2015-16 Massachusetts Single-Family Code Compliance/Baseline Study: Volume 1 – FINAL

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Volume 1

SAMPLING, RECRUITMENT, AND ON-SITE DATA COLLECTION

SUBMITTED TO:
The Electric and Gas Program Administrators of Massachusetts

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1 Section 1 Introduction

The Massachusetts Program Administrators (PAs) and Energy Efficiency Advisory Council (EEAC) Consultants began planning a study to measure single-family code compliance and baseline characteristics in December of 2014. The PAs and EEAC, along with NMR Group, Inc. and Dorothy Conant (from here on referred to as "the Team"), held three planning calls to develop the scope of the study, which was ultimately defined in the final Stage 3 detailed evaluation work plan.[1] This report, separated into five volumes, presents the results of evaluation activities, including 194 on-site visits of single-family homes in Massachusetts.

1.1 Reporting Organization

Given the amount of information covered in this study, the Team, PAs, and EEAC agreed to provide the results in five separate report volumes:

Volume 1: Sampling, Recruitment, and On-site Data Collection

This report volume presents the sampling, recruitment, and on-site data collection methods.

Volume 2: Data Analysis Findings

This report volume presents detailed findings from the on-site inspections.

Volume 3: Baseline Findings

This report volume provides a high-level summary of the data analysis findings.

Volume 4: Compliance Findings

This report volume focuses on the code compliance assessment, which is founded in the data presented in the data analysis report volume.

Volume 5: UDRH Addendum

This report volume presents the updated Residential New Construction (RNC) programs' User Defined Reference Home (UDRH).

This document represents Volume 1: Sampling, Recruitment, and On-site Data Collection.

[1] NMR Group, Dorothy Conant, and Cadmus. *Final Single-Family New Construction Compliance/Baseline Study: Evaluation Plan.* Prepared for the Electric and Gas Program Administrators of Massachusetts. May 12, 2015.

1.2 STUDY OBJECTIVES AND BACKGROUND

This study was designed to meet the following primary goals:

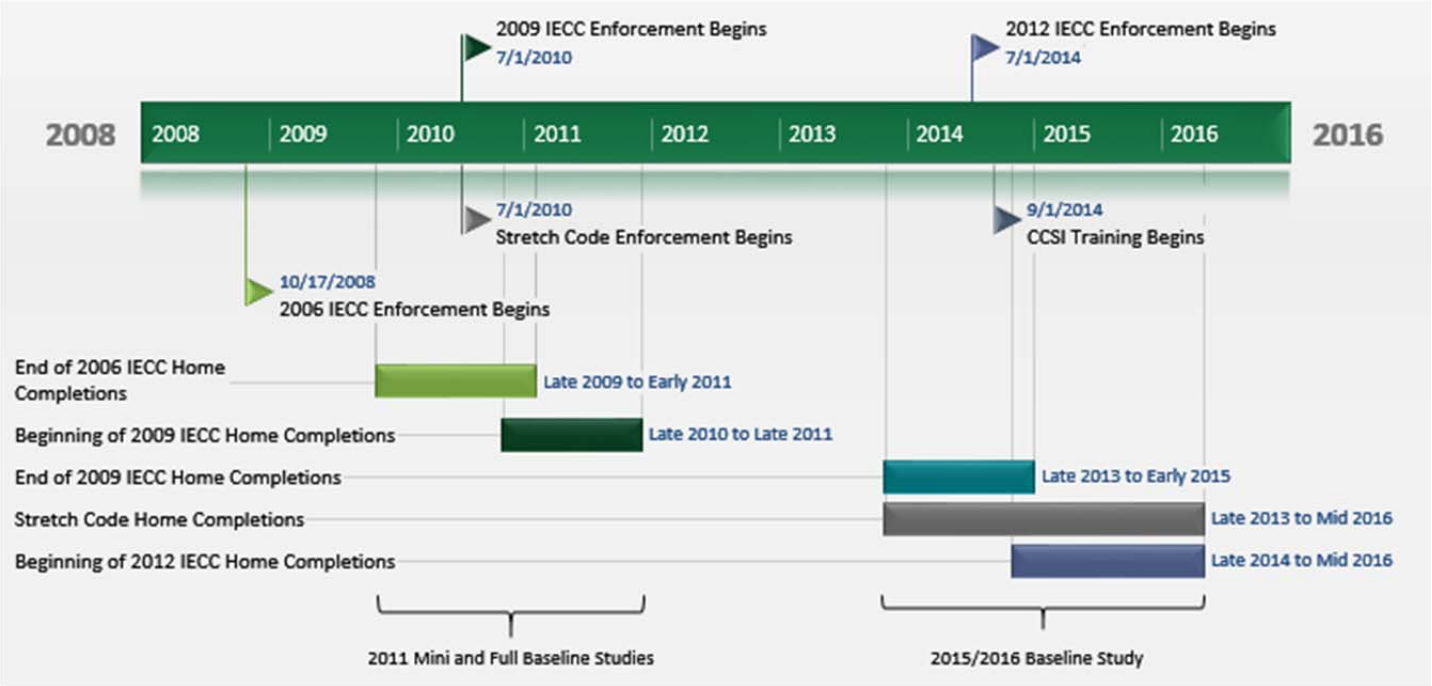
- To provide the PAs and EEAC Consultants with a code compliance assessment of newly constructed single-family homes permitted at the end of the 2009 International Energy Conservation Code (IECC) cycle, homes permitted during the beginning of the 2012 IECC cycle, and homes permitted under the stretch code
- To provide the information needed to update the UDRH for the low-rise component (residential buildings three stories or lower) of the RNC program

To meet the primary goals of the study and answer the research questions listed below, the PAs and EEAC Consultants decided to conduct on-site inspections with non-program single-family homes. This is consistent with the approach that has historically been used in Massachusetts to conduct code compliance assessments and update the RNC UDRH.

The code compliance assessments were conducted to provide support for the PAs' Code Compliance Support Initiative (CCSI). The CCSI seeks to claim savings from enhancing compliance with the energy code throughout Massachusetts. The PAs previously measured compliance with homes built at the end of the 2006 IECC and the beginning of the 2009 IECC cycles.[2] The inclusion of homes built at the end of the 2009 IECC cycle, the beginning of the 2012 IECC cycle, and homes built under the stretch code provides the PAs with a rich set of time series data that can be used to assess the potential savings from compliance enhancement efforts and the proportion of those savings that are attributable to the PAs' CCSI. Figure 1 presents the timing of the various code compliance cycles and also shows the range of construction completion dates for homes that have been included in the PAs' single-family compliance/baseline studies.

[2] NMR Group, Inc. *Code Compliance Results for Single-Family Non-Program Homes in Massachusetts.* Submitted to the Massachusetts Electric and Gas Program Administrators. September 2, 2014.

Figure 1: Timeline of Compliance Cycles and On-site Visit Home Completions



To leverage economies of scale, the Team, PAs, and EEAC Consultants decided to use this study to update the RNC programs' UDRH in conjunction with the aforementioned compliance assessment. The previous UDRH was completed in 2011 and is outdated, as it was based on homes built at the beginning of the 2009 IECC cycle.[3] The Team will work with the PAs and EEAC Consultants, along with other key stakeholders, to review the findings from this study and determine which results should be used to update the UDRH.

1.2.1 Research Questions

This study was designed to answer the following research questions:

- What are the code compliance levels of single-family homes built at the end of the 2009 IECC cycle, homes built at the beginning of the 2012 IECC cycle, and homes recently built under the stretch code?
- What above-code energy components are found in homes?
- What are the baseline characteristics of homes built in this period? How does that differ in stretch communities and for different code periods?
- How does compliance vary between stretch code and non-stretch code communities?
- In non-stretch code communities, how does compliance vary across the compliance paths (i.e., prescriptive, UA[4] trade-off, and performance)?
- How have compliance levels changed over time?
- What are the efficiency characteristics of homes' thermal envelopes (e.g., insulation, air leakage, duct leakage)?
- What are the efficiency-related characteristics of homes' heating, cooling, and water heating equipment?
- What are the efficiency-related characteristics of homes' other features, such as lighting and appliances?

[3] NMR Group, KEMA, Cadmus, and Dorothy Conant. *Massachusetts 2011 Baseline Study of Single-Family Residential New Construction.* Submitted to Berkshire Gas, Cape Light Compact, Columbia Gas of Massachusetts, National Grid, New England Gas Company, NSTAR Electric & Gas, Until, and Western Massachusetts Electric Company. August 16, 2012.
[4] U-factor*area.

2 Section 2 Sampling and Recruitment

To answer the research questions detailed above, the Team developed a detailed sampling plan involving 200 on-site inspections at new single-family homes across the state of Massachusetts.

The sampling plan for previous Massachusetts single-family new construction baseline studies sampled homes from all counties, matching the percentage of on-site inspections conducted in each county to the percentage of state-level permits issued in that county. For this study, The Team adopted a cluster sampling approach. Cluster sampling is a sampling technique where the entire population is divided into groups, or clusters. For the Single-family Compliance/Baseline study, the clusters are towns.[5] A random sample of towns (clusters) was selected, and then a sample of homes was randomly selected from each town (cluster).

2.1 Sampling Plan and Disposition

The Team used a probability proportional-to-size (PPS) sample of towns as the foundation for the sampling plan. Using this approach, each town was assigned a probability of being selected based on the percentage of 2013 single-family new construction permits. We used 2013 permits to assess the rate of new construction activity in each town for two reasons.

1. It was the most recent data available
2. These permits represent houses that were likely completed somewhere between 2014 and 2015 due to the time lag that exists from permit application to construction completion.

For this study, three separate populations of non-program homes were identified, and two types of inspections were conducted (Table 1):

Table 1: Details on Study Populations

Population (Non-program homes)	Inspection Type	Purpose
Homes built at the end of the 2009 IECC cycle	Full inspection	To calculate compliance with the energy code
Homes built at the beginning of the 2012 IECC cycle	Full & diagnostic-only inspections	To update the UDRH and calculate compliance with the energy code
Homes built under the stretch code	Full inspection	To update the UDRH and calculate compliance with the energy code

[5] Towns, not counties, were used as the sampling medium in this study because the study had to differentiate between stretch code and non-stretch code municipalities, which can only be done at the town level.

The full inspections included the necessary data collection to conduct a code compliance assessment and update the RNC UDRH. The diagnostic-only inspections focused specifically on air and duct leakage testing and were conducted to improve the precision of air and duct leakage testing results which will be used to update the UDRH.

Table 2 shows the original sample targets and the final sample disposition for each of the aforementioned groups. The sample targets for this study included attached and detached housing splits along with custom and spec housing splits.[6] The 2012 IECC targets were developed to represent the attached/detached and custom/spec splits found in the RNC program, as the primary purpose of this sample of homes is to update the UDRH. The 2012 IECC homes are also used to calculate compliance with the energy code. The attached/detached and custom/spec splits for the 2009 IECC and stretch code samples were developed to represent the market, as the primary purpose of these samples is to calculate compliance with the energy code. The stretch code homes are also used to aid in the development of the UDRH.

Table 2: Sample Disposition

Sample	House Type	Targets		Completions	
		Custom	Spec	Custom	Spec
2009 IECC—Full Inspections	Single-family detached	19	22	13	30
	Single-family attached	--	10	--	7
Stretch Code—Full Inspections*	Single-family detached	19	22	15	23
	Single-family attached	--	10	--	8
2012 IECC—Full Inspections	Single-family detached	8	23	11	36
	Single-family attached	--	19	--	3
2012 IECC—Diagnostic-Only Inspections	Single-family detached	8	23	10	32
	Single-family attached	--	19	--	8

*The Team originally targeted 50 stretch code visits, but ultimately closed the sample at 46 completions due to recruitment challenges.

The sample sizes of 50 homes for each sample were determined based on the results of the previous baseline study. As part of the planning effort for this study, the Team looked at three random samples of 50 homes from the 2011 study which showed that only two measures, air infiltration and duct leakage, had relative precisions greater than ±10% at the

[6] Homes are classified as custom or spec built based on the design and construction process for the home. The definitions are discussed in more detail on page 7.

90% confidence level. As a result, a decision was made to add the 50 diagnostic only inspections to improve the precision of the air infiltration and duct leakage results. The sample sizes of 50 homes from the 2011 study were also shown to have relative precisions within ±10% at the 90% confidence level for overall code compliance calculations.

2.2 SAMPLE DEVELOPMENT

The sample of homes for the on-site inspections was initially developed from new residential permanent service requests collected by four electric PAs in Massachusetts: National Grid, Eversource, the Cape Light Compact, and Unitil. Over the past several years, new permanent service requests have been used to identify newly constructed homes in Massachusetts for baseline studies and new home buyer surveys. To augment the sample derived from this approach, internet research was conducted to identify newly built homes that were not included in the new service request data; specifically, the Team used resources such as real estate websites (e.g., Zillow) and municipal assessors' databases.

As part of this study, the Team had sample targets for homes built at the end of the 2009 IECC cycle, homes built at the beginning of the 2012 IECC, and homes built under the stretch code; the same towns were used to serve both the 2009 IECC and 2012 IECC samples. To differentiate between the two codes, the Team contacted building departments to verify the code under which homes were built.[7] Building department visits were also used to help identify additional homes that had been recently permitted under the new codes, had completed construction, and, in the case of spec homes, were no longer owned by the builder. A similar approach was taken for stretch code homes, which had their own sample of towns from which the Team recruited.

2.3 RECRUITMENT

Each prospective homeowner was mailed a letter containing the PAs' logos, explaining the purpose of the study and what the on-site inspections would entail, and offering a $250 incentive for participation. Each letter included a stamped postcard on which the homeowner could write their name and contact information and send back if they were interested in participating. Pre-recruitment by phone (for homes that did not return a postcard) was complicated by the volume of builder contact information that was associated with addresses rather than homeowner contact information, a result of dealing with a sample of newly built homes.

As postcards were returned with contact information, homeowners were recruited through a short phone call asking them how they had purchased their homes (so that site could be classified as spec or custom) and if they were interested in participating in the on-sites. Specifically, the following screening question was used to designate a home as custom or spec:

[7] The Team used a mixture of in-person visits, email exchanges, and phone calls to confirm which code homes were built under in non-stretch code towns.

How did you purchase your home?

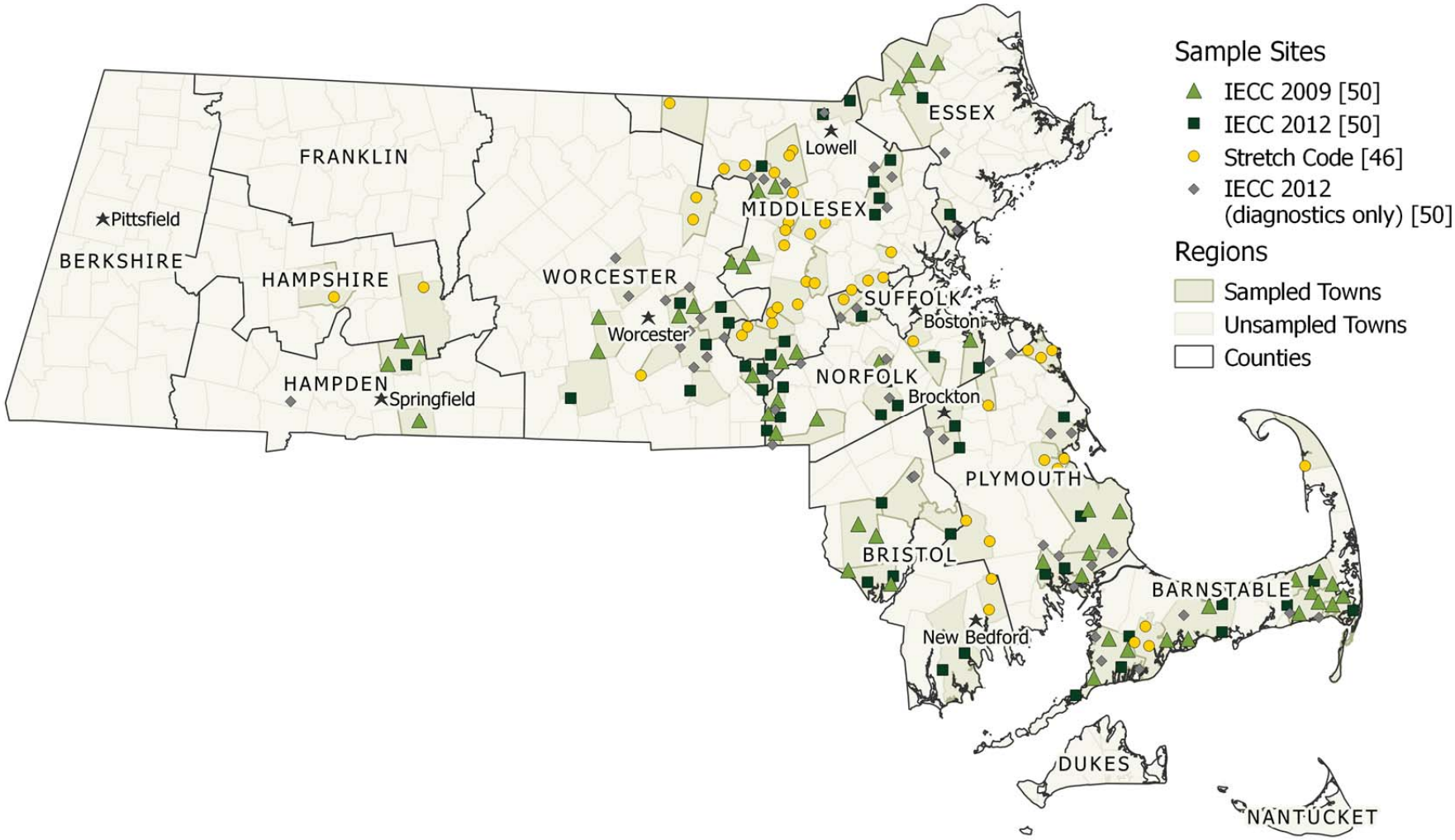
1. Purchased land and worked with an architect and/or builder to build the home
2. Had a house plan and a lot and hired a contractor/builder to build the home
3. Purchased a lot from a builder, selected one of several house plans offered by the builder, and selected from various available upgrade options
4. Purchased a home that was under construction and selected from various available upgrade options
5. Purchased a finished home
6. I am the owner and builder

Homes were classified as custom built if the homeowner chose responses 1, 2, or 6; if the homeowner chose responses 3, 4, or 5, the home was classified as spec built.

2.4 COMPLETED ON-SITE INSPECTIONS

Figure 2 on the next page shows the geographic distribution of the full on-site inspections.

Figure 2: Map of On-site Inspections



2.5 WEIGHTING

The Team worked closely with the PAs and EEAC Consultants to determine the weighting approach to be used for this study. The Team reviewed the results for air leakage, duct leakage, Home Energy Rating System (HERS) scores[8], and ceiling insulation under various weighting schemes. Results were presented for all homes, single-family attached/detached homes, and custom/spec homes using the following weighting schemes:

- Simple cluster weights (cluster weights developed at the town-level)[9]
- Raw data weighted by attached/detached and custom/spec splits (no cluster weights applied)[10]
- Simple cluster weighted data, then weighted by attached/detached and custom/spec splits
- Larger cluster weights (cluster weights developed at the county level)

Interestingly, none of the weighting schemes had a significant impact on results when compared to the unweighted data. As a result, the group ultimately decided to use a simple cluster weighting scheme because this approach ensures the most consistency with the original sampling plan for the study.

2.5.1 Simple Cluster Weights

Each observation within the three sampling groups (i.e., 2009 IECC, 2012 IECC, and stretch code) was assigned a weighting factor. These weighting factors take into consideration that the probability of inclusion in the sample was not uniform across all homes in the relevant populations due to the two-stage cluster sampling method that was employed. Therefore, each observation must be weighted to reflect the inverse probability of its inclusion in the sample and, for cross-sample aggregations, weighted to the relevant population sizes from which those samples are drawn. The calculation of within-sample relative weights involves calculating a town weight and a site weight. The overall population weight is the product of these two, and the relative weight for each observation is its population weight divided by the average population weight of the sample; algorithms detailing these calculations can be found in Appendix A.

For each of the code samples, a selection of towns was used to generate the sample; the selection of towns included both core and supplemental clusters.[11] The towns in the

[8] The HERS index is nationally recognized rating system through which a home's energy efficiency is measured. The index scores range from below zero to well above 100. According to the U.S. Department of Energy a standard new home would have a rating of 100. A home with a score of 70 would be 30% more energy efficient than home with a score of 100 while a home with a score of 130 would be 30% less energy efficient.

[9] Simple cluster weights project the clusters (in this case towns) to the overall statewide population. The weights are adjusted depending on the number of on-site inspections that take place in each cluster.

[10] This weighting approach uses the statewide or program mix of attached/detached homes and/or spec/custom homes to adjust the baseline study sample splits to represent the population of interest.

[11] The supplemental sample of towns was necessary as the Team could not procure a sufficient number of participants from the core cluster sample of towns.

supplemental clusters were less likely to be selected and thus had a higher town weighting once included. One town (Plymouth) was selected with certainty due to a high number of permits (greater than the sampling interval) and therefore receives no weighting adjustment (town weighting factor of one). Appendix A presents the number of observations per town for the 2009 IECC sample, the 2012 IECC sample, and the stretch code sample, respectively, as well as the total number of residential new construction permits issued in the town and the weighting factors that contribute to the final relative weighting factor for each observation in the town.

3 Section 3 On-site Inspection Methodology

This section describes the inputs in our data collection form and the procedures that were used for on-site data collection and in-office data-cleaning procedures.

3.1 On-site Data Collection Inputs

An electronic on-site data collection form was developed that contained the inputs required to conduct a full HERS rating and gather all of the necessary information to conduct a code compliance assessment. The data collection form was broken up into six primary sections that are detailed in Table 3.

Table 3: Data Collection Inputs

General Information	Code Compliance	Insulation/Shell Measures
• House type • Area of conditioned space • Volume of conditioned space • Stories • Bedrooms • Thermostat type • Faucet and shower flow rates • Basement details	• Builder information • Drawings available • Permit date • Applicable code • Compliance path • Photos of building department documents • All applicable code requirements	• Exterior walls • Ceilings • Frame floors • Rim/Band joists • Windows • Skylights • Doors • Slab Floors • Foundation walls • Mass walls • Sunspaces
Mechanical Equipment	**Test Results**	**Lighting & Appliances**
• Heating equipment • Water heating equipment • Cooling equipment • Duct insulation • Renewables	• Blower door results • Duct blaster results • Ventilation Equipment	• Fixture type • Bulb type • Bulb shape • Room type • Specialty feature • Ceiling Fans • Refrigerators • Dishwashers • Ovens and Ranges • Washer and Dryer

3.2 ON-SITE DATA COLLECTION PROCEDURES

As part of this study, the Team inspected completed and occupied homes. This approach avoids the potential bias suggested in other studies[12] that only builders who believe their homes are energy efficient are likely to allow their homes to be inspected. Because most homeowners are not familiar with the energy code or even the way their home was constructed, we believe homeowner recruitment minimizes the bias toward more energy-efficient homes.

One of the challenges of inspecting completed homes is that several building envelope components are not accessible or visible. The following list represents the building components that are typically difficult to visually inspect in a completed home:

- Exterior wall insulation
- Vaulted ceiling insulation
- Slab insulation
- Window U-factor and SHGC
- Exterior foundation wall insulation
- Garage and cantilevered frame floor insulation

As part of our on-site data collection procedures, we relied on the following key data sources.

On-site visual verification of actual component. Actual observations in the field are our first and most important source of data. When direct access to the component was not possible, we examined the area around the component to gather whatever information we could. For example, when trying to determine exterior wall insulation, we might have removed an electrical outlet cover and probe to determine the presence of insulation.

On-site visual verification of similar component. Once we exhausted opportunities to examine the actual component, we used similar locations to inform our assessment. For example, we might have found that there was visible/accessible above-grade wall insulation in an attic knee wall or a walkout basement that we would then have used to inform our assessment of the enclosed wall cavities.

Building department documentation. The above methods were supplemented by documentation available at most building departments to improve the accuracy of our data collection. As part of this study, the Team used a combination of in-person visits, phone calls, and email exchanges with building departments to review all energy-related compliance documentation associated with most homes.[13] A separate report summarizing the information that was documented at building departments, including the type and frequency of various required documents, was issued in December of 2015.[14] Ultimately, building department documentation was used to determine the compliance path used by

[12] Nexus Market Research, Dorothy Conant, Shel Feldman Management Consulting, GDS Associates. *Evaluation of the Massachusetts ENERGY STAR Homes Program.* May 2004.
[13] Note that while we were able to procure this type of documentation for most homes, it is not comprehensive. Some homes simply did not have any documentation on file to review, and some building departments were not cooperative.
[14] NMR Group. *Residential Single-Family Building Department Document Review-Final Report.* December 1, 2015.

each home and also to inform our assessment of the previously mentioned hard-to-observe measures. The specifications for hard-to-observe items were most commonly found in the form of home energy rating certificates[15] and REScheck™ documents.[16]

The information available at the building department was helpful in these areas and was used to supplement our on-site inspections. Building department document reviews were also useful in limiting the number of unobservable items for our code compliance analyses. Not only does the documentation enhance our confidence for hard-to-observe building components, but it also aids in the assessment of some administrative compliance requirements (e.g., plans indicating compliance with the code and Manual J documentation).[17]

While this information is extremely valuable, it is important to understand that the documentation at building departments varies by home and jurisdiction in terms of what information is available and how accurately that information reflects as-built conditions. The Team was unable to obtain documentation from two building departments, one due to a lack of response and another simply refused to provide access to the files. The remaining building departments varied widely in terms of their willingness to provide information and their responsiveness to our inquiries. The Team acknowledges that building department information is imperfect, and we did not blindly rely on this information. Instead, we examined the documentation in the context of the observed characteristics of the home. If, for example, we found documentation for a home that suggested R-49 attic insulation but we observed R-38 attic insulation, then we did not rely on the documentation to inform our on-site assessments in hard-to-observe areas. Qualitatively, these types of inconsistencies were fairly rare and the Team did not identify any trends in terms of specific measures or jurisdictions where this was an issue.

[15] Home energy rating certificates are outputs of the REM/Rate software that is used to produce HERS scores.
[16] REScheck is a tool that was developed by the Department of Energy to calculate compliance with the residential energy code.
[17] There are many administrative requirements that are not verifiable via visual inspection by building inspectors. For example, the energy code requires that mechanical equipment be properly sized using Manual J calculations—these calculations are conducted in a software package and are verified by having builders and/or HVAC contractors provide documentation that the equipment was properly sized.

Appendix A Weights by Town

This section details the weights that were developed for each town in the sample. As explained in Section 2.5, the calculation of within-sample relative weights involves calculating a town weight and a site weight. The overall population weight is the product of these two, and the relative weight for each observation is its population weight divided by the average population weight of the sample. Specifically, the following algorithms were used to develop the relative weights for each town:

$$Town\ Weight = \frac{Sample\ Interval}{Number\ of\ Permits\ in\ Town}$$

Where: *Sample Interval* is the population size (the total number of construction permits) divided by the intended sample size (sample count) for each of the samples investigated as part of this study.

$$Site\ Weight = \frac{Number\ of\ Permits\ in\ Town}{Sample\ Count\ in\ Town}$$

$$Raw\ Weight = Town\ Weight * Site\ Weight$$

$$Relative\ Weight_i = \frac{Raw\ Weight_i}{\left(\sum_n Raw\ Weight \Big/ \sum_n Sample\ Count\right)}$$

Table 4, Table 5, and Table 6 below present the relative weights that were used for the analysis and results that will be presented in the supplemental report volumes.

Table 4: 2009 IECC Full Inspection Relative Weights

Town	Sample Count	Number of Permits	Town Weight	Site Weight	Raw Weight	Relative Weight
Barnstable	3	45	3.94	15.00	59.15	0.71
Bellingham	3	20	8.87	6.67	59.15	0.71
Brewster	3	19	9.34	6.33	59.15	0.71
Chatham	2	49	3.62	24.50	88.73	1.07
Falmouth	3	62	2.86	20.67	59.15	0.71
Hampden	1	7	25.35	7.00	177.46	2.14
Harwich	3	36	4.93	12.00	59.15	0.71
Haverhill	3	35	5.07	11.67	59.15	0.71
Holliston	2	60	2.96	30.00	88.73	1.07
Hudson	3	26	6.83	8.67	59.15	0.71
Leicester	2	15	11.83	7.50	88.73	1.07
Littleton	2	42	4.23	21.00	88.73	1.07
Ludlow	3	30	5.92	10.00	59.15	0.71
Methuen	1	122	1.45	122.00	177.46	2.14
Milford	1	67	2.65	67.00	177.46	2.14
Norwood	1	13	13.65	13.00	177.46	2.14
Plymouth	3	239	1.00	79.67	79.67	0.96
Rehoboth	2	40	4.44	20.00	88.73	1.07
Shrewsbury	2	93	1.91	46.50	88.73	1.07
Swansea	2	39	4.55	19.50	88.73	1.07
Wareham	3	19	9.34	6.33	59.15	0.71
Weymouth	1	55	3.23	55.00	177.46	2.14
Wrentham	1	47	3.78	47.00	177.46	2.14

Table 5: 2012 IECC Full Inspection Relative Weights

Town	Sample Count	Number of Permits	Town Weight	Site Weight	Raw Weight	Relative Weight
Barnstable	2	45	3.94	22.50	88.73	0.77
Bellingham	3	20	8.87	6.67	59.15	0.52
Brewster	1	19	9.34	19.00	177.46	1.55
Brockton	1	45	3.94	45.00	177.46	1.55
Burlington	3	49	3.62	16.33	59.15	0.52
Charlton	1	47	3.78	47.00	177.46	1.55
Chatham	1	49	3.62	49.00	177.46	1.55
Dartmouth	2	31	5.72	15.50	88.73	0.77
Dracut	2	48	3.70	24.00	88.73	0.77
Duxbury	1	25	7.10	25.00	177.46	1.55
Falmouth	3	62	2.86	20.67	59.15	0.52
Grafton	1	85	2.09	85.00	177.46	1.55
Harwich	1	36	4.93	36.00	177.46	1.55
Holliston	2	60	2.96	30.00	88.73	0.77
Littleton	1	42	4.23	42.00	177.46	1.55
Ludlow	1	30	5.92	30.00	177.46	1.55
Milford	3	67	2.65	22.33	59.15	0.52
Needham	1	104	1.71	104.00	177.46	1.55
North Andover	1	51	3.48	51.00	177.46	1.55
Northbridge	1	36	4.93	36.00	177.46	1.55
Plymouth	1	239	1.00	239.00	239.00	2.08
Randolph	1	27	6.57	27.00	177.46	1.55
Saugus	1	12	14.79	12.00	177.46	1.55
Sharon	3	21	8.45	7.00	59.15	0.52
Shrewsbury	1	93	1.91	93.00	177.46	1.55
Swansea	2	39	4.55	19.50	88.73	0.77
Taunton	2	71	2.50	35.50	88.73	0.77
Wareham	2	19	9.34	9.50	88.73	0.77
West Bridgewater	1	20	8.87	20.00	177.46	1.55
Westborough	2	60	2.96	30.00	88.73	0.77
Weymouth	1	55	3.23	55.00	177.46	1.55
Wilmington	1	43	4.13	43.00	177.46	1.55

Table 6: Stretch Code Full Inspection Relative Weights

Town	Sample Count	Number of Permits	Town Weight	Site Weight	Raw Weight	Relative Weight
Acton	3	83	1.17	27.67	32.30	0.39
Acushnet	2	19	5.10	9.50	48.46	0.59
Ashland	2	21	12.48	10.50	131.09	1.59
Ayer	2	30	3.23	15.00	48.46	0.59
Belchertown	1	30	8.74	30.00	262.18	3.19
Belmont	1	22	4.41	22.00	96.91	1.18
Concord	2	42	6.24	21.00	131.09	1.59
Framingham	2	23	4.21	11.50	48.46	0.59
Hopkinton	2	59	4.44	29.50	131.09	1.59
Kingston	3	69	1.40	23.00	32.30	0.39
Lakeville	2	17	5.70	8.50	48.46	0.59
Lancaster	2	22	4.41	11.00	48.46	0.59
Mashpee	3	35	2.77	11.67	32.30	0.39
Maynard	1	17	5.70	17.00	96.91	1.18
Millbury	1	9	29.13	9.00	262.18	3.19
Milton	1	5	19.38	5.00	96.91	1.18
Newton	2	123	1.00	61.50	61.50	0.75
Northampton	1	31	8.46	31.00	262.18	3.19
Rockland	1	20	4.85	20.00	96.91	1.18
Scituate	3	34	7.71	11.33	87.39	1.06
Townsend	1	12	8.08	12.00	96.91	1.18
Truro	1	11	23.83	11.00	262.18	3.19
Wayland	2	15	6.46	7.50	48.46	0.59
Wellesley	2	66	1.47	33.00	48.46	0.59
Westford	3	108	1.00	36.00	36.00	0.44