Rhode Island Office of Energy Resources

In RE: Proposed Rhode Island Commercial Stretch Code

RESPONSE TO COMMENTS

Introduction

On November 29, 2017, a notice was posted on the websites of the Rhode Island Office of Energy Resources (OER) and the Rhode Island Office Secretary of State, and was forwarded to interested parties, announcing a public comment period to accept comments on the adoption of the "Proposed Rhode Island Commercial Stretch Code". Copies of the proposed document were made available at the OER offices, on OER's website (www.energy.ri.gov), by calling OER at (401) 574-9106 or by writing to Rhode Island Department of Administration, Office of Energy Resources, One Capitol Hill, Providence, Rhode Island. A Public Meeting notice stating that a public meeting would be held on December 13, 2017 at 5:00 pm, at the Department of Administration, Conference Room B, Second Floor, One Capitol Hill, Providence, Rhode Island was also posted on November 29, 2017. The public meeting provided an overview of the proposed Commercial Stretch Code and allowed the public to share their comments and insights. Meeting minutes and the PowerPoint presentation from the public meeting are available on the Rhode Island Secretary of State website.

The Rhode Island Commercial Stretch Code is a voluntary code that provides guidance and best practice requirements intended to reduce the negative impacts and increase the overall positive impacts of the built environment. It is consistent with the Rhode Island Office of Energy Resources' mission to lead Rhode Island to a secure, cost-effective, and sustainable energy future and supports the Governor's energy efficiency and renewable energy goals for State-owned facilities (Executive Order 15-17).

Response to Comments

The following are the paraphrased comments of Mike Moore, PE at Newport Ventures, ASHRAE 62.2 IAQ Subcommittee Chair, Representing the Home Ventilating Institute, submitted via email, followed by OER's responses:

Comment:

Consider requiring balanced ventilation with heat or energy recovery. Specifically, two options were presented by Mr. Moore:

Option 1, Recommended: Revise Section 7, Indoor Environmental Quality as follows:
To promote healthy indoor environments, this code includes simple requirements related to indoor air quality:
• Ventilation rates - Each of the available energy efficiency paths within this code include guidelines for ventilation rates and control. Across all energy efficiency paths, the home shall be provided with a balanced heat recovery or energy recovery dwelling unit ventilation system.

Option 2, Backup Position: Revise Section 7, Indoor Environmental Quality as follows:
To promote healthy indoor environments, this code includes simple requirements related to indoor air quality:
• Ventilation rates - Each of the available energy efficiency paths within this code include guidelines for ventilation rates and control. Across all energy efficiency paths, the home shall be provided with a balanced dwelling unit ventilation system (Note: exhaust-systems or supply-systems provided with passive vents or openings shall not be considered balanced).

Reasoning: Balanced mechanical ventilation systems provide superior ventilation to unbalanced

exhaust or supply ventilation systems. Exhaust-only systems work by depressurizing the home and scavenging outdoor air from the path of least resistance – through leaks in the building. The problem is that those leaks can introduce air from attics, crawlspaces, attached garages, adjacent soil, etc. and can introduce more contaminants into the space. Supply-only systems do a better job controlling the quality of air introduced into the space, but these systems pressurize the home relative to outside; this can result in condensation forming in the walls as warm, humid indoor air is pushed through cold wall assemblies.

Balanced systems control the source of outdoor air, provide filtration, can include heat or energy recovery for superior energy performance and comfort, and do not introduce pressure differentials that could otherwise result in condensation in walls and the introduction of harmful pollutants. For these reasons and others, the International Mechanical Code has required that ventilation systems for high-rise dwelling units be balanced. But for low-rise dwelling units, no such requirement exists in the model code. That said, several jurisdictions or programs now require balanced mechanical ventilation for low-rise dwelling units too (e.g., the draft New York Stretch Code; the State of Minnesota (all new construction); Aspen, Colorado; Boulder County, Colorado; most of Canada, etc.).

Heat recovery and energy recovery ventilators (H/ERVs) provide the benefits of balanced ventilation but at a lower energy penalty with improved comfort – especially in cold climates like Rhode Island. H/ERVs are now required across most of Canada, within the draft New York Stretch Code (with some exceptions), and within the prescriptive path of the DOE Zero Energy Ready Home (note that H/ERVs are not required for homes following the performance path, so they would need to be called out specifically in Section 7 to guarantee implementation in all Rhode Island Stretch Code homes).

Response:
The comments above refer to homes. The RI Residential Stretch Code requires that homes be designed and constructed to specific indoor air quality standards. The commercial code requires demand control ventilation and/or heat/energy ventilation for many space types that will experience significant human occupancy rates. No changes have been made to the code document.

The following is the letter submitted via email by the New Buildings Institute (NBI). Below the letter are the paraphrased comments from NBI followed by OER's responses:

nbi new buildings institute
celebrating 20 YEARS

Thank you for the opportunity to comment on the Rhode Island Stretch Code.

Rhode Island showed early leadership in the world of green and stretch codes when it was one of the first jurisdictions to adopt the then new International Green Construction Code (IgCC).

New Buildings Institute believes strongly in the role that Stretch Codes can play in moving our building stock toward greater energy efficiency and advancing base energy codes. The first Massachusetts Reach Code, perhaps the first stretch code in the nation, was based on NBI's *Core Performance Guide*, a prescriptive guide for achieving significant energy savings in commercial buildings. NBI has continuously worked in this space, playing a major role in the development of the first IgCC, creating stretch code recommendations for Washington State, the City of Boulder. NBI is completing a 20% Stretch Code Solution that will be released later this summer. The 20% Stretch Code Solution describes a set of efficiency measures that targets energy savings of 20% beyond ASHRAE 90.1-2013 (comparable to 2015 IECC). NBI is currently leading the development of the New York State Stretch Energy Code, while also being an organizational member of ASHRAE 189.1

Based on this extensive history in stretch and green codes, NBI sees some important ways that this draft of the commercial Rhode Island Stretch Code could be made even better. It can be augmented to both improve the energy performance of the Stretch Code and improve the impact the stretch code can make in Rhode Island. We see a few reasons to refine the provisions of the stretch code even further.

1. Rhode Island utilities are a key to the ultimate success of the Stretch Code. The likeliest and biggest support for building owners and developers to use the Stretch Code would be if there were programs and incentives available for Stretch Code compliance. Utilities could incentivize compliance with the whole stretch code or incentivize individual requirements from the stretch code. In either scenario, the stretch code will need to deliver sufficient savings for the utilities to be able to offer incentives. This is especially important since the Rhode Island base energy code likely will be updated before the stretch code is updated again, and the savings from certain stretch code measures will be eroded or erased. Therefore it is important to strengthen the stretch code so that it can deliver savings in the widest range of measures.
2. Market penetration of the stretch code in Rhode Island can be aided by greater alignment with other regional stretch code efforts. At a fundamental level, alignment will add credibility to the Rhode Island Stretch Code. Additionally, the Stretch Code being finalized for nearby New York State will likely be mandatory in many communities, including New York City. It will therefore create market capacity for the equipment and building approaches required in New York's stretch code. Regional builders will be more likely to utilize the Rhode Island stretch code if its provisions align with the requirements they are already following for New York State stretch code projects. The draft Rhode Island Stretch Code already has strong similarities with the draft New York State Stretch Code. With the adjustment of some key provisions, the two codes could be brought into substantial parity, fostering this regional consistency.
3. Rhode Island's "Energy 2035, State Energy Plan" Greenhouse Gas (GHG) reduction goals will require aggressive energy codes. Right now, the base energy code in Rhode Island is falling behind what will be needed to meet that

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goal. The leadership provided by the Stretch Code is important, and it is also important that the requirements in the stretch code demonstrate leadership on all energy issues.

4. The IgCC is in a transition period. The International Code Council, the American Society of Heating, Refrigerating and Air-Conditioning Engineers and the United States Green Building Council have signed an agreement to collaborate and coordinate the development of their green standards/codes. As a result, there is no 2018 edition of the IgCC and the next edition will be based largely on ASHRAE's green Standard 189.1. This will create a significant change in the nature of the content of the IgCC. The New York State Stretch Code is aligned with many requirements of 189.1. Therefore, in addition to fostering regional consistency, increasing alignment with final draft of NYStretch will also improve alignment with Standard 189.1 and ease the transition to the next edition of the IgCC.

NBI would like to comment on a few key opportunities for improvement in the Rhode Island Stretch Code: Thermal Bridging, Hot Water Conservation, Exterior Lighting Control , and Lighting Efficiency.

These are critical technical updates that Rhode Island should address in the stretch code if it is going to deliver the level of energy savings to be successful for all of the stakeholders in Rhode Island.

Thermal Bridging

Energy codes and stretch codes have gone a long way to improve the performance of building thermal envelopes. Envelope requirements are often subject to the most extensive vetting by the building industry to ensure cost effectiveness and technical feasibility. This means that opportunities to improve the thermal envelope by improving insulation levels are limited. However, there is an area where the most codes, including the IgCC on which the RI Stretch Code is based, allows opportunities for real improvement: thermal bridging. Thermal bridges are like superhighways for heat to leave or enter a building, bypassing the insulation meant to prevent heat transfer. However, the R-value, U-factor and weighted U-factor approaches in the base energy code allow for the construction of opaque thermal envelopes with considerable thermal bridges. The simplest and most effective way to limit thermal bridges in thermal envelopes is the adoption of a continuous insulation requirement. A continuous insulation requirement will prevent thermal bridges from penetrating completely through the thermal envelope, all portions of the thermal envelope would maintain a minimum level of resistance to heat transfer. Continuous insulation is already defined in the base code, allowing for considerations for issues such as mechanical fasteners.

Recommendation: *NBI recommends that RI Stretch adopt the continuous insulation from NYStretch. The most logical place to introduce this requirement would be as a new Section 605.3 with language such as the following: "**Continuous Insulation.** All parts of the opaque thermal envelope shall be provided with not less than R-5 continuous insulation."*

Water Conservation

As a comprehensive Green Code, RI Stretch has an opportunity to improve the efficiency of hot water systems through reducing hot water consumption. The most direct way to reduce hot water consumption is with lower flow plumbing fixtures. Reducing the flow of water through plumbing fixtures reduces the amount of hot water per use and with it the energy needed to heat water. EPA's *Water Sense* standard sets flow limits for plumbing fixtures and is a widely-used and nationally vetted standard to reference.

Recommendation: *NBI recommends that RI Stretch adopt the Water Sense standard for lavatory faucets and showerheads in Section 607 (most logically as a new Section 607.7). This will allow for the reduction of water heating energy, a substantial load in occupancies such as R-1 (hotels/motels) and R-2 (multifamily).*

Exterior Lighting Control

Although LED lighting technology has seen its widest adoption in exterior lighting, there is still significant opportunity to save energy through exterior lighting control. Most site lighting consumes energy even when there are no people in the site. While it is important to provide minimum levels of lighting in the site for safety and security, there is an opportunity to reduce those lighting levels when there are few, if any, people in the area. RI Stretch does include some lighting control requirements, but these do not capture the savings that are possible. RI Stretch only requires a reduction of 30% during after-hour periods. There is an opportunity to reduce exterior lighting power further.

Recommendation: *NBI recommends that Rhode Island align the exterior lighting control requirements in section 608.4.1 of RI Stretch with NYStretch. NYStretch requires a 50% reduction of lighting power instead of 30%.*

Lighting Efficiency

Light Emitting Diode (LED) lighting technology has fundamentally changed the lighting industry and market. As more efficient LED lighting products have gained market share, traditional lighting technologies like fluorescent lighting have had to improve to compete, with more efficient lamps and more efficient luminaires that can better deliver the light that is produced. In many cases, code lighting power density (LPD) requirements are lagging behind what the market can deliver. Additionally, there is a critical exception in the IgCC that allows for any level of efficiency or efficacy in sleeping units. This dynamic market cannot be ignored, especially since lighting retrofits are some of the most common energy projects in buildings.

Recommendation: *NBI recommends that RI Stretch adopt the LPD requirements from NYStretch and Standard 189.1 (see table below) in Section 608.1.2. The LPD requirements in Standard 189.1 and New York State Stretch have been vetted with the market impact of LEDs in mind and provide savings over the requirement in RI Stretch (i.e a 12% reduction from RI base code). We also recommend that the dwelling unit and sleeping unit lamp efficiency requirement from NYStretch be adopted for sleeping units (65 lm/W for lamps and 50 lm/W for luminaires) so as to close the existing loophole.*

Building Area Type[a]	LPD, W/ft²	LPD, W/m²
Automotive facility	0.64	6.9
Convention center	0.51	5.5
Courthouse	0.74	8.0
Dining: Bar lounge/leisure	0.69	7.4
Dining: Cafeteria/fast food	0.66	7.1
Dining: Family	0.61	6.6
Dormitory	0.52	5.6
Exercise center	0.61	6.6
Fire station	0.50	5.4
Gymnasium	0.67	7.2
Health-care clinic	0.68	7.3
Hospital	0.86	9.3
Hotel/Motel	0.70	7.5
Library	0.72	7.8
Manufacturing facility	0.60	6.5
Motion picture theater	0.62	6.7
Multifamily	0.49	5.3
Museum	0.68	7.3
Office	0.69	7.4
Parking garage	0.12	1.3
Penitentiary	0.67	7.2
Performing arts theater	0.85	9.1
Police station	0.68	7.3
Post office	0.62	6.7
Religious building	0.70	7.5
Retail	0.91	9.8
School/university	0.67	7.2
Sports arena	0.76	8.2
Town hall	0.72	7.8
Transportation	0.51	5.5
Warehouse	0.41	4.4
Workshop	0.83	8.9

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

New Buildings Institute (NBI) is a nonprofit organization driving better energy performance in commercial buildings. We work collaboratively with industry market players—governments, utilities, energy efficiency advocates and building professionals—to promote advanced design practices, innovative technologies, public policies and programs that improve energy efficiency. We also develop and offer guidance and tools to support the design and construction of energy efficient buildings.

Throughout its 20-year history, NBI has become a trusted and independent resource helping to drive buildings that are better for people and the environment. Our theory of change includes setting a vision and defining a path forward. We then set out to create the research that serves as the basis for tool and policy development necessary to create market change.

Thermal Bridging:
Energy codes and stretch codes have gone a long way to improve the performance of building thermal envelopes. Envelope requirements are often subject to the most extensive vetting by the building industry to ensure cost effectiveness and technical feasibility. This means that opportunities to improve the thermal envelope by improving insulation levels are limited. However, there is an area where the most codes, including the IgCC on which the RI Stretch Code is based, allows opportunities for real improvement: thermal bridging. Thermal bridges are like superhighways for heat to leave or enter a building, bypassing the insulation meant to prevent heat transfer. However, the R-value, U-factor and weighted U-factor approaches in the base energy code allow for the construction of opaque thermal envelopes with considerable thermal bridges. The simplest and most effective way to limit thermal bridges in thermal envelopes is the adoption of a continuous insulation requirement. A continuous insulation requirement will prevent thermal bridges from penetrating completely through the thermal envelope, all portions of the thermal envelope would maintain a minimum level of resistance to heat transfer. Continuous insulation is already defined in the base code, allowing for considerations for issues such as mechanical fasteners.

Recommendation: NBI recommends that RI Stretch adopt the continuous insulation from NYStretch. The most logical place to introduce this requirement would be as a new Section 605.3 with language such as the following: "Continuous Insulation. All parts of the opaque thermal envelope shall be provided with not less than R-5 continuous insulation."

Response:
Although the RI base code requirements include continuous insulation for most assemblies we agree that all opaque assemblies may not be covered and the following section has been added: ***605.3 Continuous Insulation****. The requirements for continuous insulation as specified in the Rhode Island Building Code SBC-1 and the Energy Conservation Code SBC-8 must be met. And, all parts of the opaque thermal envelope shall be provided with not less than R-5 continuous insulation to prevent thermal bridging.*

Comment:
Water Conservation:
As a comprehensive Green Code, RI Stretch has an opportunity to improve the efficiency of hot water systems through reducing hot water consumption. The most direct way to reduce hot water consumption is with lower flow plumbing fixtures. Reducing the flow of water through plumbing fixtures reduces the amount of hot water per use and with it the energy needed to heat water. EPA's Water Sense standard sets flow limits for plumbing fixtures and is a widely-used and nationally vetted standard to reference.

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Response:
Chapter 7 of the RI Commercial Stretch Code focuses solely on water consumption and includes comprehensive provisions restricting maximum flow rates for faucets and showerheads as well as dozens of other water consuming commercial appliances. No changes were made to the code.

Comment:
Exterior Lighting Control:
Although LED lighting technology has seen its widest adoption in exterior lighting, there is still significant opportunity to save energy through exterior lighting control. Most site lighting consumes energy even when there are no people in the site. While it is important to provide minimum levels of lighting in the site for safety and security, there is an opportunity to reduce those lighting levels when there are few, if any, people in the area. RI Stretch does include some lighting control requirements, but these do not capture the savings that are possible. RI Stretch only requires a reduction of 30% during after-hour periods. There is an opportunity to reduce exterior lighting power further.

Recommendation: NBI recommends that Rhode Island align the exterior lighting control requirements in section 608.4.1 of RI Stretch with NYStretch. NYStretch requires a 50% reduction of lighting power instead of 30%.

Response:
This proposed change has possible conflicts with safety codes and may raise concerns outside of the OER's jurisdiction. We are consulting with other departments before considering a change to the code.

Comment:
Lighting Efficiency:
Light Emitting Diode (LED) lighting technology has fundamentally changed the lighting industry and market. As more efficient LED lighting products have gained market share, traditional lighting technologies like fluorescent lighting have had to improve to compete, with more efficient lamps and more efficient luminaires that can better deliver the light that is produced. In many cases, code lighting power density (LPD) requirements are lagging behind what the market can deliver. Additionally, there is a critical exception in the IgCC that allows for any level of efficiency or efficacy in sleeping units. This dynamic market cannot be ignored, especially since lighting retrofits are some of the most common energy projects in buildings.

Recommendation: NBI recommends that RI Stretch adopt the LPD requirements from NYStretch and Standard 189.1 (see table below) in Section 608.1.2. The LPD requirements in Standard 189.1 and New York State Stretch have been vetted with the market impact of LEDs in mind and provide savings over the requirement in RI Stretch (i.e a 12% reduction from RI base code). We also recommend that the dwelling unit and sleeping unit lamp efficiency requirement from NYStretch be adopted for sleeping units (65 lm/W for lamps and 50 lm/W for luminaires) so as to close the existing loophole.

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Workshop	0.83	8.9
a. In cases where both a general building area type and a specific building area type are listed, the specific building area type shall apply.		

Response:
OER is working with National Grid to assure that the requirements align with the requirements of National Grid's new construction incentive programs.

The following is a letter of support submitted via email by the City of Providence regarding the Commercial Stretch Code document. No changes were made to the document based on this letter.

Mayor Jorge O. Elorza

Leah Bamberger

CITY OF PROVIDENCE

December 21, 2017

Becca Trietch
Chief Program Development
Office of Energy Resources
One Capitol Hill, 4th Floor
Providence, RI 02908

RE: PROPOSED RHODE ISLAND RESIDENTIAL AND COMMERCIAL STRETCH CODES

Dear Ms. Trietch,

On behalf of the City of Providence, it is my pleasure to write in full support of the proposed Rhode Island Residential and Commercial Stretch Codes. Our goal is to aid the State of Rhode Island, the Office of Energy Resources (OER), and ultimately the people of Providence in securing a more affordable, cleaner, and sustainable energy future.

Last year Mayor Elorza signed an executive order on climate action, committing Providence to become a carbon neutral city by 2050. Since buildings account for 70% of our carbon emissions, the City is working with stakeholders to develop a plan to reduce energy use from existing buildings. A stretch code will be a critical component to help address energy efficiency in new construction.

A strong building energy code is one of the most affordable and effective mechanisms for advancing energy efficiency in buildings. The national model building energy codes have increased energy-saving potential by nearly 30 percent from 2006 to 2015. Encouraging developers in Providence to use the stretch codes will help us achieve our carbon neutral by 2050 goal. Additionally, these codes will yield cost savings for local residents and businesses and will increase design and construction firm competitiveness in the marketplace.

Thank you for the opportunity to comment and participate in this process. We look forward to working with you on this important effort in capturing the many benefits energy efficiency offers.

Sincerely,

Leah Bamberger
Director

OFFICE OF SUSTAINABILITY
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The following are the paraphrased comments of Kevin Rose, Senior Program Manager, Mass/RI Codes & Standards at National Grid, submitted via email and at the public meeting. They are followed by OER's responses. Only comments related to the content of the Commercial Stretch Code document are shown below. For all comments from Mr. Rose please see the public meeting minutes on the Secretary of State's website: http://sos.ri.gov/documents/publicinfo/omdocs/minutes/5171/2017/57566.pdf?r=

Comment:
During the December 13, 2017 public meeting, Mr. Rose was asked to review the incentive description section in the draft commercial stretch code. The section attempted to outline the incentives available from National Grid for buildings that comply with the Commercial Stretch Code. The following comment was submitted via email by Mr. Rose in response to this request:

"While the available incentives for projects following the performance path are defined within the stretch code itself, incentive offerings for prescriptive path projects will be formalized upon finalization of the stretch code in 2018. Interested stakeholders should contact National Grid's New Construction program for more details."

Response:
To better reflect this information, the "National Grid Efficiency Program Stretch Code Support" section on page V of the Commercial Stretch Code document has been updated as follows:

"An important premise of National Grid's residential and commercial new construction offerings is to prepare building design and construction practitioners for future advancement in the energy efficiency requirements of the state building code. The Rhode Island Stretch Code shares this premise. National Grid's new construction programs have been designed to complement the energy aspects of the stretch code where possible. Incentives and assistance are available as follows but are subject to change.

Technical assistance - National Grid provides technical assistance to commercial building design practitioners to evaluate potential energy efficient design elements. This service is typically provided through third party energy engineering firms. National Grid will fund up to 75% of the cost of this service for commercial buildings over 100,000 square feet and up to 100% for commercial projects less than 100,000 square feet but greater than 20,000 square feet.

Financial incentives - Through National Grid's Energy Efficiency program, incentives are available for eligible and cost-effective design elements that improve the energy performance of a building. National Grid will fund eligible energy efficient design improvements at $0.35/kWh and $1.70 per therm saved over the base design in accordance with the "State of Rhode Island Energy Conservation Code."

To learn more about National Grid's new construction services, download the Participants' Guide, call 844-280-4326, or email newconstruction@nationalgrid.com."

Comment:
Mr. Rose asked if a section about insulation requirements had been purposely omitted. He would recommend having specific insulation requirements.

Response:
During the public meeting, Mr. McCowan responded that a section on insulation standards and related envelope provisions had been inadvertently deleted during final editing. It has been re-

inserted and addresses insulation values for all envelope components. The following insulation section was added back into the document:

*"**SECTION 605. BUILDING ENVELOPE SYSTEMS***
605.1 Prescriptive compliance. Where buildings are designed using the prescriptive-based compliance path in accordance with Section 601.3.2, building thermal envelope systems shall comply with the pro-visions of Section C402 of the International Energy Conservation Code and the provisions of this section.
605.1.1 Insulation and fenestration criteria. The building thermal envelope shall exceed the requirements of Tables C402.1.4 and C402.4 of the International Energy Conservation Code by not less than 10 percent. Specifically, for purposes of compliance with this code, each U-factor, C-factor, F-factor and SHGC in the specified tables shall be reduced by 10 percent to determine the prescriptive criteria for this code. The 10 percent reduction criteria can be met for each individual envelope component/assembly, or may be calculated as a 10 percent weighted average reduction by utilizing the COMcheck software tool envelope trade-off methodology. Non-envelope measures may not be used for the trade-off reduction calculation. Where Table C402.1.3 of the International Energy Conservation Code provides for no requirement (NR) for the R-value of an assembly, the U-factor, C-factor and F-factor are not required to be reduced. In Sky Type "C" locations specified in Section 808.4, the skylights shall not exceed 5 percent of the building roof area.
605.1.1.1 Shading devices for fenestration. Vertical fenestration within 135 degrees (3316 rad) of the nearest south cardinal ordinate in buildings located in the northern hemisphere or the nearest north cardinal ordinate in buildings located in the southern hemisphere, shall be shaded by one or a combination of the following methods:
1. Permanent horizontal exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing not less than one-half of the height of the glazing, except at building corners.
2. Automatically controlled shading devices capable of modulating in multiple steps the amount of solar gain and light transmitted into the space in response to daylight levels or so-lar intensity, that comply with all of the following:
2.1. Exterior shading devices in the closed position shall cover not less than 90 percent of the fenestration.
2.2. Interior shading devices in the closed position shall cover not less than 90 percent of the fenestration and have a minimum solar reflectance of 0.50 for the surface facing the fenestration.
2.3. A manual override, where provided, shall override operation of automatic controls for not longer than 4 hours.
2.4. Commissioning shall be conducted as required by Section 611.10 to verify that the automatic controls for shading devices respond to changes in illumination or radiation intensity.
Exception: Shading devices are not required for the following buildings and fenestrations:
1. Buildings located in hurricane-prone regions in accordance with Section 1609.2 of the International Building Code or on any other building with a mean roof height exceeding the height limits specified in Table 1504.8 of the International Building Code based on the exposure category and basic wind speed at the building site.
2. Where fenestration is located in a building wall that is within 18 inches (457 mm) of the lot line.
3. Where equivalent shading of the fenestration is provided by buildings, structures, geological formations, or permanent exterior projections that are not horizontal, as determined by sun angle studies at the peak solar altitude on the spring equinox, and three hours before and

after the peak solar altitude on the spring equinox.
4. Where fenestration contains dynamic glazing that has a lower labeled solar heat gain coefficient (SHGC) equal to or less than 0.12, and the ratio of the higher and lower labeled visible transmittance (VT) is greater than or equal to 5. Dynamic glazing shall be automatically con-trolled to modulate, in multiple steps, the amount of solar gain and light transmitted into the space in response to daylight levels or so-lar intensity. Functional testing of the controls of the dynamic glazing shall be conducted in accordance with Section 611.10.
605.1.2 Air leakage. The building thermal envelope shall be durably sealed to limit air leakage in accordance with Section C402.4 of the International Energy Conservation Code and the provisions of this section.
605.1.2.1 Air barriers. A continuous air barrier shall be provided for buildings in climate zones 1 through 8 in accordance with Section C402.5.1 of the International Energy Conservation Code. The exception in Section C402.5.1 of the International Energy Conservation Code shall not apply.
605.1.2.2 Testing requirement. The building thermal envelope air tightness shall be tested and the air leak-age rate of the total area of the building thermal envelope shall not exceed 0.25 cfm/ft2 under a pressure differential of 0.3-inch water column (1.57 lb/ft2) (1.25 L/s.m2 under a pressure differential of 75 Pa). Testing shall occur after rough-in and after installation of penetrations of the building envelope, including penetrations for utilities, heating, ventilating and air-conditioning (HVAC) systems, plumbing, and electrical equipment and appliances. Testing shall be done in accordance with ASTM E779. 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. Where the tested rate exceeds 0.25 cfm/ft2, a visual inspection of the air barrier shall be conducted and any leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal leaks shall be submitted to the code official and the building owner, and shall be deemed to satisfy the requirements of this section.
605.1.2.3 Deleted in Rhode Island
605.2 Roof Replacement. Above-deck insulation for roof replacement on an existing building with insulation completely above the deck and where the roof slope is less that two units in 12 units (17 percent roof slope) shall be in accordance with Section 1003.2.7.
605.3 Continuous Insulation. All parts of the opaque thermal envelope shall be provided with not less than R-5 continuous insulation to prevent thermal bridging.

The following are paraphrased comments from Mr. Christopher Armstrong, Assoc. AIA, LEED AP^{BD+C}, RI Green Building Advisory Council – AIAri Representative, submitted via email and presented at the public meeting, followed by OER's responses. Only comments related to the content of the Commercial Stretch Code document are shown below. For all other comments from Mr. Armstrong please see the public meeting minutes on the Secretary of State's website:
http://sos.ri.gov/documents/publicinfo/omdocs/minutes/5171/2017/57566.pdf?r=

Comment:
Mr. Armstrong asked if the multiple references to commissioning requirements throughout the document was intentional. He believes the multiple references are confusing when there is one section (Chapter 9) that explains everything concisely.

Response:
At the public meeting, Mr. McCowan explained that the references were kept in because it was believed that no harm was caused by them. However, if they result in confusion then they should be removed. All references were removed, so that now there is only one section (Chapter 9) that describes the commissioning requirements.

Comment:
Mr. Armstrong pointed out that one of the close-out tables appears to be missing in the document. He submitted the following tables via email to help address this problem.

TABLE 410.1
SITE SYSTEMS COMPLETION

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
Chapter 4: Site development and land use					
Natural resources and base line conditions of *building site*	Report	With *Permit* Submittal	None	**Designer of Record**	401.2
Landscape irrigation systems	Field Observation	Installation	None	**Designer of Record**	404.1, 405.1.1
	Verification	Prior to Occupancy	None	**CxA**	
Topsoil and Vegetation Protection Measures; Setbacks from protected areas	Field Observation & Report	Installation of measures, prior to other site disturbance	None	**Designer of Record**	405.1.1
Imported Soils	Field Observation & Report	With *Permit* Submittal; After all fill operations complete.	None	**Designer of Record**	405.1.3
Soil Restoration and Reuse	Field Observation & Report	Preparation and replacement of soils	None	**Designer of Record**	405.1.4
Erosion and sediment control	Field Observation	During construction activities	None	**Designer of Record**	405.1.1
	Maintenance Plan	None	Periodic for 24 months	**Owner**	
Hardscape and shading provided by structures and vegetation	Field Observation	During construction and installation		**Designer of Record**	408.2
	Maintenance Plan	None	24 Months	**Owner**	
Vegetative Roofs	Field Observation	Installation	None	**Designer of Record**	408.3.2
	Verification	Prior to Occupancy	None	**CxA**	
	Maintenance Plan	None	24 months	**Owner**	
Site Lighting	Field Observation	Installation	None	**Designer of Record**	409
	Verification	Prior to Occupancy	None	**CxA**	

TABLE 508.1
MATERIALS COMPLETION PLAN

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
Chapter 5: Material Resource Conservation and Efficiency					
1. Foundation sub-soil drainage system.	Field Observation	Periodic observation for entire sub-soil drainage system.	None	**Designer of Record**	507.1 and IBC Ch 18
2. Foundation waterproofing	Field Observation	Periodic observation for the entire foundation.	None	**Designer of Record**	507.1 and IBC Ch 18
3. Foundation dampproofing	Field Observation	Periodic observation for the entire foundation.	None	**Designer of Record**	507.1 and IBC Ch 18
4. Under slab water vapor protection	Field Observation	Periodic observation for the entire slab footprint.	None	**Designer of Record**	507.1 and IBC Ch 19
	Verification	Installation	None	**CxA**	ASTM E 1643
5. Flashing at: Windows, exterior doors, skylights, wall flashing and drainage systems.	Field Observation	Periodic observation for not less than 25% of all flashing locations.	None	**Designer of Record**	507.1 and IBC Ch 14
	Testing	Installation	None	**CxA**	ASTM E 2813 *(Fundamental)*
6. Exterior wall coverings.	Field Observation	Periodic observation for not less than 25% of exterior wall cladding systems.	None	**Designer of Record**	507.1 and IBC Ch 14
7. Roof coverings, roof drainage, and flashings	Field Observation	Periodic observation for not less than 25% of all roof covering, roof drainage and flashings.	None	**Designer of Record**	507.1 and IBC Ch 15
	Testing	Installation	None	**CxA**	ASTM E 2813 *(Fundamental)*

Table 611.1
Building Energy Systems Completion Plan

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
Chapter 6 - Energy					
Energy consumption, monitoring, targeting and reporting					
a. Energy Metering, Monitoring system	Field Observation	During installation	None	**Designer of Record**	603, 610.5
	Testing & Verification	During commissioning	None	**CxA**	
b. Calibration	Testing & Verification	During commissioning	None	**CxA**	603, 610.5
	Maintenance Plan	None	Annually	**Owner**	
Mechanical systems completion – all buildings					
a. Air system balancing – provide the means for system balancing	Contract Documents	During design	None	**Designer of Record**	611.1.2.1 and through reference to IECC
	Field Observation	During installation	None	**Designer of Record**	
b. Hydronic system balancing – provide means for system balancing	Contract Documents	During design	None	**Designer of Record**	611.1.2.2 and through reference to IECC
	Field Observation	During installation	None	**Designer of Record**	
c. Mechanical system manuals – construction documents to require O&M manual	Contract Documents	During design	None	**Designer of Record**	611.1.5.2
	Field Observation	During installation	None	**Designer of Record**	
Mechanical systems – buildings over 5,000 square feet total building floor area					
d. Balance HVAC systems (both air and hydronic)	Field Observation	During installation	None	**Designer of Record**	611.1.2
	Verification	During Commissioning	None	**CxA**	
h. Acceptance of HVAC systems and equipment	RDP 128 Letter	Prior to Occupancy	None	**Designer of Record**	611.1.4.1
i. Verify final HVAC system	Submittal Review	None	Within 90 days of	**Designer of**	611.1.5

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
completion documentation including as-built drawings, O&M manuals and balancing reports			certificate of occupancy	**Record**	
	Verification	None	Within 90 days of certificate of occupancy	**CxA**	
Chapter 6 - Lighting					
Plug load controls	Field Observation	During installation	None	**Designer of Record**	608.6
	Verification	During Commissioning	None	**CxA**	
Connection of appliances to switched receptacles	Verification	Final Inspection	None	**CxA**	608.6
	Verification	None	Annually	**Owner**	
Specified transformer nameplate efficiency rating	Field Observation	Final Inspection	None	**Designer of Record**	608.8.1.1
	Verification	During commissioning	None	**CxA**	
Verification of lamps	Field Observation	During installation	None	**Designer of Record**	608.10
	Verification	During Commissioning	None	**CxA**	
Verification of ballasts	Field Observation	During installation	None	**Designer of Record**	608.10
	Verification	During Commissioning	None	**CxA**	
Lighting Controls					
a. Installation	Field Observation	During installation	None	**Designer of Record**	608.11
	Testing & Verification	During Commissioning	None	**CxA**	
b. Calibration	Testing & Verification	During Commissioning	None	**CxA**	611.3.3
	Maintenance Plan	None	Annually	**Owner**	

TABLE 711.1
PLUMBING SYSTEMS COMPLETION PLAN

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
Chapter 7: Water					
Appliances	Field Observation	Final Inspection	None	**Designer of Record**	702.6
Hot water distribution	Field observation	During installation	None	**Designer of Record**	702.8
	Verification	During commissioning	None	**CxA**	
Cooling tower performance	Testing & verification	During commissioning	None	**CxA**	703.7.7
Rainwater system water quality	Testing & verification	During commissioning	None	**CxA**	707.15.1
	Maintenance Plan	None	Annually	**Owner**	
Gray water system water quality	Testing & verification	During commissioning	None	**CxA**	708.13.8
	Maintenance Plan	None	Annually	**Owner**	
Soil percolation test	Field inspection and report	Prior to installation of gray water irrigation system	None	**Designer of Record**	708.14.2

TABLE 808.1
INDOOR ENVIRONMENTAL QUALITY SYSTEMS COMPLETION PLAN

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
Chapter 8: IEQ					
Building construction, features, operations and maintenance facilitation					
Air handling system access	Field observation	During installation	None	**Designer of Record**	802.2
	Verification	During commissioning	None	**CxA**	
Air handling system filters	Field observation	During installation	None	**Designer of Record**	802.3
	Verification	During commissioning	None	**CxA**	
HVAC Systems					
Temperature and humidity in occupied spaces	Verification	None	Monthly for 12 months	**CxA**	803.2
Specific indoor air quality & pollutant control measures					
Listing, installation and venting of fireplaces and combustion appliances	Field observation and verification	During installation and prior to occupancy	None	**Designer of Record**	804.1

TABLE 903.1
COMMISSIONING PLAN

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
Chapter 4: Site development and land use					
Landscape irrigation systems	Field Observation	Installation	None	**Designer of Record**	404.1, 405.1.1
	Verification	Prior to Occupancy	None	**CxA**	
Vegetative Roofs	Field Observation	Installation	None	**Designer of Record**	408.3.2
	Verification	Prior to Occupancy	None	**CxA**	
	Maintenance Plan	None	24 months	**Owner**	
Site Lighting	Field Observation	Installation	None	**Designer of Record**	409
	Verification	Prior to Occupancy	None	**CxA**	
Chapter 5: Material Resource Conservation and Efficiency					
4. Under slab water vapor protection	Field Observation	Periodic observation for the entire slab footprint.	None	**Designer of Record**	507.1 and IBC Ch 19
	Verification	Installation	None	**CxA**	ASTM E 1643
5. Flashing at: Windows, exterior doors, skylights, wall flashing and drainage systems.	Field Observation	Periodic observation for not less than 25% of all flashing locations.	None	**Designer of Record**	507.1 and IBC Ch 14
	Testing	Installation	None	**CxA**	ASTM E 2813
Chapter 6 - Energy					
Energy consumption, monitoring, targeting and reporting					
a. Energy Metering, Monitoring system	Field Observation	During installation	None	**Designer of Record**	603, 610.5
	Testing & Verification	During commissioning	None	**CxA**	
b. Calibration	Testing & Verification	During commissioning	None	**CxA**	603, 610.5
	Maintenance Plan	None	Annually	**Owner**	

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
Mechanical systems – buildings over 5,000 square feet total building floor area					
a. Commissioning required and noted in plans and specifications	Verification of construction documents	Plan review	None	**CxA**	611.1
b. Documentation of required commissioning outcomes	Final Cx Report	Subsequent to completion of all commissioning activities	None	**CxA**	611.1
c. Preparation and availability of a commissioning plan	Report	Between plan review and commissioning initiation	None	**CxA**	611.1.1
d. Balance HVAC systems (both air and hydronic)	Field Observation	During installation	None	**Designer of Record**	611.1.2
	Verification	During Commissioning	None	**CxA**	
e. Functional performance testing of HVAC equipment	Testing and report	After installation of HVAC systems and prior to occupancy	TBD	**CxA**	611.1.3
f. Functional performance testing of HVAC controls and control systems	Testing and report	After installation of HVAC systems and prior to occupancy	TBD	**CxA**	611.1.3.2
g. Preparation of preliminary commissioning report	Report	None	Subsequent to commissioning	**CxA**	611.1.4
i. Verify final HVAC system completion documentation including as-built drawings, O&M manuals and balancing reports	Submittal Review	None	Within 90 days of certificate of occupancy	**Designer of Record**	611.1.5
	Verification	None	Within 90 days of certificate of occupancy	**CxA**	
Chapter 6 - Lighting					
Plug load controls	Field Observation	During installation	None	**Designer of Record**	608.6
	Verification	During Commissioning	None	**CxA**	
Connection of appliances to switched receptacles	Verification	Final Inspection	None	**CxA**	608.6
	Verification	None	Annually	**Owner**	
Specified transformer nameplate	Field Observation	Final Inspection	None	**Designer of**	608.8.1.1

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
efficiency rating				**Record**	
	Verification	During commissioning	None	**CxA**	
Verification of lamp	Field Observation	During installation	None	**Designer of Record**	608.10
	Verification	During Commissioning	None	**CxA**	
Verification of ballast	Field Observation	During installation	None	**Designer of Record**	608.10
	Verification	During Commissioning	None	**CxA**	
Lighting Controls					
a. Installation	Field Observation	During installation	None	**Designer of Record**	608.11
	Testing & Verification	During Commissioning	None	**CxA**	
b. Calibration	Testing & Verification	During Commissioning	None	**CxA**	611.3.3
	Maintenance Plan	None	Annually	**Owner**	
Chapter 7: Water					
Hot water distribution	Field observation	During installation	None	**Designer of Record**	702.8
	Verification	During commissioning	None	**CxA**	
Cooling tower performance	Testing & verification	During commissioning	None	**CxA**	703.7.7
Rainwater system water quality	Testing & verification	During commissioning	None	**CxA**	707.15.1
	Maintenance Plan	None	Annually	**Owner**	
Gray water system water quality	Testing & verification	During commissioning	None	**CxA**	708.13.8
	Maintenance Plan	None	Annually	**Owner**	
Chapter 8: IEQ					
Building construction, features, operations and maintenance facilitation					
Air handling system access	Field observation	During installation	None	**Designer of Record**	802.2
	Verification	During commissioning	None	**CxA**	

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
Air handling system filters	Field observation	During installation	None	**Designer of Record**	802.3
	Verification	During commissioning	None	**CxA**	
HVAC Systems					
Temperature and humidity in occupied spaces	Field inspection and verification	None	Monthly for 12 months	**CxA**	803.2

Response:
At the public meeting, Ms. Trietch thanked him for reviewing and bringing any such errors to her attention. The tables submitted via email were incorporated into the document as was originally intended.

Comment:
Mr. Armstrong recommends adding the following definition for Continuous Insulation in the Definitions section of the document. This definition was added in the IECC 2015. He recommends adding this definition to ensure the thermal effectiveness of continuous insulation for stretch code projects until RI adopts the 2015 or 2018 IECC.

"CONTINUOUS INSULATION (ci). Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope."

Response:
OER added this definition to the document.

Comment:
In Chapter 5 – Material Resource Conservation and Efficiency – Mr. Armstrong recommends adding RIGCC 2014 Table 508.1 Materials Completion Plan.

Response:
OER added this table to the document.

Comment:
In Chapter 6 – Energy Conservation, Efficiency and CO_2e Emission Reduction – Mr. Armstrong recommends adding RIGCC Section 605 requirements back in.

Response:
OER has added Section 605 requirements back in. They were omitted unintentionally in the Commercial Stretch Code document issued for public comment.

Comment:
Mr. Armstrong recommends moving the Whole Building Life Cycle Assessment currently in Appendix A – Project Electives – to Section A105.10. In Mr. Armstrong's opinion, this location would keep with the intent of Section A105 containing all Project Electives related to Chapter 5.

Response:
The Whole Building Life Cycle Assessment elective reference additional sections beyond Chapter 5, and therefore is retained as a stand-alone section.

The following are the paraphrased comments of Mr. Brian McCowan, ERS submitted via email, followed by OER's responses:

Comment: *The introductory synopsis section which summarizes the intent and content of each chapter was based primarily on the International Green Construction Code (IGCC).*

Response: *The RICSC is largely based on the IGCC, however many amendments have been introduced. The OER revised this section to better reflect the Rhode Island amendments made to the IGCC.*

Decision

It is the decision of the Rhode Island Office of Energy Resources to approve the Rhode Island Commercial Stretch Code with the aforementioned additions and edits. The final 2018 Commercial Stretch Code is appended to this Decision.

2/19/18
Date

Carol J. Grant, Commissioner
Office of Energy Resources

A Copy of Decision has been posted on the following webpage: http://www.energy.ri.gov/policies-programs/lead-by-example/case-studies/stretch-code-development.php