoin the project site? ☐ Yes ☐ No

If Yes to either *i* or *ii*, continue. If No, skip to E.2.i.

iii. Are any of the wetlands or waterbodies within or adjoining the project site regulated by any federal, state or local agency? ☐ Yes ☐ No

iv. For each identified regulated wetland and waterbody on the project site, provide the following information:

- Streams: Name _____ Classification _____
- Lakes or Ponds: Name _____ Classification _____
- Wetlands: Name _____ Approximate Size _____
- Wetland No. (if regulated by DEC) _____

v. Are any of the above water bodies listed in the most recent compilation of NYS water quality-impaired waterbodies? ☐ Yes ☐ No

If yes, name of impaired water body/bodies and basis for listing as impaired: _____

_____

i. Is the project site in a designated Floodway? ☐ Yes ☐ No

j. Is the project site in the 100-year Floodplain? ☐ Yes ☐ No

k. Is the project site in the 500-year Floodplain? ☐ Yes ☐ No

l. Is the project site located over, or immediately adjoining, a primary, principal or sole source aquifer? ☐ Yes ☐ No
If Yes:

i. Name of aquifer: _____

m. Identify the predominant wildlife species that occupy or use the project site: _____

_____ _____ _____

_____ _____ _____

n. Does the project site contain a designated significant natural community? ☐ Yes ☐ No

If Yes:

i. Describe the habitat/community (composition, function, and basis for designation): _____

_____

ii. Source(s) of description or evaluation: _____

iii. Extent of community/habitat:

- Currently: _____ acres
- Following completion of project as proposed: _____ acres
- Gain or loss (indicate + or -): _____ acres

o. Does project site contain any species of plant or animal that is listed by the federal government or NYS as endangered or threatened, or does it contain any areas identified as habitat for an endangered or threatened species? ☐ Yes ☐ No

If Yes:

i. Species and listing (endangered or threatened): _____

_____

_____

p. Does the project site contain any species of plant or animal that is listed by NYS as rare, or as a species of special concern? ☐ Yes ☐ No

If Yes:

i. Species and listing: _____

_____

q. Is the project site or adjoining area currently used for hunting, trapping, fishing or shell fishing? ☐ Yes ☐ No

If yes, give a brief description of how the proposed action may affect that use: _____

_____

E.3. Designated Public Resources On or Near Project Site

a. Is the project site, or any portion of it, located in a designated agricultural district certified pursuant to Agriculture and Markets Law, Article 25-AA, Section 303 and 304? ☐ Yes ☐ No

If Yes, provide county plus district name/number: _____

b. Are agricultural lands consisting of highly productive soils present? ☐ Yes ☐ No

i. If Yes: acreage(s) on project site? _____

ii. Source(s) of soil rating(s): _____

c. Does the project site contain all or part of, or is it substantially contiguous to, a registered National Natural Landmark? ☐ Yes ☐ No

If Yes:

i. Nature of the natural landmark: ☐ Biological Community ☐ Geological Feature

ii. Provide brief description of landmark, including values behind designation and approximate size/extent: _____

_____

_____

d. Is the project site located in or does it adjoin a state listed Critical Environmental Area? ☐ Yes ☐ No

If Yes:

i. CEA name: _____

ii. Basis for designation: _____

iii. Designating agency and date: _____

e. Does the project site contain, or is it substantially contiguous to, a building, archaeological site, or district which is listed on the National or State Register of Historic Places, or that has been determined by the Commissioner of the NYS Office of Parks, Recreation and Historic Preservation to be eligible for listing on the State Register of Historic Places? ☐ Yes ☐ No

If Yes:

i. Nature of historic/archaeological resource: ☐ Archaeological Site ☐ Historic Building or District

ii. Name: _____

iii. Brief description of attributes on which listing is based:

_____

f. Is the project site, or any portion of it, located in or adjacent to an area designated as sensitive for archaeological sites on the NY State Historic Preservation Office (SHPO) archaeological site inventory? ☐ Yes ☐ No

g. Have additional archaeological or historic site(s) or resources been identified on the project site? ☐ Yes ☐ No

If Yes:

i. Describe possible resource(s): _____

ii. Basis for identification: _____

h. Is the project site within fives miles of any officially designated and publicly accessible federal, state, or local scenic or aesthetic resource? ☐ Yes ☐ No

If Yes:

i. Identify resource: _____

ii. Nature of, or basis for, designation (e.g., established highway overlook, state or local park, state historic trail or scenic byway, etc.): _____

iii. Distance between project and resource: _____ miles.

i. Is the project site located within a designated river corridor under the Wild, Scenic and Recreational Rivers Program 6 NYCRR 666? ☐ Yes ☐ No

If Yes:

i. Identify the name of the river and its designation: _____

ii. Is the activity consistent with development restrictions contained in 6NYCRR Part 666? ☐ Yes ☐ No

F. Additional Information

Attach any additional information which may be needed to clarify your project.

If you have identified any adverse impacts which could be associated with your proposal, please describe those impacts plus any measures which you propose to avoid or minimize them.

G. Verification

I certify that the information provided is true to the best of my knowledge.

Applicant/Sponsor Name _____ Date_____

Signature_____ Title_____

PRINT FORM

Agency Use Only [If applicable]

Project : Short-Term Rental Local Law

Date : April 16, 2020

Full Environmental Assessment Form
Part 2 - Identification of Potential Project Impacts

Part 2 is to be completed by the lead agency. Part 2 is designed to help the lead agency inventory all potential resources that could be affected by a proposed project or action. We recognize that the lead agency's reviewer(s) will not necessarily be environmental professionals. So, the questions are designed to walk a reviewer through the assessment process by providing a series of questions that can be answered using the information found in Part 1. To further assist the lead agency in completing Part 2, the form identifies the most relevant questions in Part 1 that will provide the information needed to answer the Part 2 question. When Part 2 is completed, the lead agency will have identified the relevant environmental areas that may be impacted by the proposed activity.

If the lead agency is a state agency **and** the action is in any Coastal Area, complete the Coastal Assessment Form before proceeding with this assessment.

Tips for completing Part 2:

- Review all of the information provided in Part 1.
- Review any application, maps, supporting materials and the Full EAF Workbook.
- Answer each of the 18 questions in Part 2.
- If you answer "**Yes"** to a numbered question, please complete all the questions that follow in that section.
- If you answer "**No"** to a numbered question, move on to the next numbered question.
- Check appropriate column to indicate the anticipated size of the impact.
- Proposed projects that would exceed a numeric threshold contained in a question should result in the reviewing agency checking the box "Moderate to large impact may occur."
- The reviewer is not expected to be an expert in environmental analysis.
- If you are not sure or undecided about the size of an impact, it may help to review the sub-questions for the general question and consult the workbook.
- When answering a question consider all components of the proposed activity, that is, the "whole action".
- Consider the possibility for long-term and cumulative impacts as well as direct impacts.
- Answer the question in a reasonable manner considering the scale and context of the project.

1. Impact on Land

Proposed action may involve construction on, or physical alteration of, the land surface of the proposed site. (See Part 1. D.1)

☑ NO ☐ YES

If "Yes", answer questions a - j. If "No", move on to Section 2.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may involve construction on land where depth to water table is less than 3 feet.	E2d	☐	☐
b. The proposed action may involve construction on slopes of 15% or greater.	E2f	☐	☐
c. The proposed action may involve construction on land where bedrock is exposed, or generally within 5 feet of existing ground surface.	E2a	☐	☐
d. The proposed action may involve the excavation and removal of more than 1,000 tons of natural material.	D2a	☐	☐
e. The proposed action may involve construction that continues for more than one year or in multiple phases.	D1e	☐	☐
f. The proposed action may result in increased erosion, whether from physical disturbance or vegetation removal (including from treatment by herbicides).	D2e, D2q	☐	☐
g. The proposed action is, or may be, located within a Coastal Erosion hazard area.	B1i	☐	☐
h. Other impacts: _____ _____		☐	☐

2. Impact on Geological Features

The proposed action may result in the modification or destruction of, or inhibit access to, any unique or unusual land forms on the site (e.g., cliffs, dunes, minerals, fossils, caves). (See Part 1. E.2.g)

☑ NO ☐ YES

If "Yes", answer questions a - c. If "No", move on to Section 3.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. Identify the specific land form(s) attached: _____ _____	E2g	☐	☐
b. The proposed action may affect or is adjacent to a geological feature listed as a registered National Natural Landmark. Specific feature: _____	E3c	☐	☐
c. Other impacts: _____ _____		☐	☐

3. Impacts on Surface Water

The proposed action may affect one or more wetlands or other surface water bodies (e.g., streams, rivers, ponds or lakes). (See Part 1. D.2, E.2.h)

☑ NO ☐ YES

If "Yes", answer questions a - l. If "No", move on to Section 4.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may create a new water body.	D2b, D1h	☐	☐
b. The proposed action may result in an increase or decrease of over 10% or more than a 10 acre increase or decrease in the surface area of any body of water.	D2b	☐	☐
c. The proposed action may involve dredging more than 100 cubic yards of material from a wetland or water body.	D2a	☐	☐
d. The proposed action may involve construction within or adjoining a freshwater or tidal wetland, or in the bed or banks of any other water body.	E2h	☐	☐
e. The proposed action may create turbidity in a waterbody, either from upland erosion, runoff or by disturbing bottom sediments.	D2a, D2h	☐	☐
f. The proposed action may include construction of one or more intake(s) for withdrawal of water from surface water.	D2c	☐	☐
g. The proposed action may include construction of one or more outfall(s) for discharge of wastewater to surface water(s).	D2d	☐	☐
h. The proposed action may cause soil erosion, or otherwise create a source of stormwater discharge that may lead to siltation or other degradation of receiving water bodies.	D2e	☐	☐
i. The proposed action may affect the water quality of any water bodies within or downstream of the site of the proposed action.	E2h	☐	☐
j. The proposed action may involve the application of pesticides or herbicides in or around any water body.	D2q, E2h	☐	☐
k. The proposed action may require the construction of new, or expansion of existing, wastewater treatment facilities.	D1a, D2d	☐	☐

l. Other impacts: _____ _____		□	□

4. Impact on groundwater

The proposed action may result in new or additional use of ground water, or may have the potential to introduce contaminants to ground water or an aquifer. (See Part 1. D.2.a, D.2.c, D.2.d, D.2.p, D.2.q, D.2.t)

☐ NO ☑ YES

If "Yes", answer questions a - h. If "No", move on to Section 5.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may require new water supply wells, or create additional demand on supplies from existing water supply wells.	D2c	☑	☐
b. Water supply demand from the proposed action may exceed safe and sustainable withdrawal capacity rate of the local supply or aquifer. Cite Source: _____	D2c	☑	☐
c. The proposed action may allow or result in residential uses in areas without water and sewer services.	D1a, D2c	☑	☐
d. The proposed action may include or require wastewater discharged to groundwater.	D2d, E2l	☑	☐
e. The proposed action may result in the construction of water supply wells in locations where groundwater is, or is suspected to be, contaminated.	D2c, E1f, E1g, E1h	☑	☐
f. The proposed action may require the bulk storage of petroleum or chemical products over ground water or an aquifer.	D2p, E2l	☑	☐
g. The proposed action may involve the commercial application of pesticides within 100 feet of potable drinking water or irrigation sources.	E2h, D2q, E2l, D2c	☑	☐
h. Other impacts: _____ _____		☑	☐

5. Impact on Flooding

The proposed action may result in development on lands subject to flooding. (See Part 1. E.2)

☑ NO ☐ YES

If "Yes", answer questions a - g. If "No", move on to Section 6.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may result in development in a designated floodway.	E2i	□	□
b. The proposed action may result in development within a 100 year floodplain.	E2j	□	□
c. The proposed action may result in development within a 500 year floodplain.	E2k	□	□
d. The proposed action may result in, or require, modification of existing drainage patterns.	D2b, D2e	□	□
e. The proposed action may change flood water flows that contribute to flooding.	D2b, E2i, E2j, E2k	□	□
f. If there is a dam located on the site of the proposed action, is the dam in need of repair, or upgrade?	E1e	□	□

g. Other impacts: _____ _____		☐	☐

6. Impacts on Air

The proposed action may include a state regulated air emission source. (See Part 1. D.2.f., D.2.h, D.2.g) ☑ NO ☐ YES

If "Yes", answer questions a - f. If "No", move on to Section 7.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. If the proposed action requires federal or state air emission permits, the action may also emit one or more greenhouse gases at or above the following levels:			
i. More than 1000 tons/year of carbon dioxide (CO_2)	D2g	☐	☐
ii. More than 3.5 tons/year of nitrous oxide (N_2O)	D2g	☐	☐
iii. More than 1000 tons/year of carbon equivalent of perfluorocarbons (PFCs)	D2g	☐	☐
iv. More than .045 tons/year of sulfur hexafluoride (SF_6)	D2g	☐	☐
v. More than 1000 tons/year of carbon dioxide equivalent of hydrochloroflourocarbons (HFCs) emissions	D2g	☐	☐
vi. 43 tons/year or more of methane	D2h	☐	☐
b. The proposed action may generate 10 tons/year or more of any one designated hazardous air pollutant, or 25 tons/year or more of any combination of such hazardous air pollutants.	D2g	☐	☐
c. The proposed action may require a state air registration, or may produce an emissions rate of total contaminants that may exceed 5 lbs. per hour, or may include a heat source capable of producing more than 10 million BTU's per hour.	D2f, D2g	☐	☐
d. The proposed action may reach 50% of any of the thresholds in "a" through "c", above.	D2g	☐	☐
e. The proposed action may result in the combustion or thermal treatment of more than 1 ton of refuse per hour.	D2s	☐	☐
f. Other impacts: _____ _____		☐	☐

7. Impact on Plants and Animals

The proposed action may result in a loss of flora or fauna. (See Part 1. E.2. m.-q.) ☑ NO ☐ YES

If "Yes", answer questions a - j. If "No", move on to Section 8.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may cause reduction in population or loss of individuals of any threatened or endangered species, as listed by New York State or the Federal government, that use the site, or are found on, over, or near the site.	E2o	☐	☐
b. The proposed action may result in a reduction or degradation of any habitat used by any rare, threatened or endangered species, as listed by New York State or the federal government.	E2o	☐	☐
c. The proposed action may cause reduction in population, or loss of individuals, of any species of special concern or conservation need, as listed by New York State or the Federal government, that use the site, or are found on, over, or near the site.	E2p	☐	☐
d. The proposed action may result in a reduction or degradation of any habitat used by any species of special concern and conservation need, as listed by New York State or the Federal government.	E2p	☐	☐

e. The proposed action may diminish the capacity of a registered National Natural Landmark to support the biological community it was established to protect.	E3c	☐	☐
f. The proposed action may result in the removal of, or ground disturbance in, any portion of a designated significant natural community. Source: _____	E2n	☐	☐
g. The proposed action may substantially interfere with nesting/breeding, foraging, or over-wintering habitat for the predominant species that occupy or use the project site.	E2m	☐	☐
h. The proposed action requires the conversion of more than 10 acres of forest, grassland or any other regionally or locally important habitat. Habitat type & information source: _____ _____	E1b	☐	☐
i. Proposed action (commercial, industrial or recreational projects, only) involves use of herbicides or pesticides.	D2q	☐	☐
j. Other impacts: _____ _____		☐	☐

8. Impact on Agricultural Resources

The proposed action may impact agricultural resources. (See Part 1. E.3.a. and b.) ☑ NO ☐ YES

If "Yes", answer questions a - h. If "No", move on to Section 9.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may impact soil classified within soil group 1 through 4 of the NYS Land Classification System.	E2c, E3b	☐	☐
b. The proposed action may sever, cross or otherwise limit access to agricultural land (includes cropland, hayfields, pasture, vineyard, orchard, etc).	E1a, Elb	☐	☐
c. The proposed action may result in the excavation or compaction of the soil profile of active agricultural land.	E3b	☐	☐
d. The proposed action may irreversibly convert agricultural land to non-agricultural uses, either more than 2.5 acres if located in an Agricultural District, or more than 10 acres if not within an Agricultural District.	E1b, E3a	☐	☐
e. The proposed action may disrupt or prevent installation of an agricultural land management system.	El a, E1b	☐	☐
f. The proposed action may result, directly or indirectly, in increased development potential or pressure on farmland.	C2c, C3, D2c, D2d	☐	☐
g. The proposed project is not consistent with the adopted municipal Farmland Protection Plan.	C2c	☐	☐
h. Other impacts: _____		☐	☐

9. Impact on Aesthetic Resources

The land use of the proposed action are obviously different from, or are in sharp contrast to, current land use patterns between the proposed project and a scenic or aesthetic resource. (Part 1. E.1.a, E.1.b, E.3.h.)

☑ NO ☐ YES

If "Yes", answer questions a - g. If "No", go to Section 10.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. Proposed action may be visible from any officially designated federal, state, or local scenic or aesthetic resource.	E3h	☐	☐
b. The proposed action may result in the obstruction, elimination or significant screening of one or more officially designated scenic views.	E3h, C2b	☐	☐
c. The proposed action may be visible from publicly accessible vantage points: i. Seasonally (e.g., screened by summer foliage, but visible during other seasons) ii. Year round	E3h	 ☐ ☐	 ☐ ☐
d. The situation or activity in which viewers are engaged while viewing the proposed action is: i. Routine travel by residents, including travel to and from work ii. Recreational or tourism based activities	E3h E2q, E1c	 ☐ ☐	 ☐ ☐
e. The proposed action may cause a diminishment of the public enjoyment and appreciation of the designated aesthetic resource.	E3h	☐	☐
f. There are similar projects visible within the following distance of the proposed project: 0-1/2 mile ½ -3 mile 3-5 mile 5+ mile	D1a, E1a, D1f, D1g	☐	☐
g. Other impacts: _____ _____		☐	☐

10. Impact on Historic and Archeological Resources

The proposed action may occur in or adjacent to a historic or archaeological resource. (Part 1. E.3.e, f. and g.)

☐ NO ☑ YES

If "Yes", answer questions a - e. If "No", go to Section 11.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may occur wholly or partially within, or substantially contiguous to, any buildings, archaeological site or district which is listed on the National or State Register of Historical Places, or that has been determined by the Commissioner of the NYS Office of Parks, Recreation and Historic Preservation to be eligible for listing on the State Register of Historic Places.	E3e	☑	☐
b. The proposed action may occur wholly or partially within, or substantially contiguous to, an area designated as sensitive for archaeological sites on the NY State Historic Preservation Office (SHPO) archaeological site inventory.	E3f	☑	☐
c. The proposed action may occur wholly or partially within, or substantially contiguous to, an archaeological site not included on the NY SHPO inventory. Source: _____	E3g	☑	☐

d. Other impacts: _____ _____		☐	☐
e. If any of the above (a-d) are answered "Moderate to large impact may occur", continue with the following questions to help support conclusions in Part 3:			
i. The proposed action may result in the destruction or alteration of all or part of the site or property.	E3e, E3g, E3f	☑	☐
ii. The proposed action may result in the alteration of the property's setting or integrity.	E3e, E3f, E3g, E1a, E1b	☑	☐
iii. The proposed action may result in the introduction of visual elements which are out of character with the site or property, or may alter its setting.	E3e, E3f, E3g, E3h, C2, C3	☑	☐

11. Impact on Open Space and Recreation

The proposed action may result in a loss of recreational opportunities or a reduction of an open space resource as designated in any adopted municipal open space plan.
(See Part 1. C.2.c, E.1.c., E.2.q.)
If "Yes", answer questions a - e. If "No", go to Section 12.

☑ NO ☐ YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may result in an impairment of natural functions, or "ecosystem services", provided by an undeveloped area, including but not limited to stormwater storage, nutrient cycling, wildlife habitat.	D2e, E1b E2h, E2m, E2o, E2n, E2p	□	□
b. The proposed action may result in the loss of a current or future recreational resource.	C2a, E1c, C2c, E2q	□	□
c. The proposed action may eliminate open space or recreational resource in an area with few such resources.	C2a, C2c E1c, E2q	□	□
d. The proposed action may result in loss of an area now used informally by the community as an open space resource.	C2c, E1c	□	□
e. Other impacts: _____ _____		□	□

12. Impact on Critical Environmental Areas

The proposed action may be located within or adjacent to a critical environmental area (CEA). (See Part 1. E.3.d)
If "Yes", answer questions a - c. If "No", go to Section 13.

☑ NO ☐ YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may result in a reduction in the quantity of the resource or characteristic which was the basis for designation of the CEA.	E3d	□	□
b. The proposed action may result in a reduction in the quality of the resource or characteristic which was the basis for designation of the CEA.	E3d	□	□
c. Other impacts: _____ _____		□	□

13. Impact on Transportation

The proposed action may result in a change to existing transportation systems. ☑ NO ☐ YES
(See Part 1. D.2.j)
If "Yes", answer questions a - f. If "No", go to Section 14.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. Projected traffic increase may exceed capacity of existing road network.	D2j	☐	☐
b. The proposed action may result in the construction of paved parking area for 500 or more vehicles.	D2j	☐	☐
c. The proposed action will degrade existing transit access.	D2j	☐	☐
d. The proposed action will degrade existing pedestrian or bicycle accommodations.	D2j	☐	☐
e. The proposed action may alter the present pattern of movement of people or goods.	D2j	☐	☐
f. Other impacts: _____ _____		☐	☐

14. Impact on Energy

The proposed action may cause an increase in the use of any form of energy. ☑ NO ☐ YES
(See Part 1. D.2.k)
If "Yes", answer questions a - e. If "No", go to Section 15.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action will require a new, or an upgrade to an existing, substation.	D2k	☐	☐
b. The proposed action will require the creation or extension of an energy transmission or supply system to serve more than 50 single or two-family residences or to serve a commercial or industrial use.	D1f, D1q, D2k	☐	☐
c. The proposed action may utilize more than 2,500 MWhrs per year of electricity.	D2k	☐	☐
d. The proposed action may involve heating and/or cooling of more than 100,000 square feet of building area when completed.	D1g	☐	☐
e. Other Impacts: _____ _____			

15. Impact on Noise, Odor, and Light

The proposed action may result in an increase in noise, odors, or outdoor lighting. ☑ NO ☐ YES
(See Part 1. D.2.m., n., and o.)
If "Yes", answer questions a - f. If "No", go to Section 16.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may produce sound above noise levels established by local regulation.	D2m	☐	☐
b. The proposed action may result in blasting within 1,500 feet of any residence, hospital, school, licensed day care center, or nursing home.	D2m, E1d	☐	☐
c. The proposed action may result in routine odors for more than one hour per day.	D2o	☐	☐

d. The proposed action may result in light shining onto adjoining properties.	D2n	☐	☐
e. The proposed action may result in lighting creating sky-glow brighter than existing area conditions.	D2n, E1a	☐	☐
f. Other impacts: _____ _____		☐	☐

16. Impact on Human Health

The proposed action may have an impact on human health from exposure to new or existing sources of contaminants. (See Part 1.D.2.q., E.1. d. f. g. and h.) ☑ NO ☐ YES

If "Yes", answer questions a - m. If "No", go to Section 17.

	Relevant Part I Question(s)	No,or small impact may cccur	Moderate to large impact may occur
a. The proposed action is located within 1500 feet of a school, hospital, licensed day care center, group home, nursing home or retirement community.	E1d	☐	☐
b. The site of the proposed action is currently undergoing remediation.	E1g, E1h	☐	☐
c. There is a completed emergency spill remediation, or a completed environmental site remediation on, or adjacent to, the site of the proposed action.	E1g, E1h	☐	☐
d. The site of the action is subject to an institutional control limiting the use of the property (e.g., easement or deed restriction).	E1g, E1h	☐	☐
e. The proposed action may affect institutional control measures that were put in place to ensure that the site remains protective of the environment and human health.	E1g, E1h	☐	☐
f. The proposed action has adequate control measures in place to ensure that future generation, treatment and/or disposal of hazardous wastes will be protective of the environment and human health.	D2t	☐	☐
g. The proposed action involves construction or modification of a solid waste management facility.	D2q, E1f	☐	☐
h. The proposed action may result in the unearthing of solid or hazardous waste.	D2q, E1f	☐	☐
i. The proposed action may result in an increase in the rate of disposal, or processing, of solid waste.	D2r, D2s	☐	☐
j. The proposed action may result in excavation or other disturbance within 2000 feet of a site used for the disposal of solid or hazardous waste.	E1f, E1g E1h	☐	☐
k. The proposed action may result in the migration of explosive gases from a landfill site to adjacent off site structures.	E1f, E1g	☐	☐
l. The proposed action may result in the release of contaminated leachate from the project site.	D2s, E1f, D2r	☐	☐
m. Other impacts: _____ _____			

17. Consistency with Community Plans

The proposed action is not consistent with adopted land use plans. ☑ NO ☐ YES

(See Part 1. C.1, C.2. and C.3.)

If "Yes", answer questions a - h. If "No", go to Section 18.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action's land use components may be different from, or in sharp contrast to, current surrounding land use pattern(s).	C2, C3, D1a E1a, E1b	☐	☐
b. The proposed action will cause the permanent population of the city, town or village in which the project is located to grow by more than 5%.	C2	☐	☐
c. The proposed action is inconsistent with local land use plans or zoning regulations.	C2, C2, C3	☐	☐
d. The proposed action is inconsistent with any County plans, or other regional land use plans.	C2, C2	☐	☐
e. The proposed action may cause a change in the density of development that is not supported by existing infrastructure or is distant from existing infrastructure.	C3, D1c, D1d, D1f, D1d, Elb	☐	☐
f. The proposed action is located in an area characterized by low density development that will require new or expanded public infrastructure.	C4, D2c, D2d D2j	☐	☐
g. The proposed action may induce secondary development impacts (e.g., residential or commercial development not included in the proposed action)	C2a	☐	☐
h. Other: _____ _____		☐	☐

18. Consistency with Community Character

The proposed project is inconsistent with the existing community character. ☑ NO ☐ YES

(See Part 1. C.2, C.3, D.2, E.3)

If "Yes", answer questions a - g. If "No", proceed to Part 3.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may replace or eliminate existing facilities, structures, or areas of historic importance to the community.	E3e, E3f, E3g	☐	☐
b. The proposed action may create a demand for additional community services (e.g. schools, police and fire)	C4	☐	☐
c. The proposed action may displace affordable or low-income housing in an area where there is a shortage of such housing.	C2, C3, D1f D1g, E1a	☐	☐
d. The proposed action may interfere with the use or enjoyment of officially recognized or designated public resources.	C2, E3	☐	☐
e. The proposed action is inconsistent with the predominant architectural scale and character.	C2, C3	☐	☐
f. Proposed action is inconsistent with the character of the existing natural landscape.	C2, C3 E1a, E1b E2g, E2h	☐	☐
g. Other impacts: _____ _____		☐	☐

PRINT FULL FORM

Agency Use Only [IfApplicable]

Project : Short Term Rental Local Law

Date : April 16, 2020

Full Environmental Assessment Form
Part 3 - Evaluation of the Magnitude and Importance of Project Impacts
and
Determination of Significance

Part 3 provides the reasons in support of the determination of significance. The lead agency must complete Part 3 for every question in Part 2 where the impact has been identified as potentially moderate to large or where there is a need to explain why a particular element of the proposed action will not, or may, result in a significant adverse environmental impact.

Based on the analysis in Part 3, the lead agency must decide whether to require an environmental impact statement to further assess the proposed action or whether available information is sufficient for the lead agency to conclude that the proposed action will not have a significant adverse environmental impact. By completing the certification on the next page, the lead agency can complete its determination of significance.

Reasons Supporting This Determination:

To complete this section:

- Identify the impact based on the Part 2 responses and describe its magnitude. Magnitude considers factors such as severity, size or extent of an impact.
- Assess the importance of the impact. Importance relates to the geographic scope, duration, probability of the impact occurring, number of people affected by the impact and any additional environmental consequences if the impact were to occur.
- The assessment should take into consideration any design element or project changes.
- Repeat this process for each Part 2 question where the impact has been identified as potentially moderate to large or where there is a need to explain why a particular element of the proposed action will not, or may, result in a significant adverse environmental impact.
- Provide the reason(s) why the impact may, or will not, result in a significant adverse environmental impact
- For Conditional Negative Declarations identify the specific condition(s) imposed that will modify the proposed action so that no significant adverse environmental impacts will result.
- Attach additional sheets, as needed.

The City Council of the City of Beacon has determined it is in the best interest of the City and its residents to regulate short-term rentals. Short-term rentals are defined as an entire dwelling unit, or a room or group of rooms or other living or sleeping space, made available to rent, lease or otherwise assigned for a tenancy of less than 30 consecutive days. The term “short-term rental” does not include multifamily dwelling buildings, dormitories, hotel or motel rooms, bed and breakfast inns or lodging houses, as permitted and regulated by the City of Beacon Zoning Ordinance. The City Council recognizes the benefits of short-term rentals to allow home-owners to supplement their income to defray the cost of housing and to provide lodging for visitors to the City. However, in order to protect the health, safety and welfare of the City and its residents, it is necessary to restrict the rental of homes for terms shorter than 30 consecutive days, a practice which is growing in popularity with the advent of internet and social media-based programs that connect property owners and persons seeking short-term rentals. In addition, studies have shown that short-term rentals are linked to increases in rent and housing costs because rental units are taken off the market and used as short-term rentals. Units are going to short-term renters rather than to permanent residents which results in a decrease in available housing stock within the City of Beacon. The City Council believes that the restrictions and requirements imposed herein further those objectives and the protection of the health, safety and welfare of the City and its residents.

Under the proposed local law, it shall be unlawful to use, establish, maintain, operate, occupy, rent or lease any property as a short-term rental without first having obtained a short-term rental permit. Short-term rentals must be owner-occupied whereby the property is the principal residence of the owner, tenant, grantor or grantee at all times during the term of the permit. Only one-family, two-family or accessory apartment units may be used as short-term rentals. Short-term rental permits are permitted in all zoning districts within the City of Beacon.

Determination of Significance - Type 1 and Unlisted Actions

SEQR Status: ☑ Type 1 ☐ Unlisted

Identify portions of EAF completed for this Project: ☑ Part 1 ☑ Part 2 ☑ Part 3

Upon review of the information recorded on this EAF, as noted, plus this additional support information including memorandums and comments from the City's Planning Consultant and City staff, local laws from other municipalities, reports and case law updates.

and considering both the magnitude and importance of each identified potential impact, it is the conclusion of the City Council as lead agency that:

☑ A. This project will result in no significant adverse impacts on the environment, and, therefore, an environmental impact statement need not be prepared. Accordingly, this negative declaration is issued.

☐ B. Although this project could have a significant adverse impact on the environment, that impact will be avoided or substantially mitigated because of the following conditions which will be required by the lead agency:

There will, therefore, be no significant adverse impacts from the project as conditioned, and, therefore, this conditioned negative declaration is issued. A conditioned negative declaration may be used only for UNLISTED actions (see 6 NYCRR 617.7(d)).

☐ C. This Project may result in one or more significant adverse impacts on the environment, and an environmental impact statement must be prepared to further assess the impact(s) and possible mitigation and to explore alternatives to avoid or reduce those impacts. Accordingly, this positive declaration is issued.

Name of Action: Local Law Regulating Short-Term Rentals

Name of Lead Agency: City Council of the City of Beacon

Name of Responsible Officer in Lead Agency: Lee Kyriacou

Title of Responsible Officer: Mayor

Signature of Responsible Officer in Lead Agency: Date:

Signature of Preparer (if different from Responsible Officer) Date:

For Further Information:

Contact Person: Anthony Ruggiero, City Administrator

Address: 1 Municipal Plaza, NY 12509

Telephone Number: 845-838-5000

E-mail: aruggiero@cityofbeacon.org

For Type 1 Actions and Conditioned Negative Declarations, a copy of this Notice is sent to:

Chief Executive Officer of the political subdivision in which the action will be principally located (e.g., Town / City / Village of)
Other involved agencies (if any)
Applicant (if any)
Environmental Notice Bulletin: http://www.dec.ny.gov/enb/enb.html

PRINT FULL FORM

City of Beacon Council Agenda
4/20/2020

Title:

Resolution Accepting a Sight Easement Regarding Saint Luke's Place Subdivision

Subject:

Background:

ATTACHMENTS:

Description	Type
Resolution Accepting a Sight Easement Regarding Saint Luke's Place Subdivision	Resolution
Memorandum from the City Attorney's Office Regarding the Saint Luke's Place Dedication and Sight Easement	Cover Memo/Letter
Sight Easement Saint Luke's Place Subdivision	Backup Material
Saint Luke's Subdivision Plans	Plans

CITY OF BEACON

CITY COUNCIL

Resolution No. _____ of 2020

RESOLUTION ACCEPTING A SIGHT EASEMENT REGARDING ST LUKE'S PLACE SUBDIVISION

WHEREAS, Beacon 226 Main Street LLC obtained approval from the City of Beacon Planning Board on August 14, 2018 to for a thee-lot residential subdivision at the intersection of St Luke's Place and Union Street which Subdivision Plat was filed in the Dutchess County Clerk's Office on April 5, 2019 as Filed Map No. 514A; and

WHEREAS, the Planning Board Resolution requires the applicant to submit a Sight Easement prohibiting any obstructions to sight distance across a triangular area at the corner of St Luke's Place and Union Street consisting of approximately 312 square feet; and

WHEREAS, Beacon 226 Main Street LLC submitted such Sight Easement which grants the City an easement with the right, but not the obligation, to enter the sight distance easement arear to remove obstructions to sight distance as necessary if the property owner fails to properly maintain such area.

NOW THEREFORE, BE IT RESOLVED THAT, the City Council hereby authorizes the Mayor and/or City Administrator to sign the Sight Easement for said purpose, along with all documents as may be necessary for the recording of such Agreement, subject to review and approval by the City Attorney and City Engineer.

Resolution No.____of 2020			**Date: April 20, 2020**				
□ Amendments						**□ 2/3 Required**	
□ Not on roll call.			**□ On roll call**			**□ 3/4 Required**	
Motion	Second	Council Member	Yes	No	Abstain	Reason	Absent
		Terry Nelson					
		Jodi McCredo					
		George Mansfield					
		Amber Grant					
		Air Rhodes					
		Dan Aymar-Blair					
		Mayor Lee Kyriacou					
		Motion Carried					

KEANE & BEANE P.C.
ATTORNEYS AT LAW

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  Fax 914.946.6868
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  Fishkill, NY 12524
  Phone 845.896.0120
- **New York City Office**
  505 Park Avenue
  New York, NY 10022
  Phone 646.794.5747

MEMORANDUM

TO: **Mayor Lee Kyriacou and Beacon City Council Members**

FROM: **Keane & Beane, P.C.**

RE: **St. Luke's Place – Offer of Dedication and Sight Easement**

DATE: **April 9, 2020**

On August 14, 2018, the Planning Board granted approval of a 3-lot residential subdivision for property located at the corner of St Luke's Place and Union Street. The Subdivision Plat prepared for Beacon 226 Main Street LLC was filed in the Dutchess County Clerk's Office as Filed Map No. 514A on April 5, 2019.

The Planning Board Resolution requires the applicant to submit two documents which will be recorded by the Applicant in the Dutchess County Clerk's Office: (1) Sight Distance Easement, (2) Offer of Dedication.

The proposed action for the City Council is to accept the easement, accept the Offer of Dedication, and authorize the Mayor and/or Administrator to execute all documents as may be necessary for such purposes.

Sight Easement

In order to maintain proper sight distance for vehicles at the corner of St Luke's Place and Union Street and pursuant to Section 195-21.C of the City Code, the Planning Board required a sight easement to be recorded in the County Clerk's Office. The subject area is shown on the Filed Map as approximately 312 s.f.

The Sight Easement requires the property owner to maintain the required sight distance by keeping the subject area free and clear of obstructions. It also grants the City the right, but not the obligation, to enter the Property and remove sight distance obstructions in the event the owner fails to do so.

Offer of Dedication – Union Street

During review of the application, it was discovered that a portion of the Union Street right-of-way is located on private property belonging to Beacon 226 Main St LLC (the "Applicant"). The Applicant offered to dedicate that land to the City for highway purposes. The area subject to dedication to the City is shown on the Filed Map as a shaded area along Union Street consisting of approximately 900 s.f.

The Offer of Dedication submitted by the Applicant for the City Council's consideration includes a proposed Deed to convey the land to the City for highway purposes.

GRANT OF SIGHT EASEMENT

This Indenture made the _____ day of _____, 2019, between BEACON 226 MAIN STREET, LLC, with offices at One East Main Street, Beacon, New York 12508 (hereinafter referred to as the "Grantor"), as owner of property described at Schedule "A" attached hereto and made a part hereof and shown as Lot 2 on a map entitled "Subdivision Plat prepared for Beacon 226 Main Street LLC" dated April 20, 2018, last revised July 13, 2018, prepared by TEC Land Surveying, filed in the Dutchess County Clerk's Office on April 5, 2019 as Filed Map No. 514A, (the "Premises") , and the CITY OF BEACON, with offices at One Municipal Plaza, Beacon, New York 12508, (hereinafter referred to as the "Grantee").

W I T N E S S E T H :

In consideration of the sum of One Dollar ($1.00), lawful money of the United States, and paid by the City of Beacon, receipt of which is hereby acknowledged, and in further consideration of the promises set forth below, the Grantor does give and grant unto the Grantee, its successors and assigns forever, a permanent easement on and over the Premises, the same being more particularly bounded and described in Schedule "B" attached hereto and made a part hereof (the "Sight Easement Area") upon the following terms and conditions:

1. The easement granted herein is for the purpose of maintaining sight lines and visibility along Union Street and St. Luke's Place, including clearing, pruning, or regrading so as to maintain a clear line of sight in either direction across the triangular Sight Easement Area between the observer's eye 3.5 feet above the pavement surface on one street and an object one foot above the pavement surface on the other side.
2. The initial establishment of clear sight lines with the Sight Easement Area shall be the responsibility of the Grantor. Thereafter, Grantor shall maintain clear sight lines as

described in Paragraph 1. In the event the Grantor fails to establish said sight lines, or fails to maintain the sight lines as described in Paragraph 1, the Grantee shall have the right, but not the obligation, to enter upon and clear, regrade and maintain, as necessary, the Sight Easement Area for the purposes described herein. In the event the City exercises its right to enter the Sight Easement Area, the City will restore the Sight Easement Area to the same condition that it was prior to the performance of any clearing, to the greatest extent practicable, except that the City's sole obligation in this regard shall be to rough grade and seed the surface of the Sight Easement Area, as necessary. It is expressly understood that it may be necessary to remove as part of said work trees, shrubs or bushes presently, or which may in the future be located within the Sight Easement Area. Any dispute as to restoration of the Sight Easement Area shall be submitted to arbitration pursuant to the Rules of the American Arbitration Association.

3. The Grantee shall have the right of ingress and egress by man, motor vehicle, and any equipment necessary over the Sight Easement Area to effectuate the purposes of this easement.
4. The Grantor hereby covenants that the Grantor is seized of the Premises in fee simple and has good right to convey this easement; shall do nothing in the Premises which would prevent, impede or disturb the full use and intended purpose of this easement by the Grantee; and shall execute and deliver any further documents necessary to assure the easement granted hereto to the Grantee.
5. Should any covenant, easement or restriction herein contained, of any article, section, subsection, sentence, clause, phrase or term of this Declaration be declared to be void,

invalid, illegal or unenforceable, for any reason, by the adjudication of any court or other tribunal having jurisdiction, such judgment shall in no way affect the other provisions hereof which are hereby declared to be several and which shall remain in full force and effect.

6. All references to Grantor herein shall include its successors and/or assigns. This easement shall be recorded in the Office of the Dutchess County Clerk and is binding upon and inure to the benefit of the parties hereto and their respective heirs, successors and assigns forever.

IN WITNESS WHEREOF, the Grantor and Grantee, have duly executed this easement as of the day and year first above written.

226 MAIN STREET, LLC

By_____
Gary Joseph, Member

CITY OF BEACON

By_____

STATE OF NEW YORK)
COUNTY OF DUTCHESS) ss.

On _____ 2019, before me, the undersigned, a Notary Public in and for said State, personally appeared GARY JOSEPH personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity, and that by his signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public

STATE OF NEW YORK)
COUNTY OF DUTCHESS) ss.

On _____ 2019, before me, the undersigned, a Notary Public in and for said State, personally appeared personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity, and that by his signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public

R&R:

Schedule A – Description of Property, Lot 2
Schedule B – Description of Easement, Sight Easement

Description of Property

Tax Parcel No. 156634

All that certain piece, plot or parcel of land situate, lying and being in the City of Beacon, County of Dutchess and State of New York, also know as Tax Parcel No. 6054-38-156634 and being more particularly described as follows:

Beginning at a point on the east side of St. Luke's Place, said point lying on the division between the herein described parcel and lands, now or formerly, of Cancel (Doc. No. 02-2012-1298); Thence along said division and along lands, now or formerly, of Christ Methodist Church (L. 1111 p. 131) South 58° 21' 00" East a distance of 161.04 feet generally along a chain link fence to a point; Thence along lands, now or formerly, of Piga (L. 1938 p. 373) South 28° 50' 35" West a distance of 105.52 feet generally along a chain link fence to a point, passing through an iron pipe on line near said point; Thence along the north side of Union Street, North 59° 56' 11" West a distance of 166.40 feet to a point; Thence along St. Luke's Place North 31° 42' 53" East a distance of 110.00 feet to the Point of Beginning.

Description of Easement

Sight Easement

Beginning at the southwest corner of Lot 2 as shown on a map entitled "Subdivision Plat Prepared For Beacon 226 Main Street LLC" prepared by TEC Land Surveying and filed with the Dutchess County Clerk's office on April 5, 2019 as Map No. 514A; Thence along the east side of St Luke's Place and the west line of the said Lot 2, North 31° 42' 53" East a distance of 25.00 feet to a point; Thence through said Lot 2, South 13° 14' 17" East a distance of 35.38 feet to a point on the north line of lands to be dedicated to the City of Beacon for highway use, as shown on the aforementioned Map No. 514A; Thence along the north line of said dedication, North 58° 11' 27" West a distance of 25.00 feet to the Point of Beginning.

SURVEY NOTES

1. Copyright TEC Land Surveying. All Rights Reserved. Reproduction or copying of this document may be a violation of copyright law unless permission of the author and / or copyright holder is obtained.

2. Unauthorized alteration or addition to a survey map bearing a licensed land surveyor's seal is a violation of section 7209, sub-division 2, of the New York State Education Law.

3. Only boundary survey maps with the surveyor's embossed or red inked seal are genuine true and correct copies of the surveyor's original work and opinion. A copy of this document without a proper application of the surveyor's embossed or red inked seal should be assumed to be an unauthorized copy.

4. Certifications on this boundary survey map signify that the map was prepared in accordance with the current existing Code of Practice for Land Surveys adopted by the New York State Association of Professional Land Surveyors, Inc. The certification is limited to persons for whom the boundary survey map is prepared, to the title company, to the governmental agency, and to the lending institution listed on this boundary survey map.

5. The certifications herein are not transferable.

6. The location of underground improvements or encroachments are not always known and often must be estimated. If any underground improvements or encroachments exist or are shown, the improvements or encroachments are not covered by this certificate.

7. Subject to the findings of a current title search.

8. Subject to covenants, easements, restrictions, conditions and agreements of record.

9. Subject to any right, title or interest the public may have for highway use.

10. Bearings and North shown hereon are referenced to NAD 83-NY East using NYSNET RTN GPS.

11. Contour interval is one foot. Elevations shown hereon are referenced to NAVD 88 using NYSNET RTN GPS.

12. Area shown to be dedicated to the City of Beacon for highway use contains 900 ft², more or less.

FILED MAP REFERENCE

Map entitled "Map of Lots at Matteawan, N.Y. - Property of Mrs. Maria Robinson" prepared by S. Scofield, C.E. and filed with the Dutchess County Clerk's office on July 7, 1897 as Map No. 514.

Map entitled "Map of Lands Belonging to Caroline R. Clark and Ors." prepared by W.R. Scofield and filed with the Dutchess County Clerk's office on November 15, 1916 as Map No. 1491.

DEED REFERENCE

Liber 1001 Page 311
Clarence E. Wood
Conveyed To
Leroy Steinard & Beryl Steinard
On July 15, 1959

Liber 535 Page 414
Thomas B. Finney & Theresa Finney
Conveyed To
Clarence Edward Wood & Florence May Wood
On December 13, 1933

TAX PARCEL NUMBER

City of Beacon, Dutchess County, New York
130200-6054-38-156634-0000

AREA

Total
17,635 ft²
0.405 Acres

CERTIFICATIONS

Beacon 226 Main Street LLC

ZONING

Property shown hereon is located within the R1-5 (5,000 ft²/dwelling) Residential District as shown on map entitled "Zoning" prepared by Frederick P. Clark Associates, Inc. and dated 6/7/1996, revised on 7/29/2014.

FLOOD ZONE

Property shown hereon is located within the Zone "X" Unshaded region and is determined to be outside the 0.2% annual chance floodplain as shown on Flood Insurance Rate Map (FIRM) No. 36027C0577E (Effective Date: 09/02/2012).

OWNERS & APPLICANTS

Beacon 226 Main Street LLC

PLANNING BOARD

Approved by resolution of the Planning Board of the City of Beacon, New York, on the 9th day, of year 2018. Subject to all requirements and conditions of said resolution. Any change, erasure, modification or revision of the plat as approved shall void the approval. Signed this 12th day, of year 2018. RESIGNED: 3-29-2019

By _____ *Chairman*

DCDOH STANDARD NOTE

FOR PERMISSION TO FILE
This plan does not constitute a realty subdivision as defined by Article XI, Title II, Section 1115 of the Public Health Law of the State of New York, and Article XI, of the Dutchess County Sanitary Code. Permission is hereby granted for the filing of this map with the Clerk of Dutchess County. Approval for arrangements for water supply and/or sewage disposal is neither sought nor granted.

Authorized Representative of the Commissioner of Health — *Date* 03/26/2019

OWNER'S CONSENT

The undersigned owners of the property hereon state that they are familiar with this map, its contents and its legends and hereby consent to all said terms and conditions as stated hereon.

Date 12/11/18

rev.	date	description
4	11/2/18	Revised Metes and Bounds
3	7/13/18	Revised Road Dedication
2	6/20/18	Revised Subdivision and Easement Lines
1	5/29/18	Revisions Per Planning Board

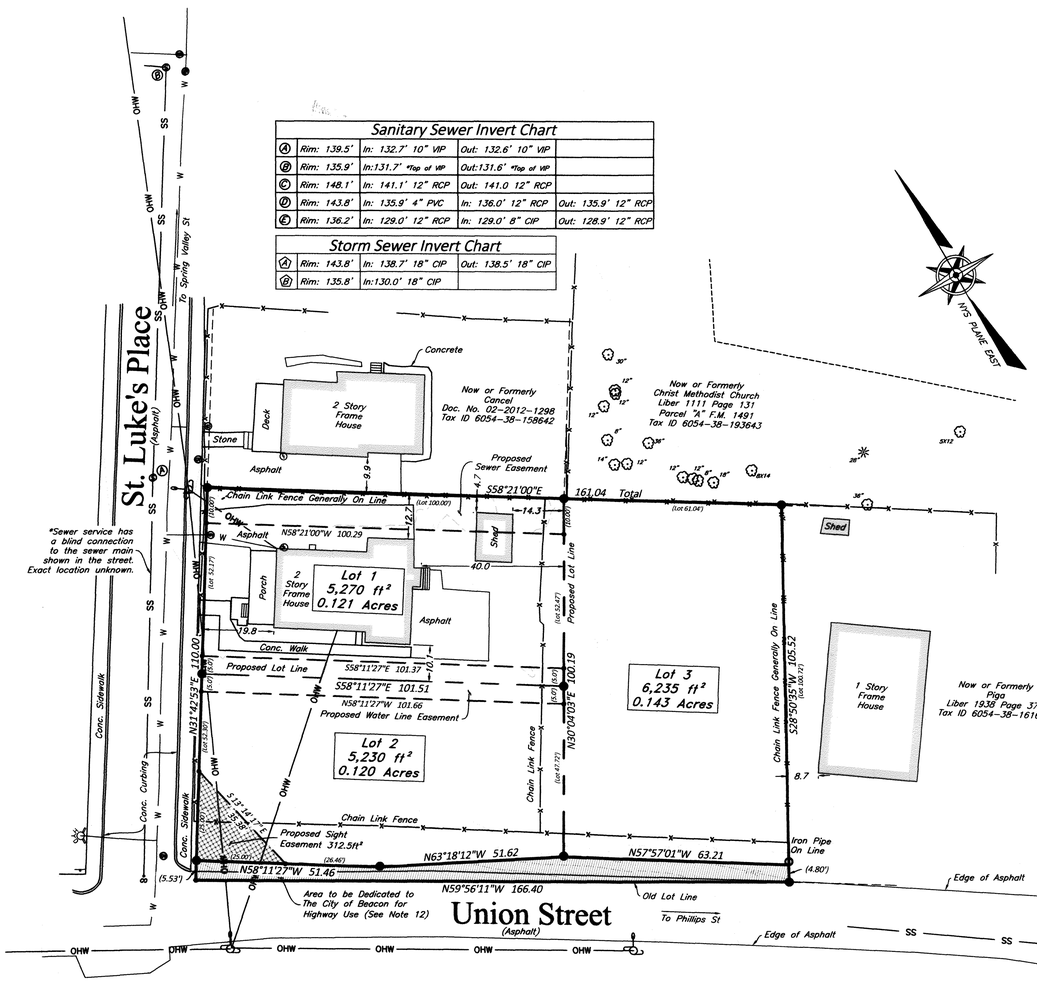
TEC LAND SURVEYING
15c TIORONDA AVE. BEACON, NY 12508
PH: 845.445.6590 Fx: 845.445.6591

Sanitary Sewer Invert Chart

(A)	Rim: 139.5'	In: 132.7' 10" VIP	Out: 132.6' 10" VIP	
(B)	Rim: 135.9'	In:131.7' *Top of VIP	Out:131.6' *Top of VIP	
(C)	Rim: 148.1'	In: 141.1' 12" RCP	Out: 141.0 12" RCP	
(D)	Rim: 143.8'	In: 135.9' 4" PVC	In: 136.0' 12" RCP	Out: 135.9' 12" RCP
(E)	Rim: 136.2'	In: 129.0' 12" RCP	In: 129.0' 8" CIP	Out: 128.9' 12" RCP

Storm Sewer Invert Chart

(A)	Rim: 143.8'	In: 138.7' 18" CIP	Out: 138.5' 18" CIP
(B)	Rim: 135.8'	In:130.0' 18" CIP	

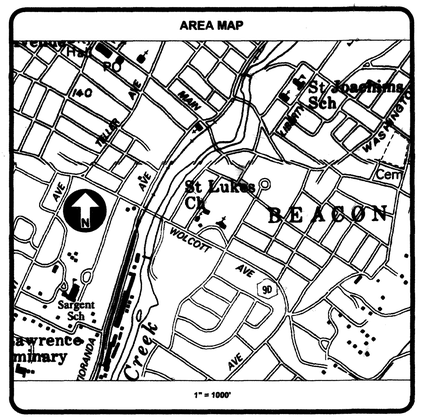


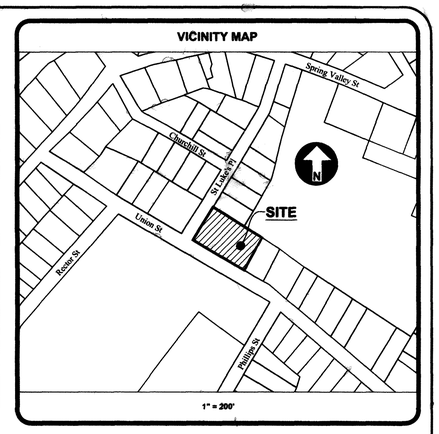
SCHEDULE OF REGULATIONS (R1-5 ZONING DISTRICT) AND LOT CONFORMANCE TABLE:

PARAMETER	REQUIREMENT	LOT #1	LOT #2	LOT #3
LOT AREA:	5,000 SQUARE FEET MIN	5,270 S.F.	5,230 S.F.	6,235 S.F.
LOT WIDTH:	50 FEET MINIMUM	52.2 FEET	50.9 FEET (AVG)	61.0 FEET
LOT DEPTH:	100 FEET MINIMUM	100.0 FEET	101.5 FEET	100.2 FEET
YARD SETBACKS (RESIDENTIAL USE):				
FRONT YARD:	30 FEET MINIMUM	12.5 FEET*	12.5 FEET**(1)	8.8 FEET**
SIDE YARD:	10 FEET MINIMUM	10.0 FEET	13.4 FEET	15.0 FEET
SIDE YARD (TOTAL OF TWO):	20 FEET MINIMUM TOTAL	22.7 FEET	28.3 FEET	37.1 FEET
REAR YARD:	30 FEET MINIMUM	40.0 FEET	56.4 FEET	58.5 FEET
YARD SETBACKS (ACCESSORY STRUCTURE):				
SIDE YARD:	5 FEET MINIMUM	STRUCTURE TBR	N/A	N/A
REAR YARD:	5 FEET MINIMUM	STRUCTURE TBR	N/A	N/A
MAIN BUILDING HEIGHT:	MAX 35 FEET, 2.5 STORIES	±27 FEET	<35 FEET	<35 FEET
MAIN BUILDING HEIGHT:	MIN 12 FEET, 1 STORY	±27 FEET	>12 FEET	>12 FEET
ACCESSORY BLDG. HEIGHT:	MAX 15 FEET, 1 STORY	STRUCTURE TBR	N/A	N/A
BUILDING COVERAGE:	MAX 25%	21.1%	13.5%	11.5%
DWELLING UNITS PER LOT:	MAX 1	1	1	1

* EXISTING, NON-CONFORMING
** THE APPLICANT REQUESTS RELIEF FROM THE PLANNING BOARD FOR THE FRONT YARD REQUIREMENT ON LOT #2 AND LOT #3 (TO PROVIDE A CONSISTENT FRONT YARD SETBACK TO HOUSES ALONG ST. LUKES PLACE AND UNION STREET, RESPECTIVELY).
(1)ASSUMES FULL FRONT YARD FROM ST. LUKES PLACE, WITH FRONT YARD ALONG UNION STREET REDUCED TO 0.25 X 52.0' = 13.0' (PER SECTION 223-13.J: ON A CORNER LOT IN ANY RESIDENCE DISTRICT, THERE SHALL BE PROVIDED A SIDE YARD ON THE SIDE STREET EQUAL IN DEPTH TO THE REQUIRED FRONT YARD ON SAID LOT, OR, IF THE LOT IS OCCUPIED BY A ONE-FAMILY HOME, SUCH SIDE YARD MAY BE REDUCED TO 25% OF THE ACTUAL LOT WIDTH).

GRAPHIC SCALE
40 20 10 0 20 60
1" = 20'





LEGEND

- PROPERTY LINE
- PROPOSED LOT LINE
- SS SANITARY SEWER LINE
- ST STORM SEWER LINE
- FENCE
- OHW OVERHEAD WIRES
- EDGE OF GRAVEL
- EDGE OF DIRT
- DECIDUOUS TREE
- CONIFEROUS TREE
- SPOT ELEVATIONS
- WETLAND FLAGS
- HYDRANT
- GAS VALVE
- WATER VALVE
- ELECTRIC BOX
- (E) ELECTRIC MANHOLE
- (T) TELEPHONE MANHOLE
- (S) SANITARY SEWER MANHOLE
- (D) DRAINAGE MANHOLE
- UNIDENTIFIED MANHOLE
- DROP INLET
- LIGHT POLE
- UTILITY POLE
- MAIL BOX
- GUY WIRE
- SIGN
- BOLLARD
- IRON ROD FOUND
- IRON PIPE FOUND
- MONUMENT FOUND
- PROPERTY CORNER

STATE OF NEW YORK * THOMAS E. CERCHIARA * LICENSED LAND SURVEYOR

THOMAS E. CERCHIARA, P.L.S.
P.L.S. No. 50732

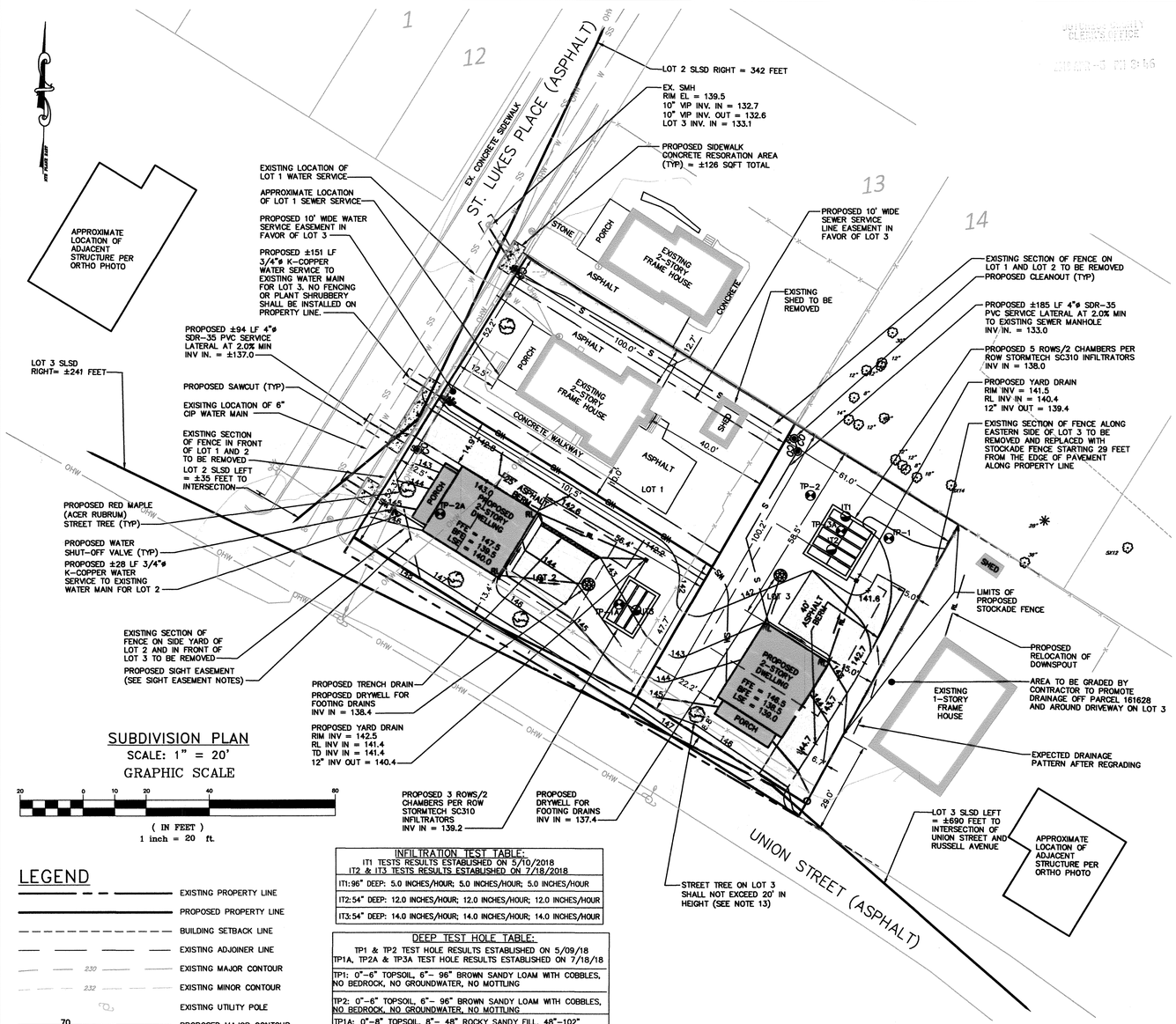
38 ST LUKES PLACE

SUBDIVISION PLAT PREPARED FOR BEACON 226 MAIN STREET LLC

CITY OF BEACON, COUNTY OF DUTCHESS, STATE OF NEW YORK

tax id	6054-38-156634
address	38 ST LUKES PLACE
date	04/20/2018
drawn	JR
scale	1" = 20'
checked	TEC
project no.	18-040
project name	38 ST LUKES PLACE
sheet	1 OF 5

FM # 514A
Page 1 of 5
FILED: 4/05/2019



SUBDIVISION PLAN
SCALE: 1" = 20'
GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- BUILDING SETBACK LINE
- EXISTING ADJOINER LINE
- 230 EXISTING MAJOR CONTOUR
- 232 EXISTING MINOR CONTOUR
- EXISTING UTILITY POLE
- 70 PROPOSED MAJOR CONTOUR
- 66 PROPOSED MINOR CONTOUR
- + 90.5 PROPOSED SPOT ELEVATION
- S EXISTING SEWER MAIN
- S PROPOSED SEWER SERVICE LINE
- W EXISTING WATER MAIN
- WS PROPOSED WATER SERVICE LINE
- PROPOSED WATER SHUT-OFF VALVE
- PROPOSED SEWER CLEAN OUT
- RL PROPOSED ROOF LEADER
- DEEP TEST PIT
- INFILTRATION TEST

INFILTRATION TEST TABLE:
IT1 TESTS RESULTS ESTABLISHED ON 5/10/2018
IT2 & IT3 TESTS RESULTS ESTABLISHED ON 7/18/2018

IT1:96" DEEP: 5.0 INCHES/HOUR; 5.0 INCHES/HOUR; 5.0 INCHES/HOUR
IT2:54" DEEP: 12.0 INCHES/HOUR; 12.0 INCHES/HOUR; 12.0 INCHES/HOUR
IT3:54" DEEP: 14.0 INCHES/HOUR; 14.0 INCHES/HOUR; 14.0 INCHES/HOUR

DEEP TEST HOLE TABLE:
TP1 & TP2 TEST HOLE RESULTS ESTABLISHED ON 5/09/18
TP1A, TP2A & TP3A TEST HOLE RESULTS ESTABLISHED ON 7/18/18

TP1: 0"-6" TOPSOIL, 6"- 96" BROWN SANDY LOAM WITH COBBLES, NO BEDROCK, NO GROUNDWATER, NO MOTTLING
TP2: 0"-6" TOPSOIL, 6"- 96" BROWN SANDY LOAM WITH COBBLES, NO BEDROCK, NO GROUNDWATER, NO MOTTLING
TP1A: 0"-8" TOPSOIL, 8"- 48" ROCKY SANDY FILL, 48"-102" BROWN SANDY LOAM, NO BEDROCK, NO GROUNDWATER, NO MOTTLING
TP2A: 0"-6" TOPSOIL, 6"- 48" BROWN SANDY LOAM WITH COBBLES, BEDROCK @ 48", NO GROUNDWATER, NO MOTTLING
TP3A: 0"-6" TOPSOIL, 6"- 30" ROCKY SANDY FILL, 30"-96" FINE SANDY LOAM, NO BEDROCK, NO GROUNDWATER, NO MOTTLING

SOIL TESTING NOTES:
1. SOIL TESTING DIRECTION AND PERFORMED BY HUDSON LAND DESIGN PERSONNEL. 7/18/2018 TESTING OBSERVED BY THE CITY ENGINEER'S OFFICE.

SURVEYOR'S CERTIFICATION:
I HEREBY CERTIFY THAT THE SURVEY SHOWN HEREON IS BASED ON ACTUAL FIELD MEASUREMENTS COMPLETED ON OCTOBER 6, 2017.

THOMAS CERCHIARA, P.L.S. — SEAL

OWNER'S CONSENT:
THE UNDERSIGNED OWNER OF THE PROPERTY HEREON STATES THAT HE IS FAMILIAR WITH THIS MAP, ITS CONTENTS AND ITS LEGENDS AND HEREBY CONSENTS TO ALL SAID TERMS AND CONDITIONS AS STATED HEREON.

GARY JOSEPH OR JM OWEN — DATE 12/11/18

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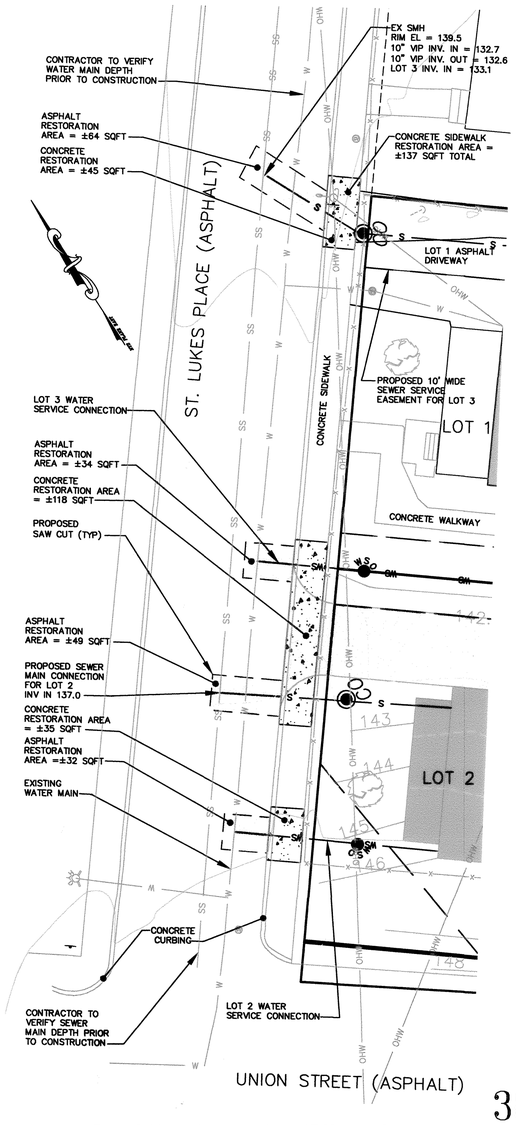


ENLARGED UTILITY CONNECTION PLAN NORTHWEST CORNER OF LOT 1
SCALE: 1" = 10'
GRAPHIC SCALE

(IN FEET)
1 inch = 10 ft.

Dig Safely. New York
800-962-7962
www.digsafelynewyork.org
- Call Before You Dig
- Wait The Required Time
- Confirm Utility Response
- Respect the Marks
- Dig With Care

DRAWN BY: AG | CHECKED BY: DGK | JOB NO.: 2018:012

REVISIONS:

NO.	DATE	DESCRIPTION	BY
1	05/29/18	REVISED LAYOUT PER CONSULTANT COMMENTS	AG
2	06/26/18	PER CONSULTANT COMMENTS	AG
3	07/31/18	PER CONSULTANT COMMENTS	AG
4	09/04/18	FOR FINAL REVIEW	AG

PROJECT INFORMATION:

PARCEL OWNERS:	BEACON 226 MAIN STREET LLC; 1 E MAIN ST, BEACON, NY 12508
PROJECT ENGINEER:	HUDSON LAND DESIGN P.C., 174 MAIN STREET, BEACON NY 12508
PARCEL LOCATION:	38 ST. LUKES PLACE, BEACON NY, 12508
TAX PARCEL ID:	6054-38-156634 (±0.405 AC)
PARCEL AREA:	±0.405 ACRES
WATER SUPPLY:	MUNICIPAL
SEWAGE DISPOSAL:	MUNICIPAL

MAP REFERENCES:
1. EXISTING FEATURES AS SHOWN ON THIS SUBDIVISION PLAN PROVIDED BY MAPPING OBTAINED FROM TEC LAND SURVEYORS, PS, LLC.

SURVEY NOTES:
1. SEE SHEET 1 FOR METES AND BOUNDS FOR EXISTING AND PROPOSED PROPERTY LINES.

SITE SPECIFIC NOTES:
1. THE CONTRACTOR SHALL PERFORM A UTILITIES CALL-OUT PRIOR TO CONSTRUCTION TO VERIFY ALL UNDERGROUND UTILITY LOCATIONS BY CONTACTING UPPO @ 1-800-962-7962. SPECIFIC ATTENTION SHALL BE PAID TO THE LOCATIONS OF THE GAS (IF APPLICABLE), WATER AND SEWER MAINS WITH RESPECT TO THE PROPOSED LOCATIONS FOR THE SERVICE LINES.
2. THE CONTRACTOR SHALL CONTACT THE CITY OF BEACON WATER AND SEWER DEPARTMENTS TO SCHEDULE A PRE-CONSTRUCTION MEETING TO ENSURE THAT THE ARRANGEMENTS FOR WATER SUPPLY AND SEWAGE DISPOSAL ARE COMMENCED IN ACCORDANCE WITH THE APPROVED PLANS AND AMENDMENTS THERETO AND GENERALLY ACCEPTED STANDARDS.
3. THE PROPOSED LOT SHALL BE SERVED BY THE CITY OF BEACON MUNICIPAL WATER AND SEWER SERVICES.
4. THE WATER SERVICE LINE AND METER SHALL BE INSTALLED IN ACCORDANCE WITH THE CITY OF BEACON WATER DEPARTMENT REQUIREMENTS.
5. THE WATER SERVICE LINE SHALL BE 3/4"ø K-COPPER.
6. THE SEWER SERVICE LINE SHALL BE 4"ø SDR 35 PVC PIPE WITH PITCH AS SHOWN ON THE PLAN (MINIMUM OF ¼" PER FOOT SHALL BE MAINTAINED).
7. A ROAD OPENING PERMIT SHALL BE REQUIRED FOR THE INSTALLATION OF THE PROPOSED WATER AND SEWER SERVICES FOR THE NEW LOT. STREET CLOSURE FOR WATER AND SEWER SERVICE CONNECTIONS SHALL BE PERFORMED IN ACCORDANCE WITH CITY OF BEACON REQUIREMENTS.
8. ALL EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO CONSTRUCTION. THE PROPOSED DRIVEWAY SHALL HAVE A STABILIZED CONSTRUCTION ENTRANCE.
9. ROOF LEADER CONNECTIONS TO BE MINIMUM 4"ø PVC OR HDPE @ 2.0% MIN.
10. SUMP PUMP TO BE PROVIDED FOR FOOTING DRAIN, IF NECESSARY. THE TYPE OF PUMP AND METHODS USED TO ENSURE PROPER DRAINAGE SHALL BE ACCEPTABLE TO THE CITY OF BEACON BUILDING DEPARTMENT.
11. THE DRIVEWAY SIGHT DISTANCE MEETS OR EXCEEDS COMPLIANCE WITH THE CITY OF BEACON'S 192-9(B) CODE AND THE NEW YORK STATE DEPARTMENT OF TRANSPORTATION REQUIREMENTS. THE STATE UTILIZES THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) GUIDELINES FOR INTERSECTION SIGHT DISTANCES. FOR ROADS WITH A SPEED LIMIT OF 30 MPH, AASHTO DESIGN TABLES CALL FOR A SIGHT DISTANCE OF 290 FEET TO THE LEFT AND 335 FEET TO THE RIGHT. THE MEASURED SIGHT DISTANCE IS AS FOLLOWS:
    LOT 2: SLSD LEFT = ±35 FEET (TO INTERSECTION OF ST. LUKES PLACE AND UNION STREET)
    SLSD RIGHT = ±342 FEET
    LOT 3: SLSD RIGHT = ±241 FEET
    SLSD LEFT = ±690 FEET (TO INTERSECTION OF UNION STREET AND RUSSELL AVE)
AS SLSD RIGHT FOR LOT 3 IS DEFICIENT, STOPPING SIGHT DISTANCE (SSD) WAS MEASURED TO BE 241', WHICH EXCEEDS THE MINIMUM REQUIRED 200 FEET WHEN APPROACHING THE PROPOSED DRIVEWAY FROM THE NORTH (SOUTHBOUND).
STOPPING SIGHT DISTANCE (SSD) WAS OBSERVED TO BE IN EXCESS OF THE REQUIRED 200 FEET WHEN APPROACHING THE PROPOSED DRIVEWAY FOR BOTH LOT 2 AND LOT 3 FROM THE LEFT AND RIGHT.
12. THE CONTRACTOR SHALL FIELD VERIFY THE LOCATIONS AND INVERTS OF ALL CATCH BASINS, STORM SEWER LINES, SANITARY MANHOLES, SEWER LINES, WATERLINES, AND UNDERGROUND UTILITY LINES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL NOT ASSUME THAT ALL LOCATIONS AS SHOWN ON THE PLAN ARE CORRECT. INVESTIGATIVE TEST PITS MAY BE REQUIRED TO VERIFY LOCATIONS.
13. TREES PLANTED ON EASTERN EDGE OF LOT 3 SHALL BE LIMITED TO SPECIES THAT WILL NOT GROW OVER 20 FEET IN HEIGHT. TREES SHALL BE PRUNED AS NECESSARY TO ALLOW SUNLIGHT TO ACCESS SOLAR PANELS ON PARCEL 161628. THE STREET TREE IN THE FRONT YARD SETBACK SHALL NOT BE REPLACED BY SHRUBS IN ORDER TO MAINTAIN ADEQUATE SIGHT DISTANCE.

INDIANA BAT PROTECTION NOTES:
1. TREE CLEARING SHALL BE RESTRICTED TO THE PERIOD BETWEEN OCTOBER 1 AND MARCH 31.
2. THE LIMITS OF DISTURBANCE SHALL BE DEMARCATED BY INSTALLING ORANGE CONSTRUCTION FENCE FOR THE GENERAL IMPROVEMENT AND INFRASTRUCTURE CONSTRUCTION ACTIVITIES AND FOR THE INDIVIDUAL LOT CONSTRUCTION. THESE LIMITS SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION.
3. DUST CONTROL DURING CONSTRUCTION SHALL BE IMPLEMENTED. THIS INCLUDES USE OF CONSTRUCTION ENTRANCES, APPLYING LIGHT WATER, AND ESTABLISHING VEGETATION.
4. SIGHT LIGHTS ARE NOT PERMITTED. RESIDENTIAL LIGHTING SHALL BE DIRECTED DOWNWARD TO REDUCE IMPACTS TO BATS FORAGING FOR FOOD.

SIGHT EASEMENT NOTES:
1. THE HOLDER OF FEE TITLE TO THE ABUTTING STREETS SHALL HAVE THE RIGHT TO ENTER THE EASEMENT AREA FOR THE PURPOSE OF CLEARING, PRUNING OR REGRADING SO AS TO MAINTAIN A CLEAR LINE OF SIGHT IN EITHER DIRECTION ACROSS THE TRIANGULAR SIGHT EASEMENT AREA BETWEEN THE OBSERVERS EYE 3.5' ABOVE THE PAVEMENT SURFACE ON ONE STREET AND AN OBJECT ONE FOOT ABOVE THE PAVEMENT SURFACE ON THE OTHER.
2. THE INITIAL ESTABLISHMENT OF CLEAR SIGHT LINES WITHIN THE SIGHT EASEMENT AREA SHALL BE THE RESPONSIBILITY OF THE SUBDIVIDER.

APPROVED BY RESOLUTION OF THE PLANNING BOARD OF THE CITY OF BEACON, NEW YORK, ON THE 14TH DAY OF AUGUST 20 18 SUBJECT TO ALL REQUIREMENTS AND CONDITIONS OF SAID RESOLUTION. ANY CHANGE, ERASURE, MODIFICATION OR REVISION OF THIS PLAT, AS APPROVED, SHALL VOID THIS APPROVAL.

SIGNED THIS ____ DAY OF DECEMBER 20 18 BY

CHAIRMAN RESIGNED: MARCH 29 2019

SECRETARY

IN ABSENCE OF THE CHAIRMAN OR SECRETARY, THE ACTING CHAIRMAN OR ACTING SECRETARY RESPECTIVELY MAY SIGN IN THIS PLACE.

SUBDIVISION PLAN
38 ST. LUKES SUBDIVISION

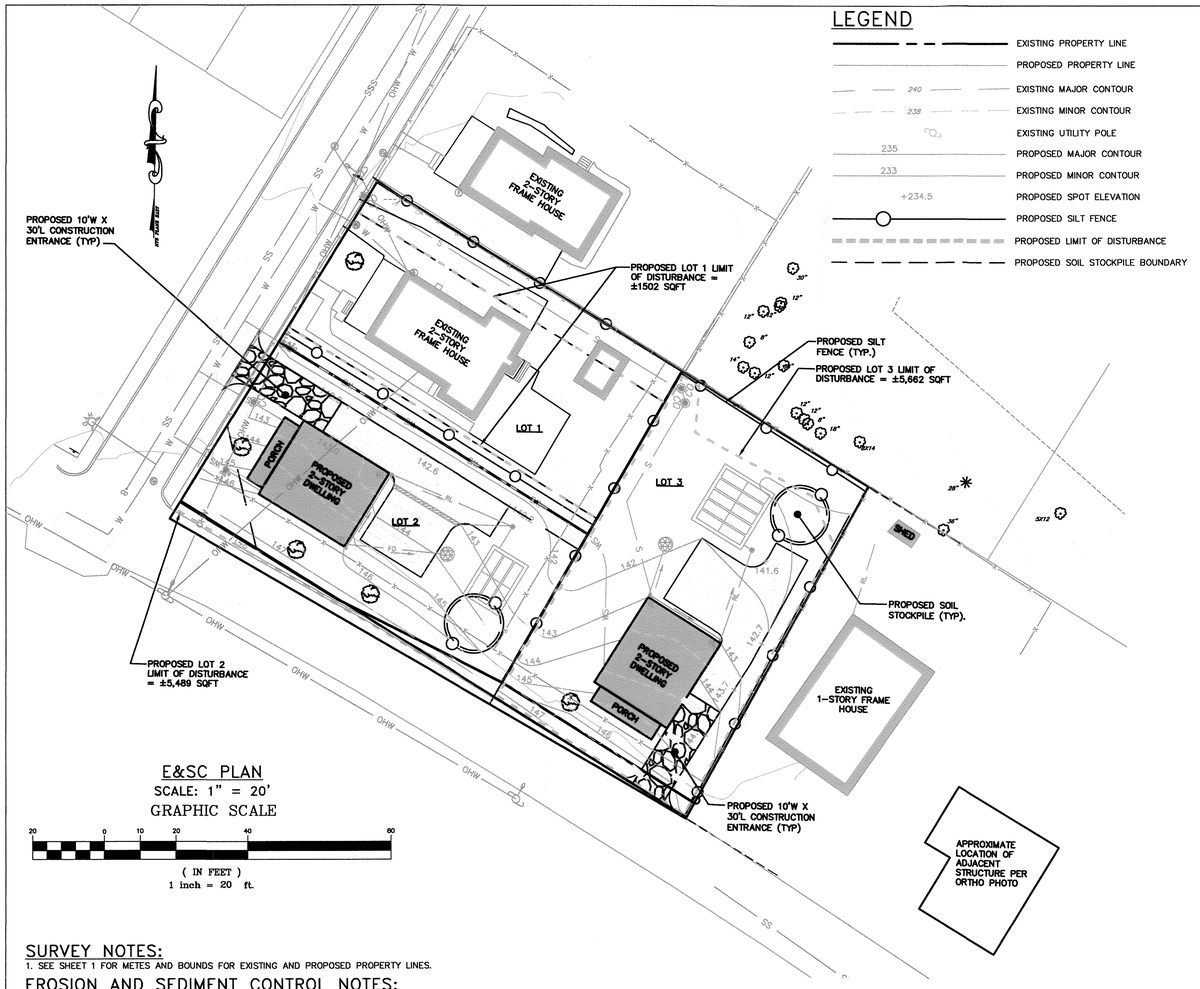
38 ST. LUKES PLACE
CITY OF BEACON
DUTCHESS COUNTY, NEW YORK
TAX ID: 6054-38-156634
SCALE: 1" = 20'
APRIL 24, 2018

HUDSON LAND DESIGN
PROFESSIONAL ENGINEERING P.C.
174 MAIN STREET
BEACON, NEW YORK 12508
PH: 845-440-6926 F: 845-440-6637

SEAL

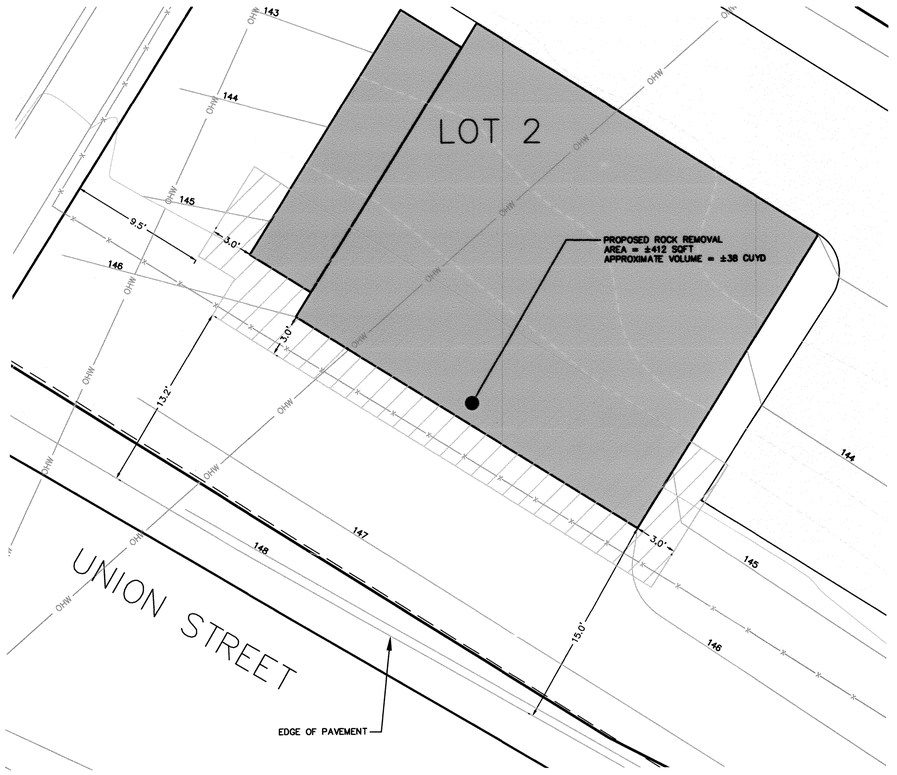
JON D. BODENDORF, P.E.
NYS LICENSE NO. 076245
DANIEL G. KOEHLER, P.E.
NYS LICENSE NO. 082716

SHEET: 2 OF 5



E&SC PLAN
SCALE: 1" = 20'
GRAPHIC SCALE

20 0 10 20 40 60
(IN FEET)
1 inch = 20 ft.



ROCK REMOVAL PLAN
SCALE: 1" = 5'
GRAPHIC SCALE

5 0 2.5 5 10 20
(IN FEET)
1 inch = 5 ft.

SURVEY NOTES:
1. SEE SHEET 1 FOR METES AND BOUNDS FOR EXISTING AND PROPOSED PROPERTY LINES.

EROSION AND SEDIMENT CONTROL NOTES:

1. ALL EROSION CONTROL MEASURES EMPLOYED DURING THE CONSTRUCTION PROCESS SHALL BE INSPECTED BY THE CONTRACTOR IN ACCORDANCE WITH THE MAINTENANCE SCHEDULE. ALL EROSION CONTROL STRUCTURES SHALL BE REPAIRED AND MAINTAINED AS NECESSARY BY THE CONTRACTOR.
2. ALL STORMWATER MANAGEMENT STRUCTURES (E.G. CATCH BASINS) SHALL BE REGULARLY INSPECTED FOR SEDIMENT ACCUMULATIONS. CATCH BASINS SHALL BE CLEANED WHEN SEDIMENT DEPTH REACHES A MAXIMUM OF ONE-HALF THE AVAILABLE SUMP DEPTH.
3. ALL EROSION CONTROL INSTALLATION AND MAINTENANCE MEASURES SHALL MEET THE REQUIREMENTS OF THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL.
4. ANY PILE OF POTENTIALLY EROSIVE MATERIAL TEMPORARILY STOCKPILED ON THE SITE DURING THE CONSTRUCTION PROCESS SHALL BE LOCATED IN AN AREA AWAY FROM STORM DRAINAGE AND SHALL BE PROPERLY PROTECTED FROM EROSION BY A SURROUNDING SILT FENCE.
5. PERMANENT SEEDED AREAS FOR EROSION CONTROL SHALL BE IN ACCORDANCE WITH DETAIL AND SPECIFICATIONS ON THIS SHEET.
6. AREAS UNDERGOING CLEARING OR GRADING AND WHERE WORK IS DELAYED OR COMPLETED AND WILL NOT BE REDISTURBED FOR A PERIOD OF 21 DAYS OR MORE SHALL BE STABILIZED WITH TEMPORARY OR PERMANENT VEGETATIVE COVER WITHIN 14 DAYS.
7. ON-SITE DUST CONTROL SHALL BE ACCOMPLISHED BY STANDARD METHODS OF LIGHTLY WATERING ALL EXPOSED SOIL AND RAPIDLY STABILIZING THE REGRADED AREAS WITH TOPSOIL, LOAM AND/OR SEEDING.
8. THE CITY ENGINEER AND PROJECT ENGINEER SHALL BE NOTIFIED NO LESS THAN 48 HOURS PRIOR TO THE START OF ANY SITE WORK, AND BY SUCH NOTIFICATION, SHALL BE PROVIDED WITH THE NAME AND TELEPHONE NUMBER OF THE GENERAL CONTRACTOR RESPONSIBLE FOR SUCH WORK.
9. THE CITY AND/OR ITS REPRESENTATIVES MAY INSPECT EROSION AND SEDIMENT CONTROL PRACTICES ON THE SITE DURING CONSTRUCTION AND RECOMMEND THAT THE CONTRACTOR INSTALL ADDITIONAL EROSION CONTROL MEASURES IF DEEMED NECESSARY TO PROTECT ANY UNDISTURBED AREAS OF THE SITE. ANY SUCH REQUESTS SHALL BE MADE DIRECTLY TO THE CONTRACTOR AND QUALIFIED PROFESSIONAL AND FOLLOWED UP WITH A WRITTEN NOTIFICATION TO THE DEVELOPER. IN ADDITION, THE PROJECT ENGINEER SHALL BE CONSULTED ON ANY SPECIAL ADDITIONS OR DELETIONS OF EROSION CONTROL MEASURES WARRANTED BY CHANGING FIELD CONDITIONS.
10. IF GROUNDWATER IS ENCOUNTERED DURING CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL CONSTRUCT A DEWATERING PIT IN ACCORDANCE WITH NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL TO FILTER WATER FOR PUMPING TO A SUITABLE LOCATION.
11. WHEN ALL DISTURBED AREAS ARE STABLE, ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED.

INSPECTION SCHEDULE & LONG TERM MAINTENANCE OF STORMWATER STRUCTURES

CATCH BASINS AND PIPING:

ALL CATCH BASINS SHALL BE INSPECTED AFTER EACH STORM EVENT FOR SEDIMENT ACCUMULATION, AND DEBRIS, AND REMOVE AS NECESSARY. WHEN SEDIMENT ACCUMULATION WITHIN THE CATCH BASIN SUMP REACHES 1/2 OF THE SUMP DEPTH, IT SHALL BE REMOVED. ASSOCIATED PIPING SHALL BE INSPECTED ANNUALLY AND ACCUMULATED SEDIMENT SHALL BE REMOVED AS NEEDED.

UNDERGROUND INFILTRATION BASIN:

THE UNDERGROUND INFILTRATION BASIN SHALL BE INSPECTED MONTHLY FOR SEDIMENT AND DEBRIS ACCUMULATION VIA THE INSPECTION PORTS. INFLOW PIPES AND OUTLET STRUCTURES SHOULD ALSO BE INSPECTED FOR SEDIMENT AND DEBRIS MONTHLY. ANY ACCUMULATED SEDIMENT OR DEBRIS SHOULD BE REMOVED AS NECESSARY. AFTER STORM EVENTS, THE INFILTRATION BASIN DEWATERING DURATION SHOULD ALSO BE MONITORED. SEDIMENT SHALL BE CLEANED OUT OF THE INFILTRATION BASIN ANNUALLY. THE CLEANING PROCEDURE FOR THE UNDERGROUND INFILTRATION CHAMBERS IS AS FOLLOWS:

THE STORMTECH SYSTEM SHALL BE EQUIPPED WITH AN INSPECTION PORT LOCATED ON THE INLET ROW. THE INSPECTION PORT IS A CIRCULAR CAST BOX PLACED IN A RECTANGULAR CONCRETE COLLAR. WHEN THE LID IS REMOVED, A 6-INCH PIPE WITH A SCREW-IN PLUG WILL BE EXPOSED. REMOVE THE PLUG. THIS WILL PROVIDE ACCESS TO THE STORMTECH CHAMBER ROW BELOW. FROM THE SURFACE, THROUGH THIS ACCESS, THE SEDIMENT MAY BE MEASURED AT THIS LOCATION. A STADIA ROD MAY BE USED TO MEASURE THE DEPTH OF SEDIMENT IF ANY IN THIS ROW. ADDITIONALLY, CCTV INSPECTION OF THIS ROW CAN BE DEPLOYED THROUGH THIS ACCESS PORT TO DETERMINE IF ANY SEDIMENT HAS ACCUMULATED. IF THE DEPTH OF SEDIMENT IS IN EXCESS OF 3 INCHES, THEN THIS ROW SHOULD BE CLEANED WITH HIGH PRESSURE WATER THROUGH A CULVERT CLEANING NOZZLE. THIS WOULD BE CARRIED OUT THROUGH THE UPSTREAM YARD BASIN. THE INLET ROW IS PLACED ON A POLYETHYLENE LINER TO PREVENT SCOURING OF THE WASHED STONE BENEATH THIS ROW. THIS FACILITATES THE FLUSHING OF THIS ROW WITH HIGH PRESSURE WATER THROUGH A CULVERT CLEANING NOZZLE. THE NOZZLE IS DEPLOYED THROUGH THE YARD BASIN AND EXTENDED TO THE END OF THE ROW. THE WATER IS TURNED ON AND THE INLET ROW IS BACK-FLUSHED INTO THE YARD BASIN WHERE IT IS REMOVED BY USING A VACUUM TRUCK.

ROCK REMOVAL NOTES:
1. FOR EXCAVATION OF LOT 2'S FOUNDATION, THE AREA OF ROCK REMOVAL SHALL BE LIMITED TO THE AREA SHOWN ON THE ROCK REMOVAL PLAN.
2. NO BLASTING SHALL BE USED FOR THE REMOVAL OF ROCK. MECHANICAL ROCK REMOVAL (CHIPPING, HAMMERING, FRACKING) SHALL BE THE ONLY MEANS OF ROCK EXCAVATION.
3. ROCK REMOVAL SHALL NOT COMMENCE BEFORE 8 AM AND AFTER 4 PM, MONDAY THROUGH FRIDAY. ROCK REMOVAL SHALL NOT OCCUR ON ANY FEDERAL HOLIDAYS OR WEEKENDS.

APPROVED BY RESOLUTION OF THE PLANNING BOARD OF THE CITY OF BEACON, NEW YORK, ON THE 14TH DAY OF AUGUST, 20 18, SUBJECT TO ALL REQUIREMENTS AND CONDITIONS OF SAID RESOLUTION. ANY CHANGE, ERASURE, MODIFICATION OR REVISION OF THIS PLAT, AS APPROVED, SHALL VOID THIS APPROVAL.

SIGNED THIS 10th DAY OF DECEMBER, 20 18, BY

CHAIRMAN RESIGNED: MARCH 29, 2019

SECRETARY

IN ABSENCE OF THE CHAIRMAN OR SECRETARY, THE ACTING CHAIRMAN OR ACTING SECRETARY RESPECTIVELY MAY SIGN IN THIS PLACE.

OWNER'S CONSENT:
THE UNDERSIGNED OWNER OF THE PROPERTY HEREON STATES THAT HE IS FAMILIAR WITH THIS MAP, ITS CONTENTS AND ITS LEGENDS AND HEREBY CONSENTS TO ALL SAID TERMS AND CONDITIONS AS STATED HEREON.

BY: JOSEPH OR JIM OWEN — DATE 12/11/18

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DRAWN BY: AG	CHECKED BY: DGK	JOB NO.: 2018:012

REVISIONS:

NO.	DATE	DESCRIPTION	BY
1	05/29/18	REVISED LAYOUT PER CONSULTANT COMMENTS	AG
2	06/26/18	PER CONSULTANT COMMENTS	AG
3	07/31/18	PER CONSULTANT COMMENTS	AG
4	09/04/18	FOR FINAL REVIEW	AG

EROSION & SEDIMENT CONTROL PLAN
38 ST. LUKES SUBDIVISION

38 ST. LUKES PLACE
CITY OF BEACON
DUTCHESS COUNTY, NEW YORK
TAX ID: 6054-38-156634
SCALE: 1" = 20'
APRIL 24, 2018

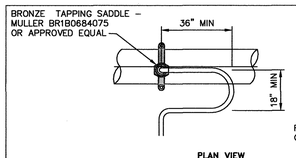
HUDSON LAND DESIGN
HUDSON LAND DESIGN
PROFESSIONAL ENGINEERING P.C.
174 MAIN STREET
BEACON, NEW YORK 12508
PH: 845-440-6926 F: 845-440-6637

STATE OF NEW YORK — DANIEL G. KOEHLER — 082716 — LICENSED PROFESSIONAL ENGINEER
SEAL

JON D. BODENDORF, P.E.
NYS LICENSE NO. 076245
DANIEL G. KOEHLER, P.E.
NYS LICENSE NO. 082716

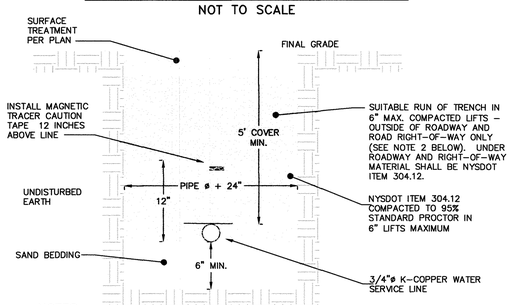
SHEET: 3 OF 5

FM # 514A
Page 3 of 5
FILED: 4/05/2019



NOTES:
1. A MINIMUM 5' COVER SHALL BE PROVIDED ON THE WATER SERVICE LINE (CONDITIONED ON ACTUAL WATER MAIN DEPTH).
2. CORPORATION STOP TO BE COMPRESSION TYPE BY MUELLER.
3. WATER SERVICE LINE TO HAVE A 'GOOSENECK' NEAR CORPORATION STOP.
4. CORPORATION STOP TO BE INSTALLED IN THE UPPER HALF OF THE WATER MAIN AT AN ANGLE OF APPROXIMATELY 45° FROM HORIZONTAL.
5. THE CONTRACTOR SHALL INSTALL A FULL BODIED STAINLESS STEEL TAPPING SLEEVE AT THE PROPOSED WATER SERVICE LOCATION.

WATER SERVICE CONNECTION DETAIL
NOT TO SCALE

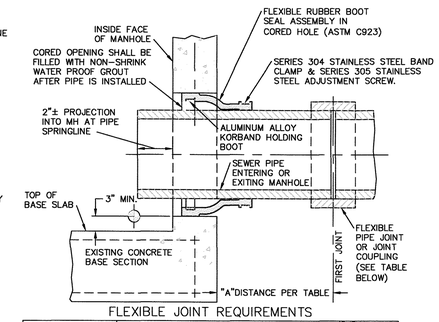


NOTES:
1. EXCAVATION AND TRENCHING SHALL MEET ALL OSHA REQUIREMENTS.
2. SUITABLE RUN OF TRENCH SHALL NOT INCLUDE FROZEN MATERIALS, DEBRIS, ORGANIC MATERIALS, ENLOGATED PARTICLES, LARGE STONES OR OTHER UNSUITABLE MATERIALS. IF THE RUN OF TRENCH MATERIAL IS FOUND TO BE UNSUITABLE, A SUITABLE BACKFILL MATERIAL SHALL BE IMPORTED AND USED.
3. IN AREAS WHERE 5' COVER REQUIREMENT CANNOT BE MET, THE CONTRACTOR SHALL PROVIDE PIPE INSULATION TO PREVENT FREEZING.
4. IF WATER SERVICE AND SEWER SERVICE LINE CROSSINGS ARE NEEDED, PROVIDE 18" OF VERTICAL SEPARATION

WATER SERVICE LINE TRENCH DETAIL
NOT TO SCALE

NOTES:
1. EXCAVATION AND TRENCHING SHALL MEET ALL OSHA REQUIREMENTS.

STORM LINE TRENCH DETAIL
NOT TO SCALE

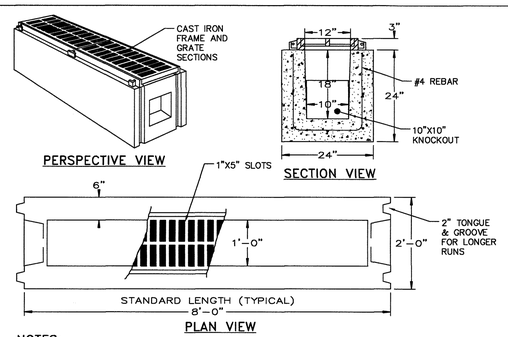


FLEXIBLE JOINT REQUIREMENTS

SEWER PIPE TYPE	FLEXIBLE JOINT TYPE IN & OUT	"A" DISTANCE (FEET)
DUCTILE IRON	STD RUBBER GASKET PIPE JOINT ONLY	10' MAX
PVC	STD RUBBER GASKET PIPE JOINT ONLY	3' MAX

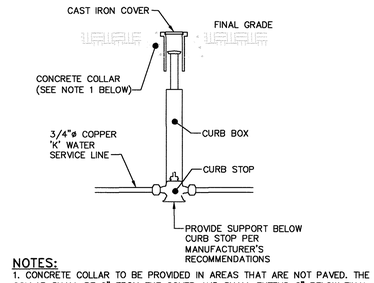
NOTE:
REFERENCE MANHOLE DETAIL(S) FOR REQUIRED INVERT CHANNEL CONFIGURATION.

CORED HOLE AND INSERTED BOOT DETAIL
NOT TO SCALE



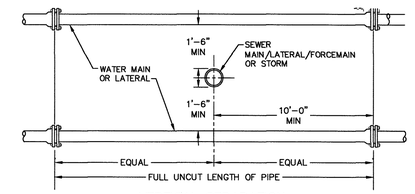
NOTES:
1. MATERIALS AND METHODS OF CONSTRUCTION SHALL BE IN CONFORMANCE WITH THE NEW YORK STATE DEPARTMENT OF TRANSPORTATION (NYSDOT) STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS, LATEST EDITION, AND ALL ADDENDA THERETO.
2. REFER ALSO TO NYSDOT STANDARD SHEET 604-01.
3. MINIMUM LOAD RATING TO BE H-20.

TRENCH DRAIN DETAIL
NOT TO SCALE

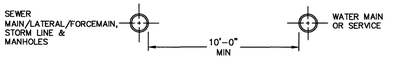


NOTES:
1. CONCRETE COLLAR TO BE PROVIDED IN AREAS THAT ARE NOT PAVED. THE COLLAR SHALL BE 6" FROM THE COVER AND SHALL EXTEND 6" BELOW FINAL GRADE.
2. CURB STOP TO BE COMPRESSION TYPE BY MUELLER.
3. AREA AROUND CURB BOX TO BE BACKFILLED WITH GRAVELLY MATERIAL.

WATER SHUT-OFF VALVE DETAIL
NOT TO SCALE



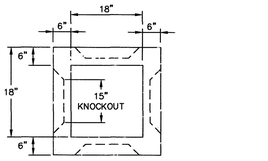
VERTICAL SEPARATION



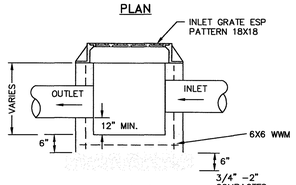
HORIZONTAL SEPARATION

NOTE:
NO DEVIATION IN THE SEPARATION REQUIREMENTS WILL BE PERMITTED WITHOUT THE EXPRESS APPROVAL OF THE DUTCHESS COUNTY DEPARTMENT OF HEALTH AND THE CITY OF BEACON. CONCRETE ENCASEMENT OF WATERLINE OR OFFSETTING OF WATERLINE SHALL BE REQUIRED WHERE SEPARATION DISTANCES CANNOT BE MAINTAINED.

WATER LINE SEPARATION DETAIL
NOT TO SCALE



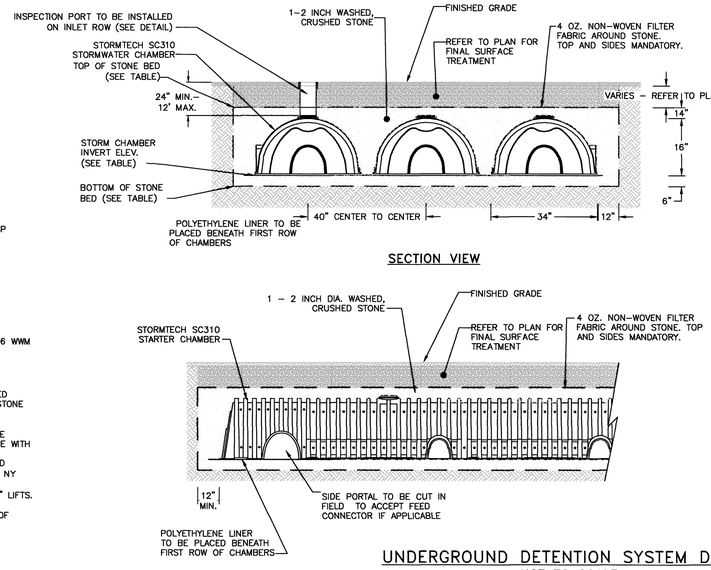
PLAN



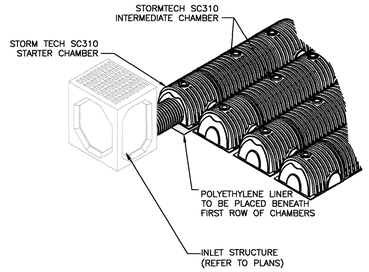
SECTION

NOTES:
1. YARD INLET BASINS SHALL BE PRE CAST REINFORCED CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI AND SHALL BE IN CONFORMANCE WITH ASTM 478-68. WALLS AND BASE SHALL BE ONE PIECE CONSTRUCTION. YARD INLET BASIN SHOWN BY EXPANDED SUPPLY PRODUCTS (ESP), 3330 ROUTE 9, COLD SPRING, NY (845) 265-3771.
2. BACK FILL USING SELECT MATERIAL, COMPACTED IN 6" LIFTS.
3. SUMP SHALL BE 12".
4. FRAMES AND GRATES SHALL BE SET IN A FULL BED OF MORTAR.

PRE-CAST CONCRETE YARD INLET DETAIL
NOT TO SCALE



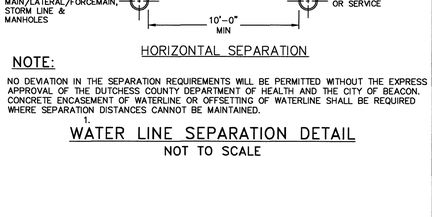
SECTION VIEW



NOTES:
1. STORMTECH SC310 CHAMBERS BY STORMTECH, INC. OF ROCKY HILL, CT. ALL CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH STORMTECH INC.'S CURRENT RECOMMENDED INSTALLATION GUIDELINES.
2. THE BED OF THE SYSYTEM FOOTPRINT SHALL BE LAID NEARLY LEVEL.
3. THE CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER IF SUBSURFACE CONDITIONS IN THE AREAS OF THE INFILTRATOR TRENCHES IS NOT CONSISTENT WITH THE TEST PIT OR PERCOLATION DATA (E.G. GROUNDWATER OR BEDROCK ENCOUNTERED, SOIL PROPERTIES ARE NOT CONSISTENT, ETC.).

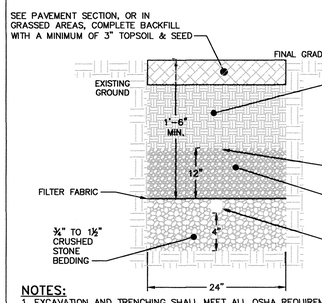
SYSTEM ID	BOTTOM OF STONE BED ELEVATION	CHAMBER INVERT	TOP OF STONE BED ELEVATION	STONE BED FOOTPRINT
LOT 2	138.7	139.2	141.7	186 S.F.
LOT 3	137.5	138.0	140.5	295 S.F.

UNDERGROUND DETENTION SYSTEM DETAIL
NOT TO SCALE



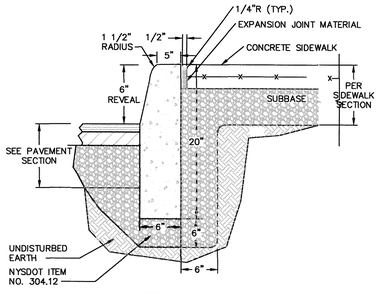
NOTES:
1. CONCRETE COLLAR TO BE PROVIDED IN AREAS THAT ARE NOT PAVED. THE COLLAR SHALL BE 6" FROM THE COVER AND SHALL EXTEND 6" BELOW FINAL GRADE.

CLEANOUT DETAIL
NOT TO SCALE



NOTES:
1. EXCAVATION AND TRENCHING SHALL MEET ALL OSHA REQUIREMENTS.
2. SUITABLE RUN OF TRENCH SHALL NOT INCLUDE FROZEN MATERIALS, DEBRIS, ORGANIC MATERIALS, LARGE STONES OR OTHER UNSUITABLE MATERIALS. IF THE RUN OF TRENCH MATERIAL IS FOUND TO BE UNSUITABLE, A SUITABLE BACKFILL MATERIAL SHALL BE IMPORTED AND USED.

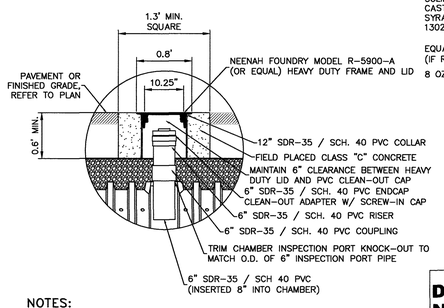
SANITARY SEWER SERVICE LINE TRENCH DETAIL
NOT TO SCALE



ABUTTING SIDEWALK

NOTES:
1. CONCRETE CURB SHALL BE 4,000 PSI CAST-IN-PLACE, AND IN ACCORDANCE WITH NYSDOT STANDARD SPECIFICATION SECTION 609.
2. EXPANSION JOINTS OF 1/2" CELLULOSE OR SIMILAR MATERIAL SHALL BE PLACED AT 10 FOOT INTERVALS.
3. FOR MOUNTABLE CURBS ABUTTING SIDEWALK OR OTHER HARDSCAPE, REFER TO "ABUTTING SIDEWALK" DETAIL.
4. CONCRETE SHALL BE SEALED WITH A SALT RESISTANT SEALER.

CAST-IN-PLACE CONCRETE CURB DETAIL
NOT TO SCALE



NOTES:
1. PROVIDE AN INSPECTION PORT FOR THE INITIAL AND FINAL CHAMBER OF EACH ROW, AND FOR ROWS WITH MORE THAN 10 CHAMBERS, ONE IN AN INTERMEDIATE CHAMBER.

UNDERGROUND DETENTION SYSTEM INSPECTION PORT DETAIL
NOT TO SCALE

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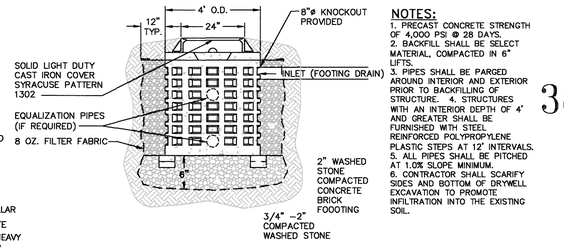

DRYWELL DETAIL
NOT TO SCALE

NOTES:
1. PRECAST CONCRETE STRENGTH OF 4,000 PSI @ 28 DAYS.
2. BACKFILL SHALL BE SELECT MATERIAL, COMPACTED IN 6" LIFTS.
3. PIPES SHALL BE PARGED AROUND INTERIOR AND EXTERIOR PRIOR TO BACKFILLING OF STRUCTURE. 4. STRUCTURES WITH AN INTERIOR DEPTH OF 4' AND GREATER SHALL BE FURNISHED WITH STEEL REINFORCED POLYPROPYLENE PLASTIC STEPS AT 12' INTERVALS.
5. ALL PIPES SHALL BE PITCHED AT 1.0% SLOPE MINIMUM.
6. CONTRACTOR SHALL SCARIFY SIDES AND BOTTOM OF DRYWELL EXCAVATION TO PROMOTE INFILTRATION INTO THE EXISTING SOIL.

OWNER'S CONSENT:
THE UNDERSIGNED OWNER OF THE PROPERTY HEREON STATES THAT HE IS FAMILIAR WITH THIS MAP, ITS CONTENTS AND ITS LEGENDS AND HEREBY CONSENTS TO ALL SAID TERMS AND CONDITIONS AS STATED HEREON.

GARY JOSEPH OWEN — DATE 12/18/18

DRAWN BY: AG	CHECKED BY: DGK	JOB NO.: 2018:012

REVISIONS:

NO.	DATE	DESCRIPTION	BY
1	05/29/18	REVISED PER CONSULTANT COMMENTS	AG
2	06/26/18	PER CONSULTANTS COMMENTS	AG
3	07/31/18	PER CONSULTANT COMMENTS	AG
4	09/04/18	FOR FINAL REVIEW	AG

APPROVED BY RESOLUTION OF THE PLANNING BOARD OF THE CITY OF BEACON, NEW YORK, ON THE 14TH DAY OF AUGUST, 20 18, SUBJECT TO ALL REQUIREMENTS AND CONDITIONS OF SAID RESOLUTION. ANY CHANGE, ERASURE, MODIFICATION OR REVISION OF THIS PLAT, AS APPROVED, SHALL VOID THIS APPROVAL.

SIGNED THIS 18th DAY OF DECEMBER, 20 18, BY

CHAIRMAN RESIGNED: MARCH 29, 2019

SECRETARY

IN ABSENCE OF THE CHAIRMAN OR SECRETARY, THE ACTING CHAIRMAN OR ACTING SECRETARY RESPECTIVELY MAY SIGN IN THIS PLACE.

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SHEET: 4 OF 5

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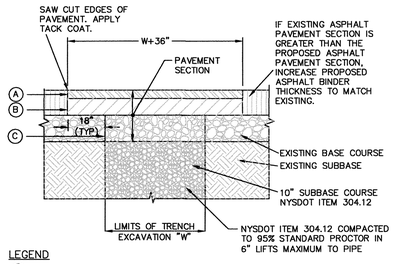
Page 4 of 5
FILED: 4/05/2019



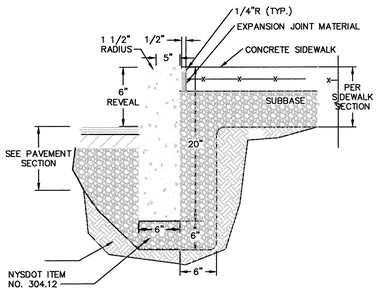
LEGEND

(A) 1.5" ASPHALT CONCRETE TOP COURSE– NYSDOT TYPE F1
(B) 3.0" ASPHALT CONCRETE BINDER COURSE– NYSDOT TYPE F9
(C) 3.0" ASPHALT BASE COURSE– NYSDOT TYPE F9

NOTES:

1. SAW CUT MIN. 18" BEYOND EXCAVATION WITH SMOOTH EDGES. 18" JOINT BETWEEN EXISTING AND NEW TOP COURSE TO BE MILLED. JOINT TO BE SEALED WITH POLYMER MODIFIED SEALER.
2. FURNISH, PLACE, AND COMPACT SUBBASE.
3. TACK COAT IN ACCORDANCE WITH NYSDOT STANDARD SPEC.
4. FURNISH AND PLACE ASPHALT CONCRETE PAVEMENT AS SPECIFIED.

PAVEMENT RESTORATION DETAIL
NOT TO SCALE

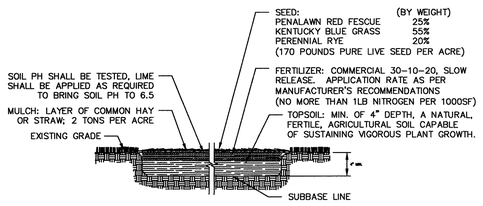


ABUTTING SIDEWALK

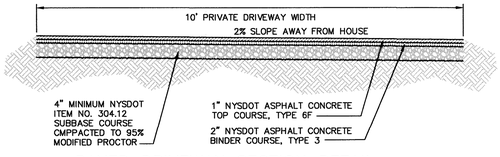
NOTES:

1. CONCRETE CURB SHALL BE 4,000 PSI CAST–IN–PLACE, AND IN ACCORDANCE WITH NYSDOT STANDARD SPECIFICATION SECTION 609.
2. EXPANSION JOINTS OF 1/2" CELLULOSE OR SIMILAR MATERIAL SHALL BE PLACED AT 10 FOOT INTERVALS.
3. FOR MOUNTABLE CURBS ABUTTING SIDEWALK OR OTHER HARDSCAPE, REFER TO "ABUTTING SIDEWALK" DETAIL.
4. CONCRETE SHALL BE SEALED WITH A SALT RESISTANT SEALER.

CAST–IN–PLACE CONCRETE CURB DETAIL
NOT TO SCALE



TOPSOIL SEED, FERTILIZER AND MULCH DETAIL
NOT TO SCALE

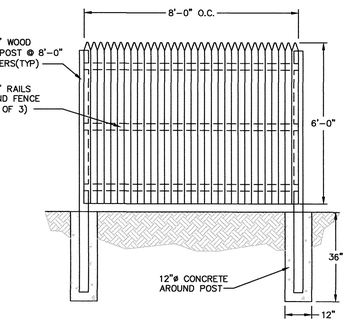


PAVED DRIVEWAY SECTION DETAIL
NOT TO SCALE

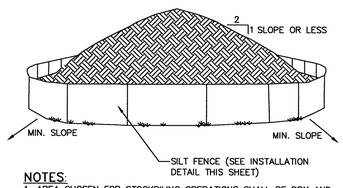
OWNER'S CONSENT:

THE UNDERSIGNED OWNER OF THE PROPERTY HEREON STATES THAT HE IS FAMILIAR WITH THIS MAP, ITS CONTENTS AND ITS LEGENDS AND HEREBY CONSENTS TO ALL SAID TERMS AND CONDITIONS AS STATED HEREON.

GARY JOSEPH OR TIM OWEN — DATE 12/11/18



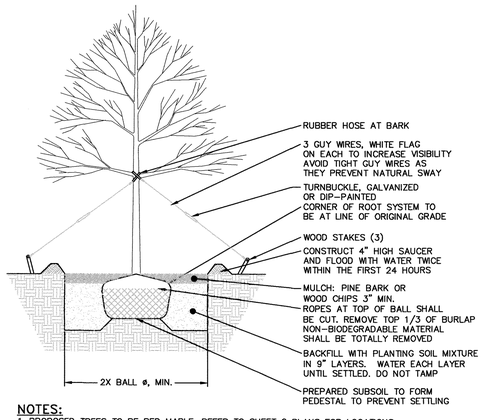
WOOD STOCKADE FENCE DETAIL
NOT TO SCALE



NOTES:

1. AREA CHOSEN FOR STOCKPILING OPERATIONS SHALL BE DRY AND STABLE.
2. EACH PILE SHALL BE SURROUNDED WITH SILT FENCING, THEN STABILIZED WITH VEGETATION OR COVERED.

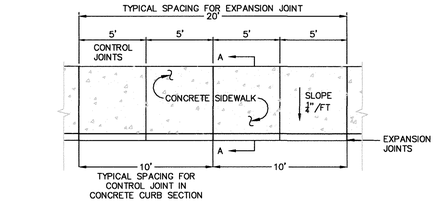
TEMPORARY SOIL STOCKPILE DETAIL
NOT TO SCALE



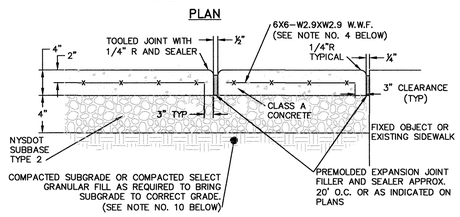
NOTES:

1. PROPOSED TREES TO BE RED MAPLE. REFER TO SHEET 2 PLANS FOR LOCATIONS.

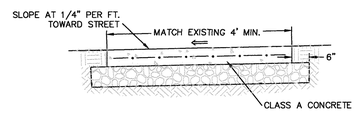
TREE PLANTING DETAIL
NOT TO SCALE



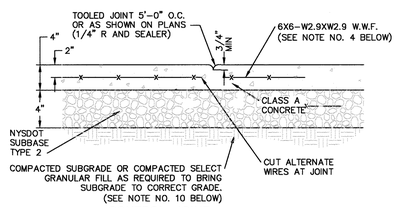
PLAN



EXPANSION JOINT



SECTION A–A

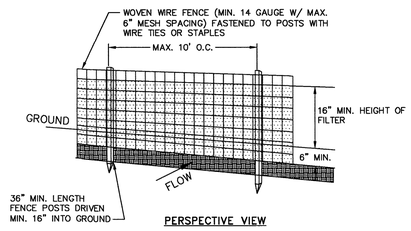


CONTROL JOINT

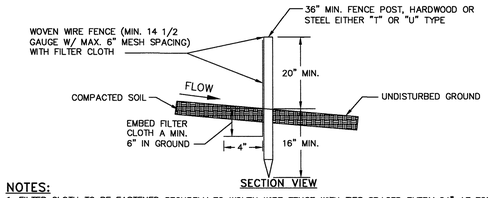
NOTES:

1. 10' SPACING OF CONTROL JOINTS SHALL BE USED FOR CAST IN PLACE CONCRETE CURBS.
2. MATERIAL AND METHODS OF CONSTRUCTION SHALL BE IN CONFORMANCE WITH THE NEW YORK STATE DEPARTMENT OF TRANSPORTATION (NYSDOT) STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS, DATED JANUARY 2, 2002, AND ALL ADDENDA THERETO; THE ONLY EXCEPTION BEING THAT THE WORK OF THIS CONTRACT SHALL BE MEASURED IN ENGLISH UNITS.
3. ALL CONCRETE SHALL BE 3,500 PSI CLASS A CONCRETE. CONCRETE MATERIALS, PLACEMENT, AND CONSTRUCTION SHALL CONFORM WITH SECTION 500 OF THE ABOVE REFERENCED NYSDOT STANDARD SPECIFICATIONS.
4. REINFORCING STEEL FOR CONCRETE SHALL CONFORM WITH SECTION 556 – REINFORCING STEEL FOR CONCRETE STRUCTURES OF THE ABOVE REFERENCED NYSDOT STANDARD SPECIFICATIONS AND AS SPECIFICALLY CALLED OUT IN THE DRAWINGS.
5. ALL EXPOSED SURFACES SHALL HAVE A BROOM TEXTURED FINISH.
6. EXPANSION JOINTS SHALL BE LOCATED A MAXIMUM OF 20' ON CENTER, OR AS INDICATED ON PLANS.
7. JOINTS SHALL NOT BE SAW CUT.
8. EXPOSED CONCRETE SURFACES SHALL BE TREATED WITH "SUREBOND"/"SAFEBOND" SB–7000 INTENSIFIER BRIGHT PROTECTOR AND SIDEWALK SEALER, OR EQUAL. RATE AND METHOD OF APPLICATION SHALL BE IN ACCORDANCE WITH MANUFACTURE'S RECOMMENDATIONS.
9. SUBBASE MATERIAL SHALL CONFORM WITH SECTION 304 OF THE ABOVE REFERENCED NYSDOT STANDARD.
10. WHERE IT IS NECESSARY TO PLACE FILL FOR PURPOSE OF BRINGING THE SUBGRADE ELEVATION UP TO A SPECIFIED GRADE, THE FILL MATERIAL PLACED SHALL BE IN CONFORMATION WITH SECTION 203–EXCAVATION AND EMBANKMENT OF THE ABOVE REFERENCED NYSDOT STANDARD SPECIFICATIONS.
11. ALL WORK SHALL CONFORM WITH SECTION 608–SIDEWALK, DRIVEWAYS, AND BICYCLE PATHS OF THE ABOVE REFERENCED NYSDOT STANDARD SPECIFICATIONS.
12. CONCRETE SHALL BE SEALED WITH A SALT RESISTANT SEALER.

CONCRETE SIDEWALK DETAIL
NOT TO SCALE



PERSPECTIVE VIEW

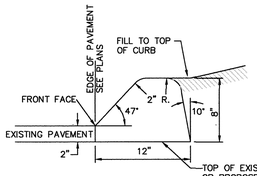


SECTION VIEW

NOTES:

1. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
2. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER–LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N OR APPROVED EQUAL.
3. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE OR APPROVED EQUAL.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

SILT FENCE DETAIL
NOT TO SCALE

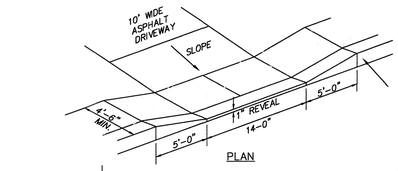


NOTE:

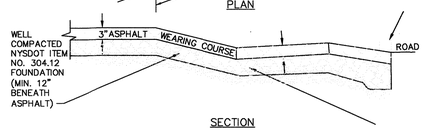
DIMENSIONS SHOWN ARE STANDARD. ADJUSTMENTS TO THE ABOVE DIMENSIONS SHALL BE MADE TO MATCH EXISTING ASPHALT CURB.

ASPHALT CURB DETAIL
NOT TO SCALE

Dig Safely. New York
800-962-7962
www.digsafelynewyork.org
- Call Before You Dig
- Wait The Required Time
- Confirm Utility Response
- Respect the Marks
- Dig With Care



PLAN

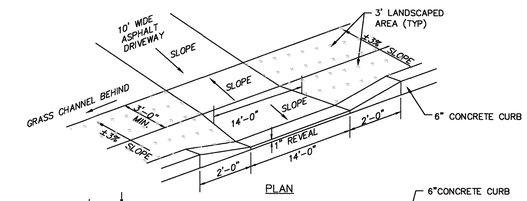


SECTION

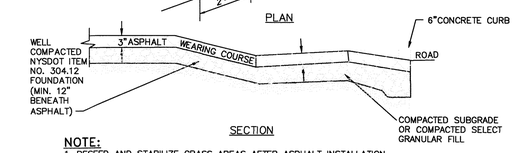
NOTE:

1. RESEED AND STABILIZE GRASS AREAS AFTER ASPHALT AND CONCRETE INSTALLATION.

LOT 2 DRIVEWAY ENTRANCE DETAIL
NOT TO SCALE



PLAN



SECTION

NOTE:

1. RESEED AND STABILIZE GRASS AREAS AFTER ASPHALT INSTALLATION.

LOT 3 DRIVEWAY ENTRANCE DETAIL
NOT TO SCALE

APPROVED BY RESOLUTION OF THE PLANNING BOARD OF THE CITY OF BEACON, NEW YORK, ON THE 14TH DAY OF AUGUST, 20 18, SUBJECT TO ALL REQUIREMENTS AND CONDITIONS OF SAID RESOLUTION. ANY CHANGE, ERASURE, MODIFICATION OR REVISION OF THIS PLAT, AS APPROVED, SHALL VOID THIS APPROVAL.

SIGNED THIS 4TH DAY OF DECEMBER, 2018, BY

CHAIRMAN RESIGNED: MARCH 29,2019

SECRETARY

IN ABSENCE OF THE CHAIRMAN OR SECRETARY, THE ACTING CHAIRMAN OR ACTING SECRETARY RESPECTIVELY MAY SIGN IN THIS PLACE.

SITE DETAILS

38 ST. LUKES SUBDIVISION

38 ST. LUKES PLACE
CITY OF BEACON
DUTCHESS COUNTY, NEW YORK
TAX ID: 6054–38–156634
SCALE: NTS
APRIL 24, 2018

DRAWN BY: AG	CHECKED BY: DGK	JOB NO.: 2018:012	
REVISIONS:			
NO.	DATE	DESCRIPTION	BY
1	05/29/18	REVISED PER CONSULTANT COMMENTS	AG
2	06/26/18	ADDED SHEET	AG
3	07/31/18	PER CONSULTANT COMMENTS	AG
4	09/04/18	FOR FINAL REVIEW	AG

HUDSON LAND DESIGN
HUDSON LAND DESIGN
PROFESSIONAL ENGINEERING P.C.
174 MAIN STREET
BEACON, NEW YORK 12508
PH: 845–440–6926 F: 845–440–6637

STATE OF NEW YORK DANIEL G. KOEHLER 082716 LICENSED PROFESSIONAL ENGINEER

SEAL

JON D. BODENDORF, P.E.
NYS LICENSE NO. 076245
DANIEL G. KOEHLER, P.E.
NYS LICENSE NO. 082716

SHEET: 5 OF 5

FM # 514A
Page 5 of 5
FILED: 4/05/2019

City of Beacon Council Agenda
4/20/2020

Title:

Resolution Accepting Offer of Dedication of Portion of Union Street

Subject:

Background:

ATTACHMENTS:

Description	Type
Resolution Accepting Offer of Dedication of Portion of Union Street	Resolution
Offer of Dedication Proposed Deed Saint Luke's Place Subdivision	Backup Material

CITY OF BEACON
CITY COUNCIL

Resolution No. _____ of 2020

ACCEPTING AN OFFER OF DEDICATION FOR HIGHWAY PURPOSES (PORTION OF UNION STREET)

WHEREAS, an irrevocable offer of dedication was made to the City of Beacon by Beacon 226 Main Street LLC (the "Applicant") in connection with the "Subdivision Plat prepared for Beacon 226 Main Street LLC" which map was filed in the Dutchess County Clerk's Office on April 5, 2019 as Filed Map No. 514A following approval of same of the City of Beacon Planning Board by Resolution dated August 14, 2018; and

WHEREAS, the Applicant has offered to convey to the City of Beacon for highway purposes a portion of its property consisting of approximately 900 s.f. upon which a portion of Union Street is currently encroaching as shown on Filed Map No. 514A (the "Property"); and

WHEREAS, the City Engineer and City Highway Superintendent have reviewed said plans and inspected the Property and find same to be suitable for acceptance by the City.

NOW, THEREFORE, BE IT RESOLVED, that the City Council of the City of Beacon hereby accepts the offer of dedication for the Property described herein for highway purposes, as shown on Filed Map No. 514A, subject to the following conditions to be satisfied by the Applicant prior to the recording of the deed conveying title thereof:

1. Payment of all outstanding fees and professional review fees.

2. Payment of all outstanding real property taxes due on the subject property.

BE IT FURTHER RESOLVED, that the Mayor and/or the City Administrator are authorized to execute any forms and documents necessary to effectuate the purpose of this Resolution.

Resolution No.____of 2020			**Date: April 20, 2020**				
□ Amendments						**□ 2/3 Required**	
□ Not on roll call.			**□ On roll call**			**□ 3/4 Required**	
Motion	Second	Council Member	Yes	No	Abstain	Reason	Absent
		Terry Nelson					
		Jodi McCredo					
		George Mansfield					
		Amber Grant					
		Air Rhodes					
		Dan Aymar-Blair					
		Mayor Lee Kyriacou					
		Motion Carried					

OFFER OF DEDICATION FOR HIGHWAY PURPOSES

KNOW ALL MEN THAT BEACON 226 MAIN STREET LLC, with offices at One East Main Street, Beacon, New York 12508, (hereinafter the "Grantor"), Party of the First Part, DOES HEREBY OFFER in dedication to the City of Beacon, a municipal corporation with its offices and place of business at One Municipal Plaza, Beacon, New York 12508:

WITNESSETH:

WHEREAS, the GRANTOR is the owner of certain parcel of land located in the City of Beacon, identified as Tax Grid No 130200-6054-38-156634 and more particularly described in a certain deed dated April 16, 2018 and recorded in the Dutchess County Clerk's Office on May 2, 2018, as document number 02-2018-3173, and further described on a Subdivision Map entitled "Subdivision Plat prepared for Beacon 226 Main Street, LLC", dated April 20, 2018, last revised July 13, 2018, prepared by TEC Land Surveyors, which Subdivision Map was filed in the Dutchess County Clerk's Office, as Filed Map No. 514A; and

WHEREAS, the Grantor wishes to record a formal Irrevocable Offer of Cession and Dedication for a strip of land for highway purposes as shown on said subdivision plat and described in Schedule "A" attached hereto.

NOW, THEREFORE, the undersigned Grantor covenants and warrants that it is seized of title of said premises in fee simple, and has good and unencumbered right to convey same, and hereby irrevocably offers to grant, cede and convey and dedicate to the grantee, for public highway purposes, all that certain plot or piece of land, more particularly described in Schedule "A" attached hereto (the "Land Offered for Dedication");

At the time of such acceptance of this Offer, the grantor hereby covenants that title to the Land Offered for Dedication will be free and clear of all liens and grantor will submit a title policy to the City Council of the City of Beacon demonstrating same;

The aforesaid Offer shall be irrevocable from the date hereof and may be accepted by the City Council of the City of Beacon at any time hereafter by the adoption of a resolution accepting the Offer of Dedication.

IN WITNESS WHEREOF, the GRANTOR has executed this Irrevocable Offer of Cession and Dedication as of the date first set forth above.

Dated:

BEACON 226 MAIN STREET LLC

By_____
Gary Joseph, Member

State of New York, County of Dutchess, ::

On the day of in the year 2019 before me, the undersigned, personally appeared Gary Joseph, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public

Description of Dedication

Proposed Dedication to the City of Beacon

Beginning at a point on the east side of St Luke's Place, said point being the southwest corner of Lot 2 as shown on a map entitled, "Subdivision Plat Prepared for Beacon 226 Main Street LLC" prepared by TEC Land Surveying and filed with the Dutchess County Clerk's office on April 5, 2019 as Map No. 514A; Thence along the southern boundary of Lot 2, South 58° 11' 27" East a distance of 51.46 feet to a point; Continuing South 63° 18' 12" East a distance of 51.62 feet to a point on the division between Lots 2 & 3 of said Map No. 514A; Thence through Lot 3, South 57° 57' 01" East a distance of 63.21 feet to a point; Thence along lands, now or formerly, of Piga (L. 1938 p. 373) South 28° 50' 35" West a distance of 4.80 feet to a point on the north side of Union Street; Thence along the old road line of Union Street, North 59° 56' 11" West a distance of 166.40 feet to a point on the east side of St Luke's Place; Thence along said road North 31° 42' 53" East a distance of 5.53 feet to the Point of Beginning.

— Bargain and Sale Deed, with Covenant against Grantor's Acts — Individual or Corporation (Single Sheet)

CONSULT YOUR LAWYER BEFORE SIGNING THIS INSTRUMENT—THIS INSTRUMENT SHOULD BE USED BY LAWYERS ONLY.

THIS INDENTURE, made the day of , in the year 2019

BETWEEN

BEACON 226 MAIN STREET, LLC, with offices at One East Main Street, Beacon, New York 12508, party of the first part,

CITY OF BEACON, with offices at One Municipal Plaza, Beacon, New York 12508 party of the second part,

WITNESSETH, that the party of the first part, in consideration of Ten ($10.00) and 00/100 - - - - - - dollars paid by the party of the second part, does hereby grant and release unto the party of the second part, the heirs or successors and assigns of the party of the second part forever,

ALL that certain plot, piece or parcel of land situate, lying and being in the CITY OF BEACON, County of Dutchess and State of New York, being more particularly bounded and described in Schedule "A" attached hereto and made a part hereof.

BEING the same premises conveyed to the Grantor herein by deed dated April 16, 2018 and recorded May 2, 2018 in the Dutchess County Clerk's Office as document number 02-2018-3173.

This conveyance does not constitute all or substantially all of the assets of the Grantor.

TOGETHER with all right, title and interest, if any, of the party of the first part in and to any streets and roads abutting the above described premises to the center lines thereof; TOGETHER with the appurtenances and all the estate and rights of the party of the first part in and to said premises; TO HAVE AND TO HOLD the premises herein granted unto the party of the second part, the heirs or successors and assigns of the party of the second part forever.

AND the party of the first part covenants that the party of the first part has not done or suffered anything whereby the said premises have been encumbered in any way whatever, except as aforesaid.
AND the party of the first part, in compliance with Section 13 of the Lien Law, covenants that the party of the first part will receive the consideration for this conveyance and will hold the right to receive such consideration as a trust fund to be applied first for the purpose of paying the cost of the improvement and will apply the same first to the payment of the cost of the improvement before using any part of the total of the same for any other purpose. The word "party" shall be construed as if it read "parties" whenever the sense of this indenture so requires.

IN WITNESS WHEREOF, the party of the first part has duly executed this deed the day and year first above written.

IN PRESENCE OF:

BEACON 226 MAIN STREET, LLC

By:_____

Gary Joseph, Member

State of New York, County of Dutchess, ss:

On the day of in the year 2019 before me, the undersigned, personally appeared Gary Joseph personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____

Notary Public

R&R

Description of Dedication

Proposed Dedication to the City of Beacon

Beginning at a point on the east side of St Luke's Place, said point being the southwest corner of Lot 2 as shown on a map entitled, "Subdivision Plat Prepared for Beacon 226 Main Street LLC" prepared by TEC Land Surveying and filed with the Dutchess County Clerk's office on April 5, 2019 as Map No. 514A; Thence along the southern boundary of Lot 2, South 58° 11' 27" East a distance of 51.46 feet to a point; Continuing South 63° 18' 12" East a distance of 51.62 feet to a point on the division between Lots 2 & 3 of said Map No. 514A; Thence through Lot 3, South 57° 57' 01" East a distance of 63.21 feet to a point; Thence along lands, now or formerly, of Piga (L. 1938 p. 373) South 28° 50' 35" West a distance of 4.80 feet to a point on the north side of Union Street; Thence along the old road line of Union Street, North 59° 56' 11" West a distance of 166.40 feet to a point on the east side of St Luke's Place; Thence along said road North 31° 42' 53" East a distance of 5.53 feet to the Point of Beginning.

City of Beacon Council Agenda
4/20/2020

Title:

Resolution Approving the Beacon Farmer's Market Interim Operations

Subject:

Background:

ATTACHMENTS:

Description	Type
Resolution Permitting the Farmer's Market to Operate on Veteran's Place	Resolution
Beacon Farmer's Market Interim Operations	Backup Material

CITY OF BEACON

CITY COUNCIL

Resolution No. _____ of 2020

RESOLUTION PERMITTING THE BEACON FARMERS MARKET TO OPERATE ON VETERAN'S PLACE

WHEREAS, the Beacon Farmers Market has requested access to establish its location on Veteran's Place on Sundays from 7:30 a.m. to 1 p.m. to manage customer traffic within the market and promote social distancing; and

WHEREAS, Veteran's Place as an outdoor location has the space to allow for social-distancing for order pickups as recommended during the COVID-19 crisis.

NOW THEREFORE BE IT RESOLVED, that the City Council of the City of Beacon hereby authorizes the Beacon Farmers Market to operate on Veteran's Place pursuant to the terms of the letter agreement dated April 14, 2020.

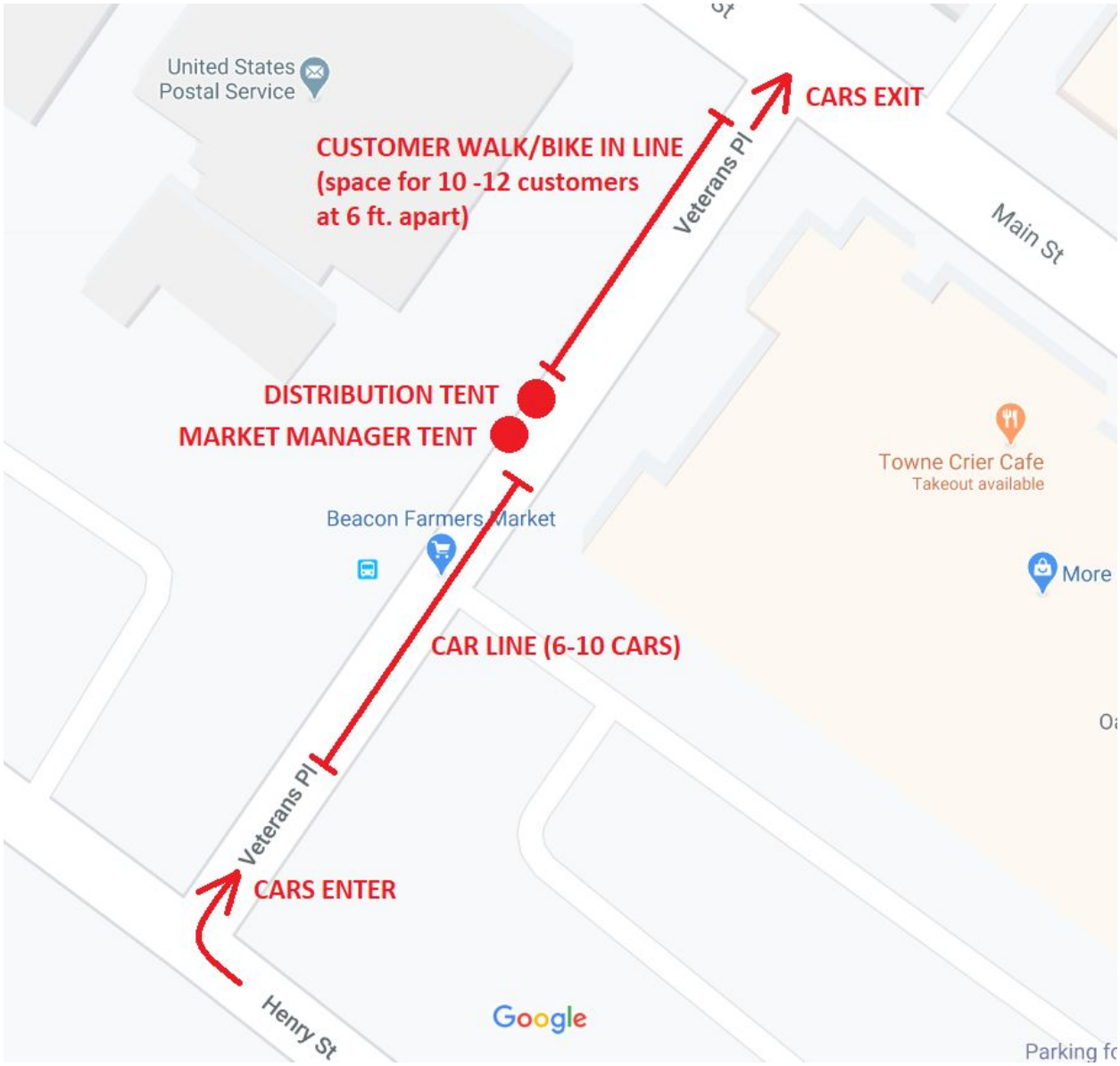
BE IT FURTHER RESOLVED, that the Beacon Farmers Market shall operate at Veteran's Place for a designated period of time to be determined by the City Administrator.

BE IT FURTHER RESOLVED, that the City Council hereby authorizes and empowers the City Administrator, or his designee, to take all actions necessary to implement the purpose of this resolution.

Resolution No.___of 2020			**Date: April 20, 2020**				
□ Amendments						**□ 2/3 Required**	
□ Not on roll call.			**□ On roll call**			**□ 3/4 Required**	
Motion	Second	Council Member	Yes	No	Abstain	Reason	Absent
		Terry Nelson					
		Jodi McCredo					
		George Mansfield					
		Amber Grant					
		Air Rhodes					
		Dan Aymar-Blair					
		Mayor Lee Kyriacou					
		Motion Carried					

Beacon Farmers' Market Distribution Site
Interim Market Operations & Procedures Guideline
Location: Veteran's Place

Map:



Context:

Farmers Market are essential businesses and critical community resources especially during the coronavirus pandemic. Recognizing this, the C.A.R.E.S. Act "includes $9.5 billion to support "agricultural producers impacted by coronavirus." The Beacon Farmers Market (BFM) is requesting access to establish its location on Veteran's Place.

During this public health crisis, the BFM is committed to upholding its mission to provide fresh food access to much needed nutrition to Beacon residents while supporting the livelihoods of local farmers and producers, who along with our dedicated market staff are the frontline workers in this crisis.

At the same time, this pandemic is having a disproportionate impact on people of color and low-income Americans that the BFM is committed to serving. "Farmers markets are essential activities for the economic livelihood of farmers and for food access for millions of Americans," says Ben Feldman, executive director of the Farmers Market Coalition. "The closure of markets has the potential to bankrupt farmers and force people to go without food."

In the absence of competent leadership from Washington, communities are looking to local leaders to solve their problems. We ask the City of Beacon to partner with the BFM to provide this local solution to fulfill our duty to the community and to our farmer and producer vendors.

Resources available at Veteran's Place:

- Veteran's Place (VP) as an outdoor location has the space to allow for social-distancing for order pickups as recommended during the COVID-19 crisis.
- VP is both pedestrian and car-friendly, and is located at a central location increasing accessibility to market patrons.
- VP is a safe, low/slow traffic area with two access points which is conducive to public safety.
- VP is a familiar location to market patrons and vendors which limits confusion about the market's location during these confounding times.

A note on social distancing:
To ensure proper social distancing, no contact, and to limit the number of people gathering, the Beacon Farmers' Market has reduced from vendor run stands to a staff/volunteer run distribution center. In this system customers place orders online, then vendors drop off orders to be organized and distributed by staff/volunteers at the pick up stand or by delivery.

Specifics on health/safety protocol at the market:
Vendor Waiver on Health & Safety Protocols
Volunteer Waiver on Health & Safety Protocols
Note to customers on social distancing and no contact at the market.

Schedule of operations:
7:30 AM to 8:30 AM - Market set up and vendor drop off.
8:30 AM to 10 AM - Order organization. Delivery people leave with orders before 10 AM.
10 AM to 12 PM - Customers pick up by car or on foot.
12 PM to 1 PM - Market break down and donation delivery.

Note on our operations since shutting down the market:

Last edit: 04/05/2020

Currently, the Beacon Farmers' Market, as an essential business, is running an interim market, under strict social distancing and no contact procedures. The goal is to host a market that is safe for our customers, vendors, and staff/volunteers, while still providing access to fresh and healthy food for our community.

Our response to COVID 19 has been radical - we shut down operations more than a week before the State government advised, we transitioned the market into an online order system within a week, and have been supporting food access for more than 120 families in the City of Beacon.

March 15th: BFM cancelled out of precaution of the rising public health concern due to COVID 19. At this point there had not yet been any confirmed cases of COVID 19 in Dutchess County, but several in surrounding counties where several of our vendors are located.

March 22nd: BFM reopens market outside of the VFW Hall under a pre-order only system. All vendors have orders packaged in plastic. Customers arrive by foot or car for pick up, following social distancing guidelines. The distributor(s) practice no contact with the customer and use either hand sanitizer or gloves while touching the packaged product. *~60 customer orders.*

March 29th: BFM expands pre-order system to online ordering through the BFM website. Procedures follow the same as above, with the implementation of stricter no contact rules for vendors. *~80 customer orders.*

April 5th: BFM follows as above, with the addition of several more vendors than previous weeks. Implementation of stricter customer social distancing guidelines, including curbside pick up and a delivery system for City of Beacon residents. *~120 customer orders.*

Future plans:

April 12th: Adding food access initiatives, including SNAP/EBT, a sliding scale, and a sponsorship program, that will greatly increase the number of families fed, and the overall impact on our community. We have raised almost $2300 already to support this initiative. Once these are implemented, we are sure that participation will be much higher.

City of Beacon Council Agenda
4/20/2020

Title:

Resolution to Extend Tow Agreement with Cervones Autobody

Subject:

Background:

ATTACHMENTS:

Description	Type
Resolution to Extend Tow Agreement with Cervones Autobody	Resolution
Towing Contract with Cervone's Autobody	Agreement
Extension Agreement with Cervone's Autobody	Agreement

CITY COUNCIL
CITY OF BEACON
Resolution No. _____ of 2020

RESOLUTION TO EXTEND TOW AGREEMENT WITH CERVONE'S AUTO BODY, INC.

WHEREAS, on March 31, 2017, the City of Beacon entered into an agreement with Cerone's Auto Body, Inc. for towing services for the Beacon Police Department ("Tow Agreement"); and

WHEREAS, the term of the Tow Agreement expired on March 31, 2020; and

WHEREAS, both parties wish to continue towing service operations under the same terms and conditions set forth in the Tow Agreement signed on March 31, 2017.

NOW THEREFORE BE IT RESOLVED, the City Council of the City of Beacon hereby extends the Tow Agreement with Cervone's Auto Body, Inc. to continue towing service operations for the Beacon Police Department until March 21, 2021.

. **BE IT FURTHER RESOLVED,** that all provisions and conditions set forth in the Tow Agreement, and not superseded herein, shall remain in full force and effect.

BE IT FURTHER RESOLVED, that suspension or termination of this Towing Agreement shall be provided by written notice to the Towing Company served at least fourteen (14) days before such suspension or termination shall take effect.

BE IT FURTHER RESOLVED, that the City Council hereby authorizes and empowers the City Administrator, or his designee, to take all actions necessary to implement the purpose of this resolution.

Resolution No.____of 2020			**Date: April 20, 2020**				
□ Amendments						**□ 2/3 Required**	
□ Not on roll call.			**□ On roll call**			**□ 3/4 Required**	
Motion	Second	Council Member	Yes	No	Abstain	Reason	Absent
		Terry Nelson					
		Jodi McCredo					
		George Mansfield					
		Amber Grant					
		Air Rhodes					
		Dan Aymar-Blair					
		Mayor Lee Kyriacou					
		Motion Carried					

City of Beacon Police Department

Tow Agreement

This Tow Agreement (the "Agreement"), dated March 31, 2017, is made by and between Cervone Auto Body, Inc, a licensed towing service operator in the State of New York, with a principal place of business located at 326 Fishkill Ave, Beacon, NY 12508 (the "Towing Company"), and the City of Beacon, having offices at 1 Municipal Plaza Beacon, NY (the "City").

Section 1: Operations

A. Term of Agreement

The term of this agreement shall be for three years.

B. Response to calls

The Towing Company will respond to scenes only at the direction of the City Police Department except in the case the motorist and/or motorist organization directly calls the Towing Company and that company is authorized to tow at the time. The City Police Department may direct special exceptions to this notice in the interest of public safety; inclement weather, natural/manmade disasters.

C. Response time

During regular business hours (9:00 a.m. to 5:00 p.m) the maximum response time from the time the Towing Company receives a call for service shall be twenty (20) minutes. Outside of regular business hours, maximum response time shall not exceed thirty (30) minutes.

D. Secured Storage Yard

The Towing Company shall have use of a secured storage yard or other facility located in Dutchess or Putnam County within a ten (10) mile radius of City Hall.

E. Towing of City Vehicles

The Towing Company shall tow City vehicles to the City's garage facilities or other designated location free of charge to the City, provided that said vehicle and garage facility or other designated location are located within fifteen (15) miles of City Hall at the time the call for service is made.

F. Calls for Service

Calls for service made by a Beacon Police Officer at the request of a vehicle owner, such as calls via AAA or special request to a particular tow service, shall not be considered a call for service by the City pursuant to this Agreement. In such instance, the Towing Company may charge its ordinary and customary rate.

G. Emergency Situations

Subject to circumstances as they unfold, the Police Department may, at their discretion, suspend all or part of this Agreement in the interest of public safety.

H. Debris and road cleanup

The Towing Company shall clean up all debris from any vehicle towed, including hazardous materials, if not otherwise directed by an enforcement authority at the scene. Such clean-up shall be conducted as part of the Towing Company's service at no charge to the City. Failure to complete clean-up may result in the Towing Company being cited for violating VTL Section 1219 and/or suspension or termination of this Towing Agreement for poor service.

I. Vehicles towed due to violation

A written release from the Beacon Police Department shall be a prerequisite for the Towing Company to release vehicles towed due to a violation that would prohibit the vehicle from being operated (suspended registration, uninsured, unregistered, equipment safety violation, etc.) or operated by a specific person (unlicensed, AUO, DWI, etc.)

J. Payment

The Towing Company must accept cash payment and at least (2) major credit cards. The only exceptions are that the Towing Company may charge cash only for impounds or abandoned vehicles.

K. Failure to respond

1. The Towing Company shall communicate to Police Dispatch any and all delays or missed responses they encounter while responding to a dispatched call which may prohibit them from arriving on scene within the required time. All communications will be made by phone to the Police Dispatch.

2. The following shall constitute delays or missed responses by the Towing Company

    a. Failure or refusal to respond to a call for service

    b. Physical incapability to tow a particular vehicle.

    c. Failure to respond timely to a call for service.

3. Upon two (2) or more missed responses, the City shall have the option of suspending or terminating this Agreement, at the City's sole discretion.

4. The City shall have the option to suspend or terminate this Agreement in response to poor service or complaints by members of the Police Department or the public.

L. Availability

1. The Towing Company must be available 24 hours a day, 7 days a week, 365 days a year. They must maintain a 24 hour answering service or dedicated phone line staffed by live personnel to take calls for service. Multiple violations may result in the suspension or revocation of this Agreement.

2. The Towing Company shall permit access, during normal business hours, to an impounded or stored vehicle by the owner of that vehicle for the purpose of removing items of property in the nature of personal effects from the vehicle. Any lien on the vehicle to which the Tow Company is entitled shall not include such property.

M. Equipment Requirements

1. The Towing Company must have a minimum equipment of two (2) or more Tow Trucks in service at all times, at least (1) of which must be a flatbed. All tow trucks must be reasonably equipped as necessary to furnish emergency towing and road service. All Tow Trucks and Towing Services must be compliant with State and Federal regulations. Pickup trucks shall not be used in lieu of a Tow Truck.

2. The Towing Company shall keep and maintain towing equipment which is adequate and reasonable to perform such Towing Services in a workmanlike manner.

N. Call for assistance

1. In the event of a motor vehicle accident, disablement, impoundment or call to the Police Department for towing assistance, except in the case of a specific request by the owner or operator, the Police Department shall notify the Towing Company that a tow is requested.

2. The Chief of Police is authorized to develop such other rules and regulations as he deems appropriate to maintain and enforce effective and responsive towing services.

O. Disposal of Vehicles

1. If the City does not choose to exercise its right to take custody and ownership of an abandoned vehicle as prescribed by § 1224 of the New York State Vehicle and Traffic Law, the Towing Company may transfer such vehicle to a registered vehicle dismantler or itinerant vehicle collector if the vehicle has a wholesale value of $1,250 or less, is 10 or more model years old and has been abandoned for at least one month. The Towing Company may also choose to salvage the vehicle after obtaining a New York State Salvage Certificate (MV-907A) from the New York State Department of Motor Vehicles with the full cooperation of the City of Beacon. In the event that the vehicle is less than 10 years old or if the vehicle dismantler or itinerant vehicle collector pays more than $1,250, the Towing Company must obtain title or a transferable registration from the City as property owner of the abandoned vehicle. In no event shall the Towing Company require the City to pay the towing and service fees incurred by such vehicle after taking title.

   In the event that there are no available registered vehicle dismantlers or itinerant vehicle collectors located within 15 miles of City Hall the parties agree to renegotiate in good faith

the expense born by the towing company for dismantling the vehicle. In the event that a new agreement is not reached, the Towing Company may cancel the Contract if more than 18 months remains on the Contract.

2. The Towing Company shall contact the City of Beacon Police Department to verify that the vehicle has not been reported as stolen prior to disposal of any unclaimed or abandoned vehicle.

3. If the City exercises its right to take custody and ownership of an abandoned vehicle pursuant to Section 1224 of the Vehicle and Traffic Law, such vehicle shall be sold at public auction and the minimum bid shall be set to equal the towing and storage fees incurred by such vehicle. Funds obtained by the City for vehicles sold at public auction shall be the exclusive source of payment to the Towing Company to satisfy any lien on the vehicle and payment shall only be made upon submission of a proper voucher to the City. The City shall hold surplus funds so realized for one year form the date of sale for the benefit of the owner of the vehicle at the time of abandonment. If unclaimed by the owner within one year time period, such monies shall be paid into the General Fund of the City of Beacon.

4. The Towing Company has the option to accept any bid below the minimum established bid as full satisfaction of towing and storage fees incurred by such vehicle or the Towing Company may choose to take possession to salvage and repair the vehicle or transfer the vehicle to a registered vehicle dismantler or itinerant vehicle collector..

5. The Towing Company shall allow its premises to be used, without charge, by the City for purposes of conducting auctions where necessary to dispose of vehicles.

P. Charges for service under this Agreement shall be as follows and will be all inclusive for each category (with no additional service charges to be added on):

Category	Description	Towing	Storage
1. City- Owned Vehicles and Light Trucks			
A	City-Owned Vehicles and light trucks	No Charge within 15 miles of City Hall	No Charge.
2. Personal Vehicles and Light Trucks			
A	Personal Vehicles and Light Trucks	$125.00 tow fee to owner	$50.00 storage fee to owner per day
B	4 X 4 Vehicles	$150.00 tow fee to owner	$50.00 storage fee to

			owner per day
3. Other Charges			
A	Police Impounded Vehicles for violations of Laws and ordinances.	No charge to City. $150.00 to be a lien against the vehicle.	$50.00
B	No key or wheel cocked charge	$25.00	N/A
C	Snow Removal Charge	$25.00	N/A
Winching	Minimum $100 for first 25 feet of winching, plus $75 for every additional 50 feet		

Fees for towing and storage of vehicles shall be borne exclusively by the owner of the vehicle, and the City shall have no obligation to advance or to ensure payment to the tow service provider or the owner/operator of the yard or facility where the vehicle is stored.

Section 2: General Provisions

A. Police Department Responsibilities

1. As determined by the Chief of Police, the City may implement an emergency action plan which would institute a temporary set of guidelines to establish a coordinated approach for dealing with an incident involving a large number of vehicles.

2. The City shall use reasonable efforts to block in all towed vehicles located in any unsecured storage area used by the Towing Company during City snow emergencies.

3. The Chief of Police may adopt Rules and Regulations with respect to the terms and conditions of this Agreement.

B. The Towing Company is prohibited from assigning, transferring, conveying subletting or otherwise disposing of this Agreement or any of its contents, or of any right, title or interest therein, or of the power to execute this Agreeemtn, to any toher person or corporation wtihout the previous consent, in writing, of the City of Beacon, which shall not be unreasonably withheld.

C. Minimum Insurance Requirements for Towing Contract

Prior to commencement of any services and for the duration of this Agreement, the Towing Company shall obtain and maintain, at its sole expense, the following insurance on its own behalf, and shall furnish to the City of Beacon Certificates of Insurance evidencing same and reflecting the effective date of such coverage as follows:

1. Worker's Compensation and Employers Liability Policy, covering operations in New York State.

2. Commercial General Liability Policy, with limits of no less than $1,000,000 Each Occurrence/ for Bodily Injury and Property Damage, and shall not exclude coverage for:

    a. Products/ Completed Operations;
    b. Independent Contractors;
    c. City of Beacon and their assigns, officers, employees, representatives and agents should be named as an "additional Insured" on the policy and the Certificate of Insurance should show this applies to the General Liability coverage on the certificate.;
    d. Each insurance policy shall be written on a primary and non-contributing coverage basis, including any self-insured retentions;
    e. To the extent permitted by New York law, the Contractor/Provider waives all rights of subrogation or similar rights against the City of Beacon, assigns, officers, employees, representatives and agents;
    f. Cross Liability coverage (Commercial General Liability and Business Automobile Liability policies only).

3. Comprehensive Automobile Policy, with limits no less than $1,000,000 Bodily Injury and Injury and Property Damage liability including coverage for owned, non-owned, and hired private passenger and commercial vehicles.

4. Certificates shall provide that thirty (30) days written notice prior to cancellation or expiration be given to the City of Beacon. Polices that lapse and/or expire during term of work shall be recertified and received by the City of Beacon no less than thirty (30) days prior to expiration or cancellation.

5. The Towing Company shall furnish to the City of Beacon Certificates of Insurance as evidenced by coverage prior to commencement of services, which shall name the City of Beacon as an Additional Insured **by separate endorsement**.

6. All the carriers listed in the certificate of insurance shall be A.M. Best Rating of "A-" Class VII or better and be licensed in the State of New York.

D. To the fullest extent permitted by law, the Towing Company shall defend, indemnify and hold the City and its agents and employees harmless from and against all claims, damages losses or expenses, including but not limited to attorney's fees, arising out of or resulting from the Towing Company's performances of any services to or on behalf of the City of Beacon, provided any such claim, damage, loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including loss of use resulting therefrom, and (b) is caused in

whole or in part by any act or omission of gross negligence or violation of statutory duty or regulation by the Towing Company or anyone directly or indirectly employed by it, or anyone for whose acts it may be liable pursuant to the performance of the Agreement. The Towing Company's obligation to defend, indemnify and hold harmless pursuant to this paragraph shall not be limited in any manner by any limitation on the amount of insurance coverage or benefits, including worker's compensation or other employee benefit acts, held by the Towing Company.

E. The Towing Company and all employees and agents thereof shall be independent contractors licensed by the City of Beacon and shall not claim or receive any benefit or privilege conferred to the City's employees. The City shall not be responsible for the Towing Company's compliance with any local, state or federal law, regulation or requirement and shall not withhold any taxes, including payroll or income taxes, for the Towing Company and any employee or agent thereof.

F. Suspension or termination of this Towing Agreement shall be provided by written notice to the Towing Company served at least fourteen (14) days before such suspension or termination shall take effect.

IN WITNESS WHEREOF, the parties hereto have signed this instrument as of the date first written above.

Cervone Auto Body, Inc	**City of Beacon**
By: _____	By: _____
Title: President	Title: City Administrator

STATE OF NEW YORK)

COUNTY OF DUTCHESS) ss.:

On the 30th day of March, in the year 2017, before me, the undersigned, a Notary Public in and for said State, personally appeared Anthony Ruggiero, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Iola C. Taylor
Notary Public

IOLA C TAYLOR
Notary Public - State of New York
NO. 01TA6154600
Qualified In Dutchess County
My Commission Expires 10.23.18

STATE OF NEW YORK)

COUNTY OF DUTCHESS) ss.:

On the 31st day of March, in the year 2017, before me, the undersigned, a Notary Public in and for said State, personally appeared Vincent Cervone, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Notary Public

CONTRACT EXTENSION AGREEMENT

This Contract Extension Agreement ("Extension") is dated as of ____ April, 2020, by and between Cervone's Auto Body, Inc., a licensed owing service operator in the State of New York, with a principal place of business located at 326 Fishkill Avenue, Beacon, NY 12508 (the "Towing Company"), and the City of Beacon, a municipal corporation, having offices at 1 Municipal Plaza, Beacon, NY 12508 (collectively, the "Parties").

WHEREAS, the Parties entered into an agreement for towing services for the Beacon Police Department on March 31, 2017 (the Original Contract").

WHEREAS, the Parties hereby agree to extend the term of the Original Contract in accordance with the provisions and conditions set forth in the Original Contract.

In consideration of the mutual covenants contained herein, Cervone's Auto Body, Inc. and the City of Beacon mutually covenant and agree as follows:

- The term of the Original Contract, which is attached hereto as part of this Extension, ended on March 31, 2020.

- The Parties agree to extend the Original Contract for one additional one year, which will be in immediately and will expire on March 31, 2021.

- All provisions and conditions set forth in the Original Contract, and not superseded herein, shall remain in full force and effect.

- Suspension or termination of this Extension shall be provided by written notice to the Towing Company served at least fourteen (14) days before such suspension or termination shall take effect.

- This Extension binds and benefits both Parties. This document, including the attached Original Contract, represents the entire agreement between the Parties.

IN WITNESS WHEREOF, the Parties hereto have signed this instrument as of the date written above.

CERVONE'S AUTO BODY, INC. **CITY OF BEACON**

By: _____ By: _____

Title: _____ Title:_____

STATE OF NEW YORK)
) SS.:
COUNTY OF DUTCHESS)

On the __ day of _____ in the year 2020 before me, the undersigned, personally appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity, and that by his signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Signature and Office of individual taking acknowledgement

STATE OF NEW YORK)
) SS.:
COUNTY OF DUTCHESS)

On the __ day of _____ in the year 2020 before me, the undersigned, personally appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity, and that by his signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Signature and Office of individual taking acknowledgement