



Improving Building Data Collection In Grafton Massachusetts

An Interdisciplinary Qualifying Project Proposal
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EXECUTIVE SUMMARY

This Interactive Qualifying Project was conducted for the building inspector of Grafton Massachusetts. Although this project will be used by the building inspector, it will also be leveraged by numerous other functional departments within the town. While the project could be adapted to fit any municipality throughout the United States, this project focuses on Grafton and how they can operate more efficiently.

Grafton, Massachusetts is a suburban community of roughly fifteen thousand people in the greater Worcester area. Like many other towns across the Bay State, Grafton is faced with the challenge of obtaining and maintaining municipal data related to affordable housing and storm water management. Many of the data-related mandates set forth by the State of Massachusetts have not been accompanied by associated funding; stretching municipal resources thin as the town's employees work to produce accurate and timely reports.

It was observed by the town's building inspector that there was an opportunity to capture key pieces of data (related to homes and properties) through the building permit application and inspection processes. Earlier data capture and a reduction in aggregate municipal workload were both considered to be desirable and achievable outcomes of a more fluid and fungible municipal data system.

Ultimately our project aimed to identify ways in which the town could more efficiently collect, maintain, and report municipal data pertaining to affordable housing, storm water management, and utility consumption. Increased levels of automated data management and a reduction in the redundancy of the work done by various departments were determined to be important potential sources of cost savings to taxpayers. In order to achieve our goals, we established the following project objectives:

1. To identify sources, applications, and key data points of municipal information related to affordable housing
2. To understand how various municipal departments take part in managing storm water runoff in order to assess and advance municipal storm water data management
3. To examine the feasibility of collecting building data in order to track, project, and ultimately reduce utility consumption

We were first challenged to develop a better system of capturing and reporting data related to affordable housing. In order to separate the important data points from the extraneous ones we studied Massachusetts general laws concerning affordable housing, namely chapters 40B and 40R. Upon learning which data points were important to the state, we were able to evaluate the town's existing systems of record keeping and reporting. We determined that by adding fields to the building permit applications, and a table for inputting this data in the Building Inspection Program (BIP), Grafton could capture the necessary affordable housing data. This would allow the town to count units towards its affordable inventory at an earlier date, and reduce further interactions with the registry of deeds.

On the Storm Water Management issue, we were charged with determining what could be done to track and prevent unmanaged flooding using existing IT systems in the Building Inspection office and the Department of Public Works without greatly increasing the burden of effort on municipal employees. To gain insight into the problems surrounding Storm Water Management in Grafton, we relied on Steve Risotti, an employee of the Department of Public Works. From the information we gained during interviews with Mr. Risotti, we determined that it would be beneficial for the town to track per plot impermeable area, flood reports, and pollution data and store that information within the town's GIS system maintained by the Department of Public Works and within the BIP system maintained by the Building Inspection office.

Our third objective was to examine the feasibility of collecting building data in order to track, estimate, and reduce utility consumption. Scientists, politicians, and environmentalists have been working on ways to reduce the emission of harmful gasses into the environment. We believe in the next ten years either state or federal mandates will be implemented regarding the amount of CO2 emissions a household can emit. We recommend that Grafton implements a system to record information based on energy consumption and energy efficiency of as many houses as possible. This will save the town substantial time and money when such mandates are enacted. One technique we recommended was a Carbon Calculator. We have included a number of recommendations home owners can use to save money on energy.

We have presented our results and recommendations to a number of people within Grafton's town hall that would be impacted by our recommendations. They included the building inspector, Town administrator, a member of the DPW, as well as the towns GIS system integrator. They were in agreement, recognizing that there needs to be a centralized database that can be leveraged by each department. Affordable housing, storm water management, and utility consumption are issues Grafton deals with every day. Our proposed system, if even partially implemented, would save the town time and money in the upcoming years and solve some of the problems that Grafton currently has in these areas.

1 INTRODUCTION

Technological innovations that foster urban data management are improving consistently in order to provide more powerful and affordable tools to municipalities. In many cases these tools have become practical and attractive solutions to problems created by a swelling global population. In recent decades the emergence of the personal computer and World Wide Web (WWW) has provided a new technological platform that can be leveraged by municipalities in order to extend infrastructure in a new, digital direction. Automated emergency response systems, virtual town halls, and online tax services are examples of such extensions. As the levels of automation and informational efficiency in these systems increase, costs decrease and value is added.

Massachusetts is in a transitional state as far as digital urban infrastructures are concerned. The cities and towns of Massachusetts benefit from various digital resources at the state level. The main portal to these resources is Mass.gov; the state's website designed to offer extensive services to residents, visitors, businesses, and municipalities alike. At the municipal level Massachusetts is stratified by population into three groups; big cities, suburban townships, and rural communities. Worcester and to a greater extent Boston are advanced cities in terms of both technological and entrepreneurial prowess (Krim, 2007.) These factors in conjunction with substantial government spending and high standards of living contribute to the breadth of high-tech local infrastructure and digitized services in these cities. A number of small cities and large towns make up Massachusetts' second tier. This tier consists of many historical suburban communities whose operations and systems are digital and automated to varying but ever increasing extents. Grafton is one such city.

Grafton is gradually moving in the direction of a comprehensive online system of municipal data storage and usage. One department helping to make steps towards this goal is the building department. The

Grafton Building department has worked over the years to develop an innovative system of data storage. A program called Building Inspection Program (B.I.P.) has been developed to store information pertaining to building permit applications, application acceptance, fee collection, owner and contractor information, location, inspections, and certificate of occupancy information. The storage process begins with Grafton's approval of a completed application. All buildings are inspected by the wire, plumbing, and gas inspectors. A final inspection is needed to obtain an Occupancy Certificate. Once the Occupancy Certificate is then entered into B.I.P. the file is saved.

This process works well within the context of the building inspector's office. However, the data is stored across multiple files and is indexed by permit number, not street address. Grafton has identified a need to improve information flow concerning affordable housing, utility consumption, and storm water runoff. A more standardized data system that links information to a specific building could be accessed, updated, and used more readily by other departments as well as residents. It would be beneficial for the town to track occurrences of flooding and runoff over time so the department of public works can allocate their efforts appropriately. Affordable housing data is extremely important to the town in order to maintain control over its own housing developments. The percentage of affordable housing could be more accurately calculated if the town took properties that are not permitted in B.I.P. into account. Utility consumption data will be important if or when the town implements an energy reform plan. Building-related storm water runoff could be greatly reduced if the town had specific information concerning the septic systems and drainage plans in existence.

Our project will analyze the data flow through the building inspector's office in order to determine how the information is used by other departments and residents, and what the best way to get them that data is. Increased informational efficiency within the building inspector's office will be attained by consolidation of existing databases. We will identify gaps in the sharing of information between departments, and help the town as it transitions into a more centralized system of information storage. Utility consumption reform, affordable housing tracking, and storm water management have been identified as

preliminary applications of the building data. Ultimately we hope to reduce the time the building department spends answering questions and preparing reports when the data they are dealing with is public record or public knowledge, and could potentially be accessed via the web.

2 BACKGROUND

Across the globe, overall population and urbanization have been increasing steadily. As the world becomes more urban and information technology becomes cheaper and better understood every year, the benefits of effectively managing city knowledge become more and more attractive. In this section, we discuss the state of information management in the town of Grafton, Massachusetts and how it effects a variety of current. The town of Grafton is located just southeast of Worcester and has a population of 14,894. Grafton's overall population growth is nearing 12% which puts pressure on the town to keep up with its building issues(Yahoo Real Estate, 2007).

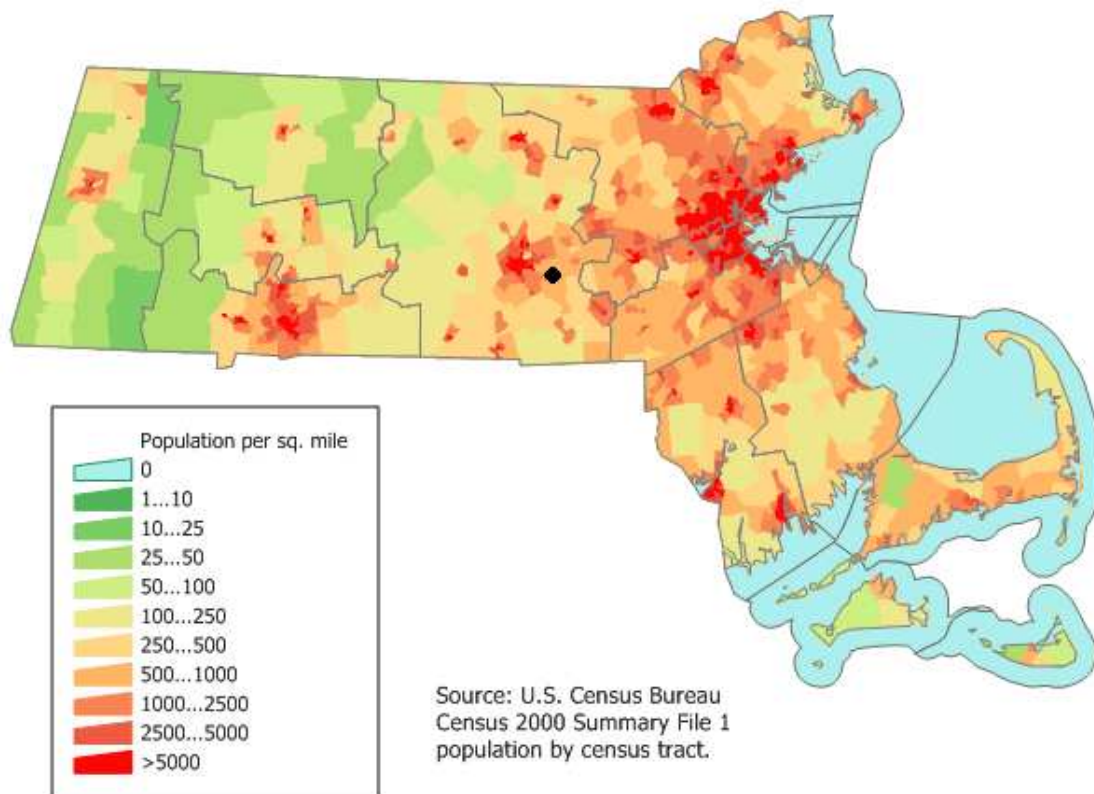


Figure 1: Grafton in Massachusetts Urbanization

2.1 LOCAL GOVERNMENT

Cities and Towns function both administratively and operationally to provide services to their residents. These administrative entities are responsible for the people who live within the city limits. These cities are responsible for providing community services to these people. The following is a list of administrative entities that can be found in most local governments.

- Political and Executive Branches
- Internal Services
- Public Health and Safety
- Culture and Leisure
- Education
- Physical Services

All six of the areas of local administration must share information and work together to provide for its residents. The physical services section in Grafton consists of the planning, building, transportation, and public works departments. We worked with Grafton's building department and public works to aid in improving information flow between departments (Carrera, 2004).

2.2 BUILDING PERMITS

Building permits are issued by the government at the local, state, and federal level. They are issued to builders and renovators once the applicant has shown that their proposed construction is compliant with the relevant building codes. The purpose of these codes is to specify a minimal level of safety that all buildings must adhere to. Over time, building permits and the codes they are derived from have transitioned away from segmentation and in the direction of centralization and uniformity.

In the United States, residential buildings for 1 or 2 families are subject to a set of building codes that is enacted at the state level. More specialized buildings such as hospitals and power plants must conform to a much more detailed set of regulations, many of them at the federal level.

Subsystems within a building such as gas, electric, elevators, boilers, and air tanks must also conform to national and state codes.

2.2.1 PERMITS AND LICENSES IN MASSACHUSETTS

The Board of Building Regulations and Standards (BBRS) is a division of the Massachusetts Executive Office of Public Safety and Security (EOPS.) The BBRS regulates all construction and renovation of one and two family homes(Massachusetts Dept. of Public Safety, 2007). Depending on the nature of the project, the contractor will need to be registered with the BBRS as a Home Improvement Contractor (HIC) and/or obtain a Construction Supervisor License (CSL.)

Most major construction activities require either a HIC or CSL in addition to the relevant permits. Some renovations that do not require a permit (painting the exterior of a house, for example) do require a HIC. The permit and licensing requirements for various construction activities are available on the Massachusetts EOPS website.

2.2.2 THE PERMIT PROCESS IN GRAFTON, MASSACHUSETTS

For most construction activities in Grafton the “Application To Construct, Renovate or Demolish A One Or Two Family Dwelling” or “Application To Construct, Renovate, Change Of Use Or Occupancy Of, Or Demolish Any Building Other Than A One Or Two Family Dwelling” is the relevant permit application. Copies of these permit applications are attached as Appendix C. With the permit the applicant must

attach other relevant documents. These include sets of plans, proof of zoning approval, a water district approval letter, and a worker's compensation certificate among other things. The town building inspector's method for evaluating these permit applications is clearly stated at the bottom of the document:

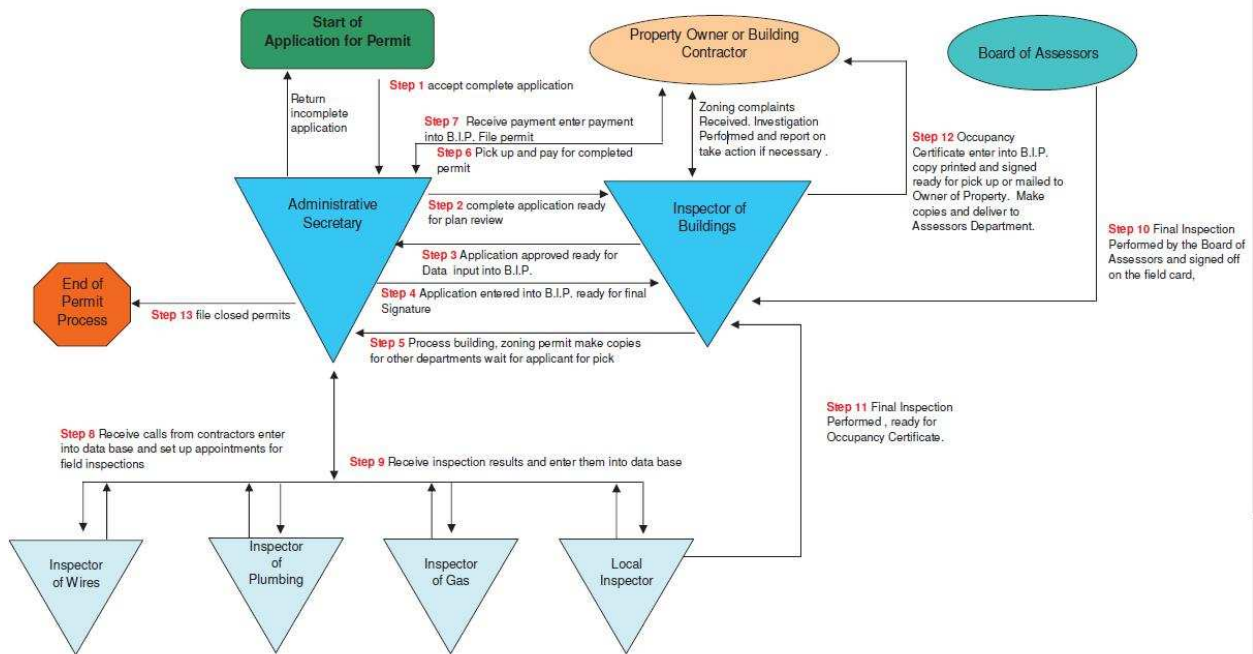
“If the application or the construction documents do not conform to the requirements of 780 CMR and all pertinent laws under the building official's jurisdiction, the building official shall reject such application in writing, stating the reasons therefor[sic]. If the building official is satisfied that the proposed work conforms to the requirements of 780 CMR and all laws and ordinances applicable thereto, the building official shall issue a permit therefor[sic].”

780 CMR is a portion of Massachusetts state law written and controlled by the BBRS.

In the case that the permit application is approved, the permit is issued to the applicant and the information is entered into the towns permit database, known as B.I.P. In addition to the two generic permit applications, the town uses specific permits for gas, plumbing, and electrical systems. These types of permits follow nearly the same application and approval guidelines, and are stored in databases that are similar to but not connected to B.I.P. After the permits are paid for and filed away, the inspection process begins.

The building permit process is centered around the town's Building Inspector and his secretary, who serves as a gatekeeper between the Inspector, the public, and other municipal departments. The exact process by which a builder can obtain the necessary permits is shown below in Grafton's Flowchart for Building Departmental Operations.

Flow Chart for Building Departmental Operations



Appendix B: Grafton Building Permit Process

2.2.3 STORING AND ACCESSING BUILDING DATA IN GRAFTON

“Grafton Permitting 4.0” is the database file commonly referred to as B.I.P. It is stored along with “Daily Inspection” and “Electric, Plumbing, Gas Permits” on a server in the building department. This server is maintained and used primarily by Bob Berger, Grafton’s inspector of buildings and zoning enforcement officer. Direct access to these databases and other related files is currently limited to employees in the building inspection office or the department of public works. All of the users have the capability to update the files in real-time, which works well as long as no two users are trying to work with the same records within a file.

Bob Berger has identified the need for read-only access to his databases to be available to all of the towns departments and residents. In the current system, Bob generates reports for other departments (such as

the affordable housing committee or town administrator) when they come to him requesting information. Bob and his co-workers also use the database to answer questions; for example, when a resident calls asking if their scheduled gas inspection was performed that day.

All of this data is considered public record. Web access to the Daily Inspection file would allow residents to seek out this information independently.

2.3 BUILDING INSPECTIONS

All new buildings must be inspected by the Inspector of Wires, the Inspector of Plumbing, the Local Inspector, and the Inspector of Gas (if applicable). Each of these inspectors makes a report of inspection results to the Inspector of Buildings of Grafton for database entry. After final inspection and issuance of an Occupancy Certificate, the Board of Assessors is notified.

Moreover, additions or major remodeling projects require an inspection by one or more of the Inspectors mentioned above, all of which are done on site.

2.3.1 BUILDING INSPECTIONS AS DATA COLLECTION

Inspectors repeatedly visit any building that is being constructed new or is undergoing major renovations. This makes the inspection a possible source of information for city data. Inspections occur on site, which allows the inspector to directly observe and measure the structure and properties of the lot, if necessary. Information on impervious surfaces can be collected. In some cases (where the developer is present, or if the inspector has access to the plans as implemented), the number of bedrooms and bathrooms can be recorded. This information can be gathered by informal questions or by direct inspection of the premises.

In Grafton, there is a project under way to equip all inspectors with Personal Digital Assistants to allow them to digitally enter their reports on site. If completed, this project will automatically sync new inspections and reports from inspectors to BIP.

2.3.2 BOARD OF ASSESSORS

Grafton's Board of Assessors is responsible for measuring the value of all buildings yearly within town limits ([http://www.town.grafton.ma.us/Public Documents/GraftonMA Assessor/value](http://www.town.grafton.ma.us/Public_Documents/GraftonMA_Assessor/value)). The Board of Assessors is the last entity to inspect new buildings. An alternative to asking affordability questions in the permit stage could be to only open a dialogue on affordable housing if the Assessors consider it feasible for the developer to designate some or all of the units as affordable after valuing the development.

2.4 STORM WATER MANAGEMENT

Storm water management is a collection of methods and practices for understanding and controlling the above-ground flow of water resulting from rainfall in an urbanized setting. As a local issue, the responsibility to manage storm water in a municipality rests with the local government. There are federal agencies that these townships can hire for aid in handling these issues, but it is important for Grafton to have a strong plan of attack when dealing issues surrounding storm water management.

2.4.1 CLEAN WATER ACT

The Clean Water Act passed by the federal government places an unfunded storm water mandate on local governments (Risotti, 2006). The Environmental Protection Agency (EPA) is charged with completing these changes in a series of phases. Phase one took place a little over five years ago and it regulated larger cities' storm water management (Boston and Worcester). The phases were determined by population density: areas with a higher population density were included in phase one while cities and towns with a lower population density are within phase two (Risotti, 2006). There are some rural areas which are not included in either phase.

2.4.2 PHASE II

Currently Grafton is in the early stages of phase two which incorporates the smaller cities and towns. By the regulations specified in the Clean Water Act, Grafton needs to determine a way to collect data regarding quantity and the quality of their storm water.

Eventually the Environmental Protection Agency government would like Grafton to address quality. They might need to start sampling the water in the next few years, especially on water that will be processed for public consumption. Grafton plans on requiring a NPDES (National Pollution Discharge Emanation System) permit that allows for capturing of the information connected to quality.

Grafton, like other towns in the area, has had issues with storm water management in the past. Grafton's annual average of rainfall is roughly 45 inches. They deal with a moderate amount of flooding caused by excess rainfall. On the storm water issue, flooding and quantity are priorities.

As visually represented by Appendix A, Grafton's average rainfall and snow fall both exceed the national average. Grafton uses a central drainage system to manage its storm water.

2.4.3 PHASE II REQUIREMENTS OF MS4S

As an MS4 (Municipal Separate Storm water System), the Grafton storm water system is required to address six minimum control measures:

1. Public Education and Outreach
2. Public Participation and Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Pollution Prevention/Good Housekeeping for Municipal Operations

(Reference: <http://www.stormwatermatters.org/phase2.html>)

Our paper details approaches for addressing requirements 3, 4, 5, and 6.

2.4.4 STORM WATER MANAGEMENT INFORMATICS

In Grafton, subdivision development has steadily decreased the amount of pervious soil(Risotti, 2006).

Pervious soils are areas in which water, air and roots move freely through the soil. This decrease in pervious soil in turn leads to an excess of water not being absorbed into the earth, but rather becoming runoff. Unless runoff is managed properly, it can lead to flooding and property damage.

Table 1.1: Typical Impervious Area Percentages (MPCA, 1989)

Land Use	% Impervious Cover
Business District or Shopping Center	95-100
Residential, High Density	45-60
Residential, Medium Density	35-45
Residential, Low Density	20-40
Open Areas	0-10

This is where the need for sufficient storm water control comes into play - if the storm water system can't handle enough flow, there will be flooding(Wanielista, 1993).

There are some accepted constants for approximations of runoff for different ground cover types. The amount of runoff affects both pollution, which brings up Clean Water Act requirements, and flooding, which is a priority of the Grafton DPW.

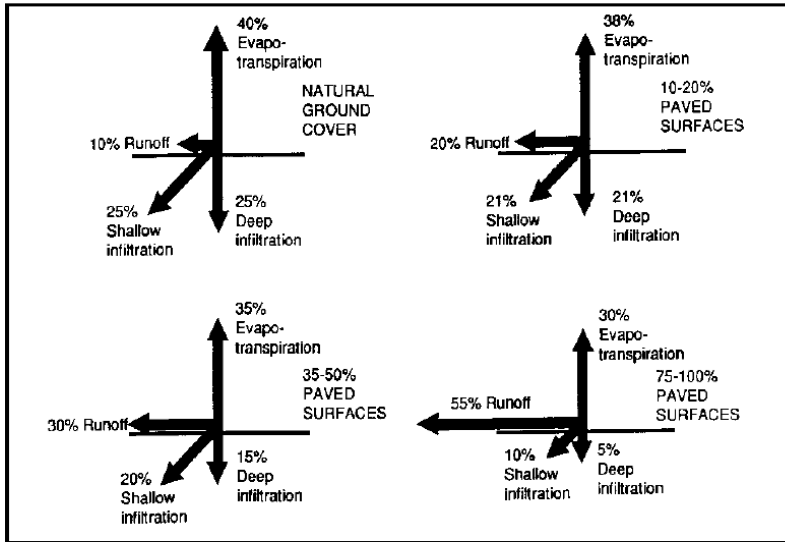


Figure 1.1: Typical Changes in Runoff Flows Resulting From Paved Surfaces (Minnesota Pollution Control Agency (MPCA), 1989)

As you can see, much of the precipitation that falls on urban areas becomes runoff unless it is properly controlled by the storm water management system in place. Even then, the stormwater can be highly polluted.

2.5 ENERGY CONSUMPTION

Cities and towns need ways to estimate the amount of public utilities that are used by each house hold before anyone lives in the building. This refers to the amount of water consumed as well as how much is being sent into the sewer system. We are also concerned about electricity, gas, and oil which are some of the most common household utilities. By obtaining information regarding the number of bedrooms as well as the number of bathrooms it allow us to be able to fine tune our estimations and relay that information to the utility companies throughout the town.

The number of bedrooms is uniquely important because from that number we can generate the number of occupants. Once the total occupancy is known, estimating other utility usages is simple. This data can be leveraged by town officials to help in decision making; for instance the school system will be able to

estimate the number of new students coming in. This will help with hiring the right number of new teachers, installing computers, or any other expansion that might otherwise not be known until it was too late. When gathering information regarding the number of bathrooms we can combine it with the number of occupants in order make accurate estimates on the amount of water and waste that is going to be sent into the towns sewer system (Hazou, 2007).

2.6 AFFORDABLE HOUSING MONITORING

Demand for housing in Grafton is high, resulting in a rising cost of homeownership, which makes it difficult for people who can only marginally afford their current situation to stay in the town. There is not enough affordable housing to serve those who need it. The situation is not sustainable, and the pressure will be relieved one way or another ('Karen Sunnarborg', 'Wayne Nicholas', 'Lea Anthony', 2006). According to the Massachusetts Department of Housing and Community Development's most recent data, as of 2006, 5.27% of Grafton's housing units fit this definition of affordable ('Karen Sunnarborg', 'Wayne Nicholas', 'Lea Anthony', 2006).

2.6.1 CHAPTER 40R DEFINITION OF AFFORDABLE HOUSING AND REQUIREMENTS

As defined in M.G.L. 40R.2, to be classified as 'affordable housing' a housing unit must be economical for a household with a gross income at or below 80% of the median area income. M.G.L. Chapter 40B Section 21 regulations permit developers to submit applications directly to the state zoning board of appeals in some cases. This is permitted only in municipalities where under 10% of the housing units are affordable and when the proposed development composes at least 25% affordable units. This is undesirable for Grafton, as it does not permit the town to be the entity that handles the legalities of the development; Grafton retains only an advisory role in the approval process in these cases. However, all of a development's units count towards the 10% benchmark when the units are rented rather than leased or sold and at least 25% of them are affordable rate (see Massachusetts General Law 40B).

The goal of tracking affordable housing in Grafton more effectively is to assist the Affordable Housing Committee in carrying out its plan to reach 10% affordable housing and to assist the Building Inspection Office's function as the inventory point for affordable housing. Having higher quality, more complete information is key in keeping the plan on track. There is no state assistance for tracking affordable housing – the Department of Housing and Community Development gets its statistics from the Grafton Building Inspection office.

2.6.2 40B RESTRICTIONS & INCENTIVES FOR DEVELOPERS

Affordable housing units constructed via chapter 40B applications must remain income restricted for 30 years. This is to prevent developers from obtaining permission to build via chapter 40B and then removing the income restrictions soon afterwards, which would be a loophole in local zoning regulations state-wide.

This 30 year restriction reduces the monetary value of the development as is, but the remainder of the development (up to 75% of the housing units) does not need to be income restricted in any way.

Additionally, a density bonus (allowance for more units per acre than would normally be allowed) is generally given by the state zoning board of appeals – by boosting the number of units, the value of the development is allowed to grow more than it could have otherwise. With the inclusion of this relaxation of zoning requirements, this track to approval will remain quite popular while it is available.

2.6.3 DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT PLANNED PRODUCTION EXEMPTION

The Massachusetts DHCD administers the Planned Production program, which allows municipalities that show affordable housing unit growth of 0.75% per year of their total housing unit inventory to reject applications submitted to the state zoning board provided that growth continues at a reasonable pace and remains on track overall. This establishes a second way to avoid the effects of Section 40B.21. This exemption retains the spirit of 40B, which is to encourage affordable housing growth, but allows towns to retain local control.

The DHCD receives its yearly inventory from the Grafton building inspection office. The office currently tracks the affordability of units as a Boolean field in the unit database. However, this database only has record of affordability of relatively recent units, as older permits (the point of data collection for affordability) were paper records that have not been entered into the computerized systems.

2.6.4 GRAFTON'S PLANS FOR AFFORDABLE HOUSING IMPROVEMENT

The Town of Grafton intends to increase its levels of affordable housing, both to further the welfare of its citizens, and to avoid loss of control of housing growth. The current plan under way is to use the Planned Production exemption. There is a schedule for many developments over the next few years that incorporate affordable housing units ('Karen Sunnarborg', 'Wayne Nicholas', 'Lea Anthony', 2006). This growth, while quick, allows the town to guide the growth of housing according to the Grafton Vision:

“Grafton is a small Town with a strong sense of community made up of historical New England villages and new neighborhoods, whose residents are its most vital asset, where pastoral landscapes are valued, where open space preservation is considered integral to our town's character, and where carefully-planned residential as well as non-residential development enhance the community's economic stability.”

('Residents of Grafton','Grafton Planning Board', 2001)

The Grafton Affordable Housing Committee was formed with the mission to “create an Affordable Housing Long-range Plan which shall include goals, objectives, guidelines and principles in accordance with MGL Chapter 40B to achieve, at a minimum, a 10% level of affordable housing which suits the character of our community” ('Karen Sunnarborg', 'Wayne Nicholas', 'Lea Anthony', 2006).

2.6.5 LEGAL PROCESS FOR 40B DEVELOPMENTS

Applications for building permits sent directly to the state zoning board of appeals are copied to the building permitting office in Grafton, as per M.G.L. chapter 40B. A representative of Grafton is expected to be present at the hearing at the appeals board to offer recommendations to the appeals board. This means Grafton already has a direct pipeline of information concerning the application for, and approval or denial of, any applications submitted to the state board of appeals under chapter 40B.

The Town of Grafton Affordable Housing Committee has performed inventories of the availability of affordable housing in the town, but in cases where the buildings were constructed via permits obtained through the normal process rather than 40B, the affordability of the units is not guaranteed in the future and is not fully tracked at present. This disqualifies an unknown amount of current affordable housing in the town from the present tracking scheme, reducing the reported statistics.

2.6.6 CONSTRUCTION/CHANGE PERMITS

Currently, the application forms for construction and change do not include detailed information about the affordability of units. The form for initial construction or change of a 1 to 2 unit building does ask whether the units are/will be rented or sold at an affordable rate - however, the form for more than 2 units does not require any information about affordability. Requesting this information on the permit applications would increase the uptake of information on the amount of affordable housing in Grafton that could be counted towards the 10% requirement to avoid chapter 40B construction.

2.6.7 CONCLUSIONS

In summary, Grafton's affordable housing problem is of 3 parts: legalities, statistics, and the needs of citizens. To address all three of these issues, we plan to create a city knowledge framework for affordable housing. More complete statistics will bring Grafton closer to chapter 40B compliance and assist citizens in need of affordable housing.

3 OBJECTIVES & METHODOLOGY

In essence this project critically analyzes the building inspection and permitting processes from the perspective of an urban planner. Our goal is to enhance the flow of information through the building inspector's office in order to address the issues of energy consumption, affordable housing, and storm water management. We identify ways in which data management can aid building inspectors and their interactions with other municipal departments. Finally, we will propose an improved system of building data management which should be more fungible than the current system for widespread access and use in future urban improvements. This system will potentially be implemented and updated by the building inspectors and DPW in collaboration with Applied Geographics, Inc.

This project took place during the 2007-2008 academic year. While the issues at hand may be pertinent to many cities, states, and countries, our scope of interest is limited to Grafton, Massachusetts.

3.1 PROJECT OBJECTIVES

4. Identify sources, applications, and key data points of municipal information related to affordable housing
5. Understand how various municipal departments take part in managing storm water runoff in order to assess and advance municipal storm water data management
6. Examine the feasibility of collecting building data in order to track, project, and ultimately reduce utility consumption

3.2 AFFORDABLE HOUSING METHODS

In order increase information flow with respect to affordable housing we will carefully examine chapter 40b as well as the housing market in Grafton. The current residential permit has an option to check "Market Rate" or "Affordable Rate." Bob Berger uses this information to supply the affordable housing committee with their data. This allows the town to accurately account for the availability of affordable housing in newly constructed or renovated units. What they do not

have is a way of monitoring existing homes for which no permits are on file. We will work to find a way to fill this gap in information.

3.3 STORM WATER METHODS

In order to aid storm water management efforts we will first need to distinguish which sources of runoff can be attributed to homes, construction of buildings, and accessories to buildings (such as parking lots.) To make this distinction we will research books and academic publications to gain a strong working knowledge of storm water as a global issue. This broad knowledge will be complimented by interviews with town officials and first-hand observation of runoff problems in Grafton. Once we know exactly how and to what extent buildings in Grafton contribute to runoff, we can produce a list of relevant attributes that would be useful in assessing buildings on a case-by-case basis. This list is likely to include information pertaining to septic systems, gutters, and drainage.

3.4 UTILITY CONSUMPTION METHODS

Consumption levels of public water and electricity are also of interest. Number of bedrooms, bathrooms, and square footage are potential indicators of how much water and electricity a building *should* be consuming. We will investigate this relationship and aim to identify any other indicators that may be present in existing permits. Our database will allow for us to sort by these data points. If the town pursues utility consumption reform in the future, this will be helpful in identifying which homes are using excessive amounts of resources relative to the number of people living there.

4 RESULTS AND ANALYSIS

4.1 AFFORDABLE HOUSING

The Town of Grafton is trying to meet the DHCD's requirement of 10% affordable housing stock. Part of the plan for meeting this figure is to provide the DHCD with the most accurate statistical information possible about the current affordable housing situation in Grafton each year in the annual report.

4.1.1 DATA COLLECTION

The affordable housing inventory reports sent to the DHCD every year by the Town of Grafton are created by the building inspection department based on the records kept in the BIP software. While BIP is technically equipped to store whether every unit is affordable or not, this information is not kept up to date by the current process in place in the town.

There are two options for keeping this information complete and up to date – pulling the data directly from the deeds as they pass through the building inspection office, and utilizing the Board of Assessors' database which is already up to date.

4.1.2 DATA SOURCING

Directly recording the current state of a new building or unit is trivial – only a checkbox is required. Keeping the information up to date is more difficult. There are expirations of the period of restriction and other ways that the restriction can be removed by the owner of the unit(s).

Adding affordable units to the database is a relatively simple process. There is no significant overhead involved in doing so directly. The database is already equipped to store this

information. The main problem with direct information gathering as a complete answer to the Building Inspection Office's affordable housing problems is that they are not currently experienced with tracking the status of homes when no permits are involved in the changes involved. B.I.P.'s current affordable tracking capabilities are shown below:

The screenshot shows a web-based permit application form. The form is divided into several sections:

- Property Address:** Includes fields for Property Address (0 PUTNAM LANE), Month (SEP), Day (28), Year (2007), Accessor's Map (59), Block, Lot/Parcel Number (59), and Builder's Lot Number.
- Permit Information:** Includes Permit Number (389), Permit Fee (\$152.00), Date of C. O. Issued, and checkboxes for Market Rate (checked) and Affordable Unit.
- Contractor Information:** Includes Contractor's Name (TIM O'LEARY), Street Number (13), Street Name (INDEPENDENCE WAY), City (MEDWAY), State (MA), Zip (02053), and Telephone (508-533-5256).
- Construction Details:** Includes Number of Bedrooms, Number of Floors, Number of Garages, Total Living Area (S.F.) (1024), Number of Dwellings (1), and Construction Value (\$18,500.00).

A red box highlights the 'Name of Subdivisions' dropdown menu and the 'Market Rate' and 'Affordable Unit' checkboxes.

4.1.3 COMPOSITE SOLUTION

The two methods above are best used by combining them – the building inspection office combining deeds and permits for affordability information on the addition side, while reverting units to market rate based on information from the Assessors' office. If this option is decided upon, the Building Inspection office would receive notification from the Assessors when a unit goes from being deed restricted to market rate. This puts little load on the Assessors or the Building Inspection office, while keeping the BIP database accurate in a timely fashion.

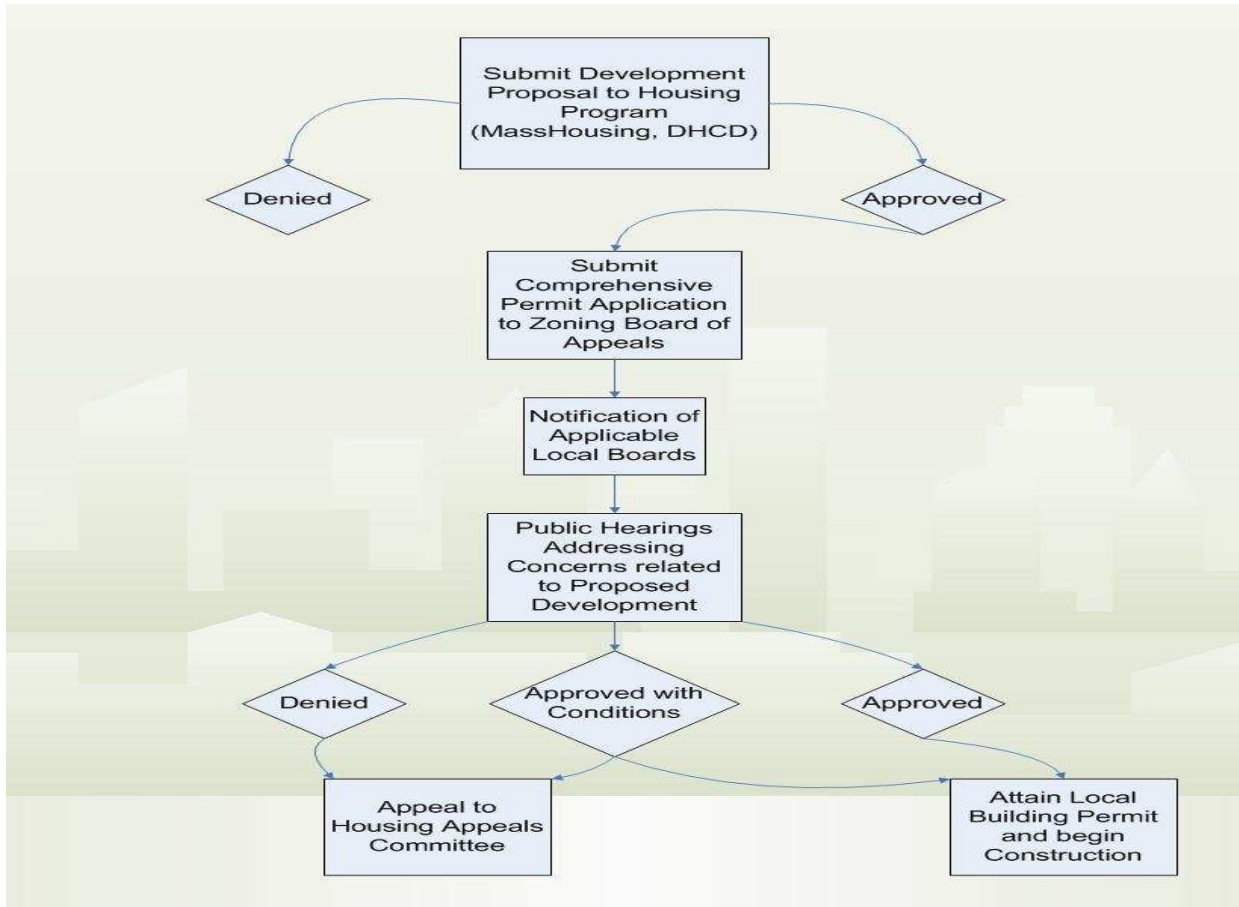
4.1.4 INTEGRATION WITH GIS

Another of our goals related to affordable housing in Grafton is to supply the public with up to date and easy to use information about the availability of affordable housing within the town. Making it easy for new arrivals or current residents to find housing that fits their budget will improve the housing situation in Grafton considerably. Currently it can be difficult for Grafton's citizens to find housing they can afford to live in.

The GIS system on Grafton's website shows many features of the town. We recommend automating transfer of affordable housing information from the BIP system to the web GIS and displaying affordable developments using color coding.

Both affordable rental units and homeownership units carry deed restrictions that are filed as attachments at the registry of deeds. For rental units, these restrictions include specific limitations regarding the rental terms landlords can make with their tenants. Maximum monthly rent and minimum length of lease are the most important restrictions. Affordable homeownership units are often restricted to resale limitations, owner-occupation, and fixed-rate non-re-financeable mortgages. All of Massachusetts' affordable deed restrictions are agreed upon for 15 to 30 years, on a case-by-case basis.

A summarized affordable housing creation process diagram is shown below:



The multiple interactions between the developer and the municipality create a variety of potential catch-points for deed restriction data. Because B.I.P. is maintained by the building inspector, the most logical and hassle-free way to obtain deed restriction data is at the local building permit stage. After the Zoning Board of Appeals issues the comprehensive permit, the unit becomes countable towards the town's affordable housing inventory, and the developer applies for a local building permit. By requiring developers to produce deed restriction details through the local permit application, the building inspector can easily enter the data into the municipal information system to be tracked and reported. The town's general bylaws would have to be amended in order to require affordable housing developers to submit deed restriction data along with their local permit application.

While it does have the affordable check box, B.I.P, is currently missing some key data points concerning affordable housing. These include restriction expiration dates, as well as a distinction between truly affordable units, and those that are not actually affordable are but included (and counted) as part of rental subdivisions. A picture of what B.I.P could look like with these improvements is shown below. This solution is probably not the most sensible tracking method over a long period of time, because it still requires units to be cataloged by permit number which presents obvious problems when attempting to count units that do not yet have building permits. It is however a viable band-aid fix until the town begins to centralize its data systems and reduce departmental overlap.

Permit Number	Housing Type	Actually Affordable?	Restricted Until	Restriction Notes
57864784	1 family home	Yes	2023	Owner Occ., 30 yr

4.1.5 INCREASING THE AFFORDABLE HOUSING STOCK BY BARTERING FOR DEED RESTRICTIONS

Through researching the affordable housing management practices of various municipalities in Massachusetts, we found that some towns had implemented programs designed to convert existing low-income housing into deed restricted affordable units. Such a program could be beneficial in Grafton because it would allow the town to increase its stock of affordable housing without the construction of any new buildings. Essentially the town could offer small property tax breaks to low-income families and landlords in exchange for the deed restrictions necessary to count their homes or apartments towards Grafton’s affordable housing inventory.

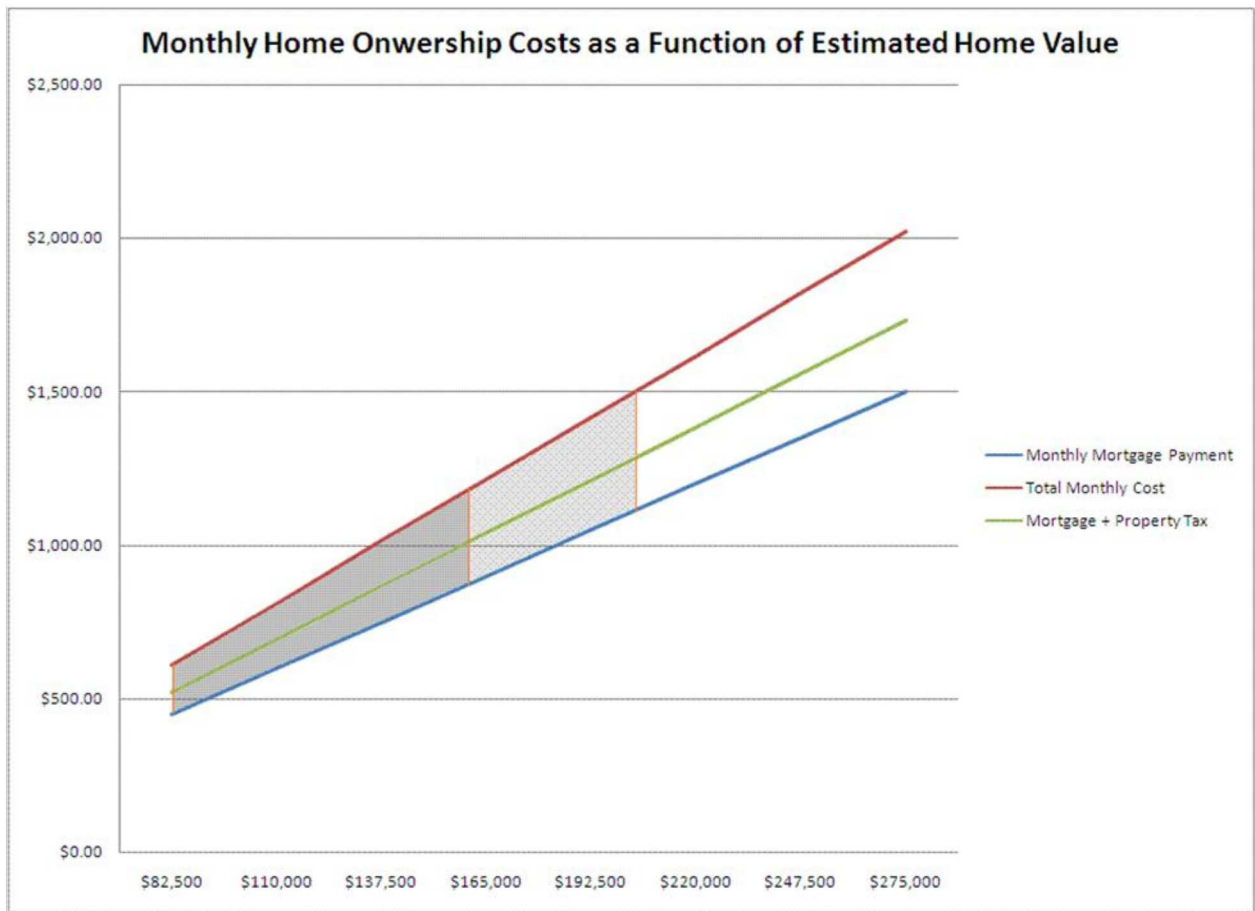
The program we’re suggesting would target two groups of people in Grafton:

Landlords renting to families at or below 80% of the area’s median income, who also charge rents in accordance with the state’s affordable limits (based on # of bedrooms):

Family Size	1	2	3	4	5	6	7	8
Income Limit	\$43,050	\$49,200	\$55,350	\$61,500	\$66,400	\$71,350	\$76,250	\$81,200

# of Bedrooms	1	2	3	4
Rent Limit	\$792	\$965	\$1,154	\$1,224

Low-income homeowners whose properties are valued in the range below:



The deed restrictions necessary to achieve affordable status vary on a case-by-case basis.

Common deed restrictions for homeownership units:

- Unit must be owner-occupied
- The unit can only be sold to a family whose income qualifies them for affordable housing
- The resale price cannot exceed \$X (adjusted for inflation)
- State and/or local agencies have the option to buy the unit before anyone else
- Owner is not eligible for home-equity loans
- Owner is eligible for a 30-year fixed-rate mortgage, but has no other financing options

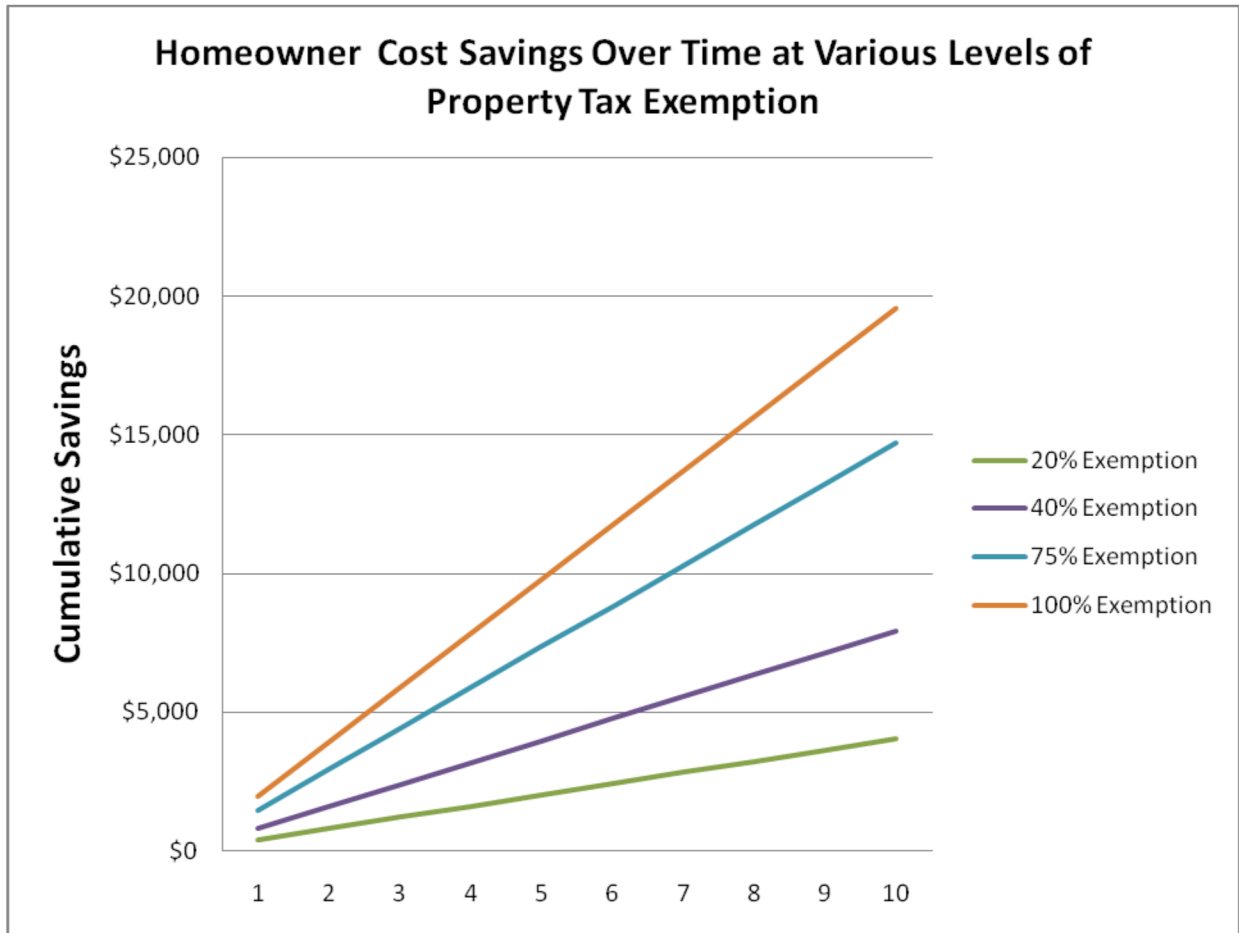
Common deed restrictions for rental units:

- Unit will be retained as permanent, year-round rental dwelling with leases \geq 1 year
- Owner (of rental unit) must provide yearly proof of occupancy and tenant income
- Unit must be rented to qualifying tenants at fixed rental rates, under established rental terms

While home value (or rental payment) and family income are the most important factors, there are other criteria that determine which residents may want to participate in the deed restriction program. In the case of a homeowner, it would probably not make sense to deed restrict your house to the affordable rate if you were planning on selling it in the near future. This is because the resale limitations would likely not be justified by only a few months or years of property tax savings. In creating affordable rental units, one of the most common deed restrictions is a minimum lease length of one year. This means deed restriction may not be feasible for landlords who only rent seasonally or part-time for one reason or another.

In order to convince building owners that this is a good deal for them, the town will need to offer a clear and concise explanation of the cost savings achievable through this program. The town's

bargaining power comes from its control of local property tax allocation. The diagram below shows potential cost savings for a sample family at various levels of property tax exemption.



Sample Household used in diagram: Family of 4, Income: ≤ \$5125/mo, Home Valued at \$192k.

Offsetting the Cost of Deed Restrictions by Raising the CPA Tax Rate

One of the ways the town could raise money to support a deed restriction program would be to adjust the CPA tax. Grafton currently collects about a \$250,000 annually via the recently adopted Community Preservation act. These funds are matched by the state at a current rate of 1:1 (although it will be reduced to 60 or 70% in the near future.) This state program allows towns to increase property taxes by up to 3% in an effort to raise funds to go towards preservation of rural character, affordable housing, and open space. Grafton is only taxing its

residents at a rate of 1.5% currently. Increasing this to only 2% would generate about another \$80,000 in tax revenue that could do directly towards affordable housing programs. One of the nice things about this solution is that the first \$100,000 in property value is exempt from the tax. This means low and medium income households would bear the least additional tax burden.

4.1.6 IMPACT ON GRAFTON'S COMMUNITY DEVELOPMENT PLAN

The suggested affordable housing data management improvements would help Grafton in its effort to improve the periodical Community Development Plans it submits to DHCD. One of the four “core elements” of the Community Development Plan is information pertaining to “Location, type, and quantity of new housing units, including housing affordable to individuals and families across a broad range of income” (Mass.gov.) Bolstering the Community Development plan is beneficial to Grafton mainly in three ways:

- It gives potential residents with wide ranges of income more information with which to work, giving them a greater chance of finding a suitable and financially sustainable home
- It puts Grafton in a good position to receive future planning service money from the state
- It helps promote maintenance of the town's historical buildings and overall character

4.2 STORM WATER MANAGEMENT

One of the main goals of this project is to look at the building inspection and permitting processes from an IT angle in order to help solve the problems of unmanaged flooding and excess pollution in runoff from industrial sites. Our primary method of achieving this goal is to change and improve the methods

by which Grafton currently stores and manages data. The main factor used in evaluating potential improvements has been the minimization of extra work created for the town's employees.

4.2.1 DATA GATHERING AND STORAGE

In this section, we discuss the types of data & data collection processes we recommend Grafton implement and store. These recommendations will move Grafton towards the goal of increased compliance with EPA requirements and reducing flooding within city limits. The citizens and town administration will benefit from improvements that require a relatively low outlay of funds and effort, thus we have optimized our recommendations to minimize the amount of time, money, and disruptive change required.

Data collection and storage are not the only two recommendations we have - it is imperative for there to be good communication between the DPW and Building Inspection Office in this matter. The primary objective is to enable cost-effective reduction of flooding in residential areas. We also suggest some corresponding methods for approaching the Illicit Discharge Detection & Elimination control measure required as a Phase II MS4 under the NPDES storm water program.

4.2.2 IMPERVIOUS SOIL PERCENTAGES

The percentage of impervious soil is related to the frequency of flooding in residential areas. This is because an increase in the amount impervious soil created causes an increase in the amount of run-off. The result is the reduction of the amount of water that is absorbed into the ground.

Regarding storm water, we recommend creating a new table within BIP that stores only parcel id, date, total area, and impervious soil area. This table will serve as a 'history' of the permeability of the town's lots. We also recommend that the file containing the table be accessible by the DPW for their use in

storm water management. The DPW can use this information to update their GIS maps of the town in real time.

Every time a developer applies for a zoning permit, the site plan required by the zoning bylaw must include the area and types of impervious soil on the lot affected (see Grafton Zoning Bylaw, Section 1.3.3.3, d.15). The calculation of total impervious soil percentage for the lot is quite simple from this information:

$$\text{Impervious Soil \%} = \frac{(\text{Driveway} + \text{Deck} + \text{Building(s) Footprint Area}) \text{ft}^2}{(\text{Total Area of the Lot}) \text{ft}^2}$$

Currently in Grafton the maximum impervious soil permitted to be on a lot is 75% - this information is calculated now during the permit approval procedure, but it is not stored.

For sourcing this information, we have determined that the BIP building permit form is the best place to source the data. The construction details section is well matched to the data being collected - the relevant areas should be entered there.

4.2.3 FLOODING COMPLAINT SYSTEM

While electronic systems are capable of detecting flow within the system, the price of measuring every single point that is statistically significant is probably too high for a system that is already in place.

Even measuring flow within every bit of the system is inadequate for detecting floods; flooding occurs as a result of water not entering the system in the first place.

People notice when there is flooding on their property; the most reliable way to detect floods is to provide an easy way for residents to report floods & encourage them to use it. To ensure maximum participation by residents, we recommend that reporting be available by telephone, email, or the web. Grafton's Department of Public Works should publish flood information flyers with the web address of a form for

submitting reports of flooding – the flyer would also include a special flood reporting email address and phone number for contacting the DPW. The implementation could be done in any number of ways, all of which are simple for a trained web professional to implement.

4.2.4 WATER QUALITY DEVELOPER MANDATE

To fully discover the main sources of all pollution in the outflows of the system itself and the treatment plant, it is necessary to perform stream and drainage pollutant tests throughout the town. The cost of this analysis is not low – trained technicians and equipment are required and to analyze the entire town's system could cost a great deal of the town's funds.

It is therefore most financially sensible to require that developers perform pollutant measurements on and near the property that they are developing before & after the development itself. Grafton has already taken this approach, and we suggest storing the data collected in BIP with a date of test.

4.2.5 DATA INFRASTRUCTURE

Permeability information, as it is derived from permits & site plans submitted to the building department, needs to be stored in BIP to allow the building department direct and simple access to it for other administrative uses. This information should be entered into BIP when all of the other data is entered, in step 3 of Grafton's Chart for Building Departmental Operations (Appendix B). By adding the information early in the permit process, the process ensures the most up-to-date records of information useful for storm water management. This information should also be collected/updated any time another permit is filed for an existing property; for instance, the building of an addition. As soon as the Grafton building inspection office receives and files the permit, the records within BIP should be updated.

Currently, only the building department can access BIP files. In order for the transfer of permeability information from the building inspection office to the DPW to be smooth, access will need to be granted to this part of BIP.

The other information, namely rainfall history and flood reports, does not need to be accessible directly from the building inspection office, as it is more directly bound to storm water, which is one of the responsibilities of the DPW. We recommend storing flooding reports and rainfall history directly in the GIS system; this makes the spatial analysis section easier later on.

4.2.6 SPATIAL ANALYSIS APPLICATIONS

The total collected data - comprising permeability of each lot over time, historical rainfall figures, flooding complaints, and pollution measurements before and after development – must be interpreted into actionable information before they are useful to the town administration or citizenry. We investigate the usefulness of this data in determining shortfalls that exist within the permitting & inspection process.

No matter how good a system is in place, and how well designed developments are, flooding and pollution will occur eventually. When it does occur, it's often a goal to find out why it did, and if it's likely to happen again.

Without a great deal of research and testing it would be nearly impossible to create an automated system for answering these questions, so we must be satisfied with proposing the data presentation method that will allow DPW personnel to answer these questions themselves.

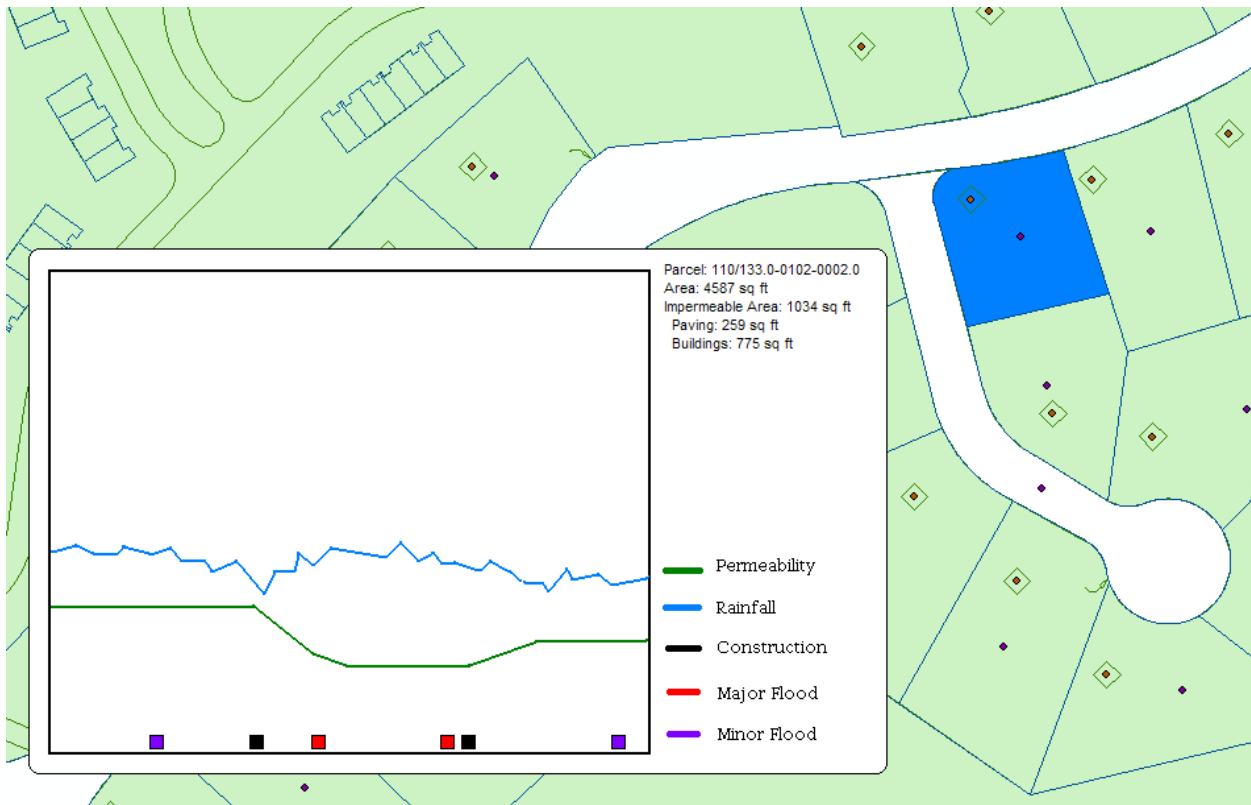
4.2.6.1 Abatement of Flow from Plots

In problem areas, there will be certain plots that are causing more runoff than others. It is generally less expensive for the town to assist property owners in abating runoff flow than it is to increase the capacity of the storm water management system. For this reason, the logical course of action is to identify the local plots whose flow abatement will most benefit the public.

This can be done by noting the areas with the most flood reports and looking within them for the largest areas of high impervious percentage.

4.2.6.2 Methods of Analysis through GIS

As show below, we propose the addition of a dialog within the GIS system to display the log information that we have already described in a graphical manner. This is only a mockup of what we believe the most effective display would be like; the units and other details are ignored. The important thing to consider is that all this information can be synthesized into one display that allows a trained DPW employee to better understand the storm water related issues at hand in any given area.



4.2.7 GRAFTON GENERAL BYLAW AMENDMENTS IN SUPPORT OF RECOMMENDATIONS

Relating to storm water, there are several provisions in both the General Bylaws and the Zoning Bylaw that are relevant. The first is article 13, Earth Removal. This article governs the degree to which the town regulates the removal of Earth (soil, loam etc) from any plot within the town.

4.2.7.1 Article 13, Section 5B, Subsection I

“Control of temporary and permanent drainage.”

This section allows the board of selectmen to impose requirements related to drainage on construction that requires the removal of earth from a plot.

Changes: require that unless unreasonable, the requirements include restriction of expected runoff to the level the land currently produces.

4.2.7.2 Article 13, Section 2B

“Any person wishing to remove such material from a property in Town shall file a formal application with the Board, which application shall include the following specific information and supporting documentation”

This section requires that developers provide a list of information on the proposed excavation and surrounding property to the board of selectmen.

Changes: add subsection i: A pH, sediment, and heavy metal analysis of typical storm water runoff from the plot as it currently exists.

4.2.7.3 Article 13, Section 5B

“In approving the issuance of a permit, the Board shall impose reasonable conditions which shall accompany and shall constitute part of the permit”

This section includes a listing of conditions the board shall impose as part of the permit.

Changes: add subsection k: Requirement that upon completion of the development, the developer shall either perform itself, or contract one of its agents to again measure the pH, sediment, and heavy metal values of runoff from the development.

4.2.8 LONG-TERM STORM WATER OBJECTIVES

In the future, Grafton would like to see some additional checks during inspection on all new buildings. This inspection will monitor the foundation drains to check for any connection to the town's storm water runoff systems. This is to ensure that the quantity of water that is entering the sewer system can be calculated as well as ensuring that little or no pollution enters the storm water system. A majority of the sewers in Grafton are located underneath the streets, which leads to how the town of Grafton shares information. Storm water, Road opening permits, and driveway permits are the data points that link the DPW to the building inspector's office (Risotti, 2006).

4.3 UTILITY CONSUMPTION

Rapidly depleting petroleum reserves and the ideals of environmental responsibility have put immense pressure on the global population to reduce energy consumption. Buildings and their related construction processes account for the majority of global energy waste. In advanced countries buildings typically account for about 50% of total energy consumption, and a similar proportion of carbon dioxide emissions. (http://www.newhorizontech.com/NCBC2005_032705.pdf) Because of this, building design and construction processes have logically been targeted as candidates for green reform.

“Green building” has been a growing priority in Europe for nearly two decades, and has gained significant traction in the United States since around the turn of the century. In 2005 Washington was the first state to enact any type of green building legislation. “According to the State Board of Education and Superintendent of Public Instruction's office, use of sustainable building designs result in: 20% annual savings in energy costs; 20% reduction in water costs; 38% in waste water production; and a

22% reduction in construction waste.”

(<http://www.renewableenergyaccess.com/rea/news/story?id=25765>) The benefits of green building in conjunction with global energy pressure lead us to believe that energy reform will become a **major** socioeconomic issue in Massachusetts in the near future. We believe Grafton will be better prepared to face this issue *in the future* by collecting and maintaining more municipal data *now*.

Buildings vary widely in terms of consumption levels and energy efficiency, which can make them difficult to compare to each other. High levels of consumption are sometimes a product of the building's functional purpose, such as manufacturing, but are more commonly a result of inefficiency to one extent or another. By tracking key characteristics through permitting and inspecting, it is possible to compare the energy consumption of a specific building to pre-defined benchmarks determined by similar buildings. This type of comparative analysis helps municipal employees identify and assess energy inefficiencies.

Currently, the town of Grafton would like to record the number of rooms in each building, as well as the number of windows/doors. We recommend that they add a field on the building permit that asks for this information. Then when it is received by the town it can be entered into BIP and later mapped using GIS. Then after the building has been completed the building inspector should cross-reference the collected data with the “As-Builds” to verify accuracy. This will aid in Grafton's tracking and monitoring of utility efficiency and consumption.

Above and beyond tracking of rooms is the transition to alternate energy sources. In Grafton there are two sub-groups of people: those who understand the long term investment that alternate energy sources represent, and others who would like a quick and cheap way to cut costs on their utility bills.

The issue currently with alternate energy sources is that people don't know very much about them. We recommend a detailed education program to help change this problem. People that would be willing to purchase an alternate energy source might not buy one, because he doesn't know the benefits. We recommend using billboard advertisements, TV commercials (local access), and local newspapers to

educate the town on the following issues: State tax incentives, long term break-even point, monetary savings, and cleanliness. There are fewer residents in Grafton that fall into this category than those who would like cheap and quick solutions to cut down on their energy bills.

For them an education strategy must be implemented as well. A home assessment list should be posted on the town's web site. This will allow residents to go around their own house and check to see how efficient it operates. Then they need to be told about cost effective solutions to increase efficiency. Such solutions include switching to CFL lights, replacing or sealing of windows and doors, insulation, etc. The costs to monetary benefits should also be portrayed to the public. This can also be done through TV commercials, newspaper ads, and the town's web site.

The last recommendation that we have for the town of Grafton is the addition of a CO2 calculator to their web site. Using this calculator, Grafton would be able to ask questions both about consumption and efficiency in conjunction with street addresses. Leveraging this data will allow the town of Grafton to assess which areas of the town run efficiently and which do not. This information will save a lot of time and money when state mandates are implemented.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 DELIVERABLES

The end results delivered in this project are our recommendations. We based our recommendations on site research, legal readings, and literature describing effective methods used elsewhere.

Some of the requirements such as updated building inspection requirements and extra reporting rules for builders required updates to town ordinance; also, the technical changes to BIP and the GIS application development were outside of our technical capabilities – some of our recommendations are somewhat speculative. In support of our recommendations - which involve updates to the BIP program, the paper and online forms, and the internal processes within the town administration - we drafted suggested changes to Grafton's town code that supply the information needed to drive the new recommended processes.

5.2 ACCOMPLISHMENT OF OBJECTIVES

We accomplished our objectives: to find the sources, applications, and key points in information processing and record keeping related to affordable housing stocks, storm water informatics, and utility usage.

Our presentation to the key players in Grafton was a success – our recommendations were well received and understood to be cogent and reasonable. This report goes into further depth than our presentation on the details of what should be done and why.

5.3 THANKS

We would like to thank our longsuffering project advisor Fabio Carrera, Bob Berger, the Building Inspector for the town of Grafton who took time out of his days many times to speak to us, and

Steve Risotti, with the Grafton Department of Public Works, who spent many hours helping us understand the issues relating to the EPA rules and Grafton's storm water problems.

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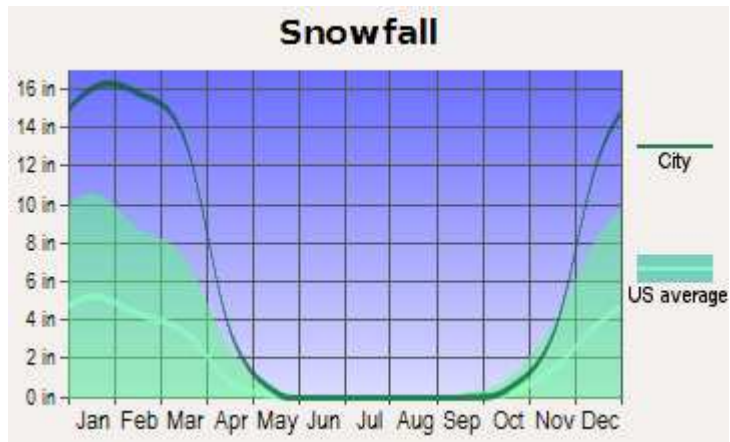
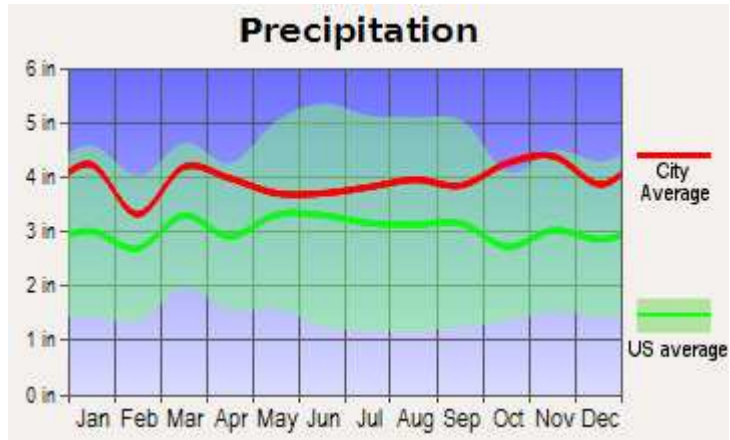
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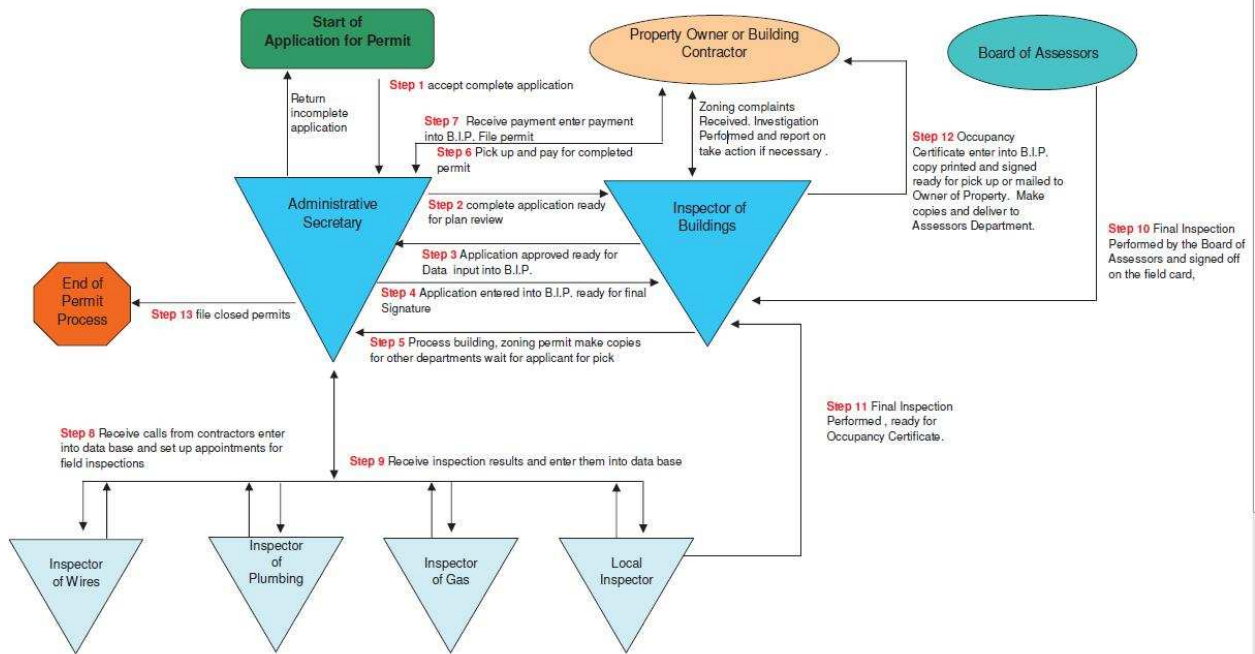
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7 APPENDIX A: GRAFTON PRECIPITATION AND SNOWFALL CHARTS



8 APPENDIX B: FLOWCHART FOR GRAFTON MUNICIPAL OPERATIONS

Flow Chart for Building Departmental Operations



9 APPENDIX D: GRAFTON PERMITTING FORMS



The Commonwealth of Massachusetts
 State Board of Building Regulations and
 Standards
 Massachusetts State Building Code
 780 CMR



Town of Grafton
 Building Department
 30 Providence Road
 Tel: 508-839-5335 x 190
 Fax: 508-839-8543
 Email: buildingdept@town.grafton.ma.us

APPLICATION TO CONSTRUCT, RENOVATE OR DEMOLISH A ONE OR TWO FAMILY DWELLING

This Section For Official Use Only

Building Permit Number: _____ Date Issued: _____

Signature: _____
 Building Commissioner /Inspector of Buildings

SECTION 1 - SITE INFORMATION

SECTION 2 – Construction Type: _____ **Use group:** _____

1.1 Property Address:

 Zip Code _____

1.2 Assessors Map & Parcel Number:
 _____ / _____ / _____
 Map Number Lot/Parcel Number
 Builder's Lot No _____ Block _____

1.3 Zoning Information:

 Zoning District Proposed Use

1.4 Property Dimensions:

 Lot Area (sf) Frontage (lf)

1.5 Building Setbacks (l.f.) _____ **Number of dwelling(s)** _____

Front Yard		Side Yards (R/L)		Rear Yard	
Required	Provided	Required	Provided	Required	Provided
		/	/		

1.6 Water Supply (M.G.L. c. 40 s 54)
 Public Private

1.7 Flood Information
 Zone _____ Outside Flood Zone

1.8 Sewage Disposal Information
 Municipal On Site Disposal System

SECTION 2 - PROPERTY OWNERSHIP/AUTHORIZED AGENT

2.1 Owner of Record:

Name: (Print) _____ Address : _____
 Signature _____ Telephone: _____

2.2 Authorized Agent:

Name: (Print) _____ Address _____
 Signature: _____ Telephone: _____

SECTION 3 - CONSTRUCTION SERVICES

3.1 License Construction Supervisor:

Construction Supervisor: _____
 Address _____
 Signature _____ Telephone _____

Not Applicable
 License Number _____
 Expiration Date _____

3.2 Registered Home Improvement Contractor:

Company Name _____
 Address _____
 Signature _____ Telephone _____

Not Applicable
 Registration Number _____
 Expiration Date _____

SECTION 4 - WORKERS' COMPENSATION INSURANCE AFFIDAVIT (M.G.L. c.152, S 25c(6))

Workers Compensation affidavit must be completed and submitted with this application. Failure to provide this affidavit will result in the denial of the issuance of the building permit.

Signed Affidavit Attached Yes..... No.....

SECTION 5a - DESCRIPTION OF PROPOSED WORK (Check all applicable)

New Construction Existing Building Repairs Alterations Addition
 Accessory Bldg. Demolition Foundation only Other: _____

Brief Description of Work:

SECTION 5b - CONSTRUCTION DETAILS

# Bedrooms _____	# Floors _____	# Garages _____	Total Decks & Porches _____ s.f.
1 st Floor _____ s.f.	2 nd Floor _____ s.f.	3 rd Floor _____ s.f.	
Garage _____ s.f.	Unfinish Bsmt _____ s.f.	Finished Bsmt _____ s.f.	Tot Living. Area S.F. _____

SECTION 6 - ESTIMATED CONSTRUCTION COST

Item	Cost	For Official Use Only	Amount
1. Building		(a) Building Permit Fee	
2. Electrical		Estimated Cost (Dollars)	
3. Plumbing		Building Permit Fees (a)+(b)	
4. Mechanical (HVAC)		Check Number	
5. Fire Protection			
Total= 1+2+3+4+5			

SECTION 7a - OWNER AUTHORIZATION TO BE COMPLETED WHEN OWNERS AGENT OR CONTRACTOR APPLIES FOR BUILDING PERMIT

Homeowner authorizing an agent to obtain the building permit

I _____; as Owner of the subject property
 hereby Authorize _____ to act on
 my behalf, in all matters relative to work authorized by this building permit application.

 Signature of Owner

 Date

SECTION 7b - OWNER/AUTHORIZED AGENT DECLARATION

Person obtaining the building permit

I _____; as Owner/Authorized Agent hereby declare that the statements and information on the foregoing application are true and accurate, to the best of my knowledge and belief.

Signed under the pains and penalties of perjury.

 Print Name

 Signature of Owner/Agent

 Date

DESCRIPTIONS/COMMENTS:

(Finished areas only)

1 st Floor s.f.
2 nd Floor s.f.
3 rd Floor s.f.
Finished Basement
Unfinished Basement:
Other:
Total s.f. Living Space.
Deck s.f.
Garage s.f.
Storage s.f.
Fee based on B.O.C.A. fee schedule
Will you be using the 6 th edition code <input type="checkbox"/> or the 7 th edition code <input type="checkbox"/>
Automatic Sprinkler System Provided <input type="checkbox"/> Yes <input type="checkbox"/> No
Market Rate <input type="checkbox"/> Affordable Rate <input type="checkbox"/>
Subdivision Name

“780 CMR 111.0 PERMITS 111.1 Action on application: The building official shall examine or cause to be examined all applications for permits and amendments thereto within 30 days after filing thereof. If the application or the construction documents do not conform to the requirements of 780 CMR and all pertinent laws under the building official’s jurisdiction, the building official shall reject such application in writing, stating the reasons therefor. If the building official is satisfied that the proposed work conforms to the requirements of 780 CMR and all laws and ordinances applicable thereto, the building official shall issue a permit therefor.”

SUGGESTED CHECKLIST FOR APPLICATION

- Zoning Application Included
- 3 Sets of plans for building or structure
- Site Plan prepared by Engineer or Registered Land Surveyor showing location of buildings or structure to lot lines also proposed location of new structures as per 780 CMR 110.10
 - a.k.a. As Built Site Plan prepared by Engineer or Registered Land Surveyor showing location of buildings or structure to lot lines also location of new structures as per 780 CMR 110 Date delivered ____/____/____
- Sewer Department Approval or Approved Septic Plan
- Water District Approval Letter
- Well Water Quantity & Quality Approval certificate from the Board of Health
- Smoke Detector Application From The Fire Department
- Driveway Permit from The Highway Department (If applicable)
- Copies of Variances or Special Permits Granted by The Planning Board or Zoning Board of Appeals or any other Town Boards
- Worker's Compensation Certificate
- Insurance Binder from Insurance Company made out to the Town of Grafton
- Homeowner License Exemption (If applicable)
- Copy of Construction Supervisor License
- Copy of Home Improvement Registration (If applicable)
- Statement for disposal of debris (If applicable)

- Massachusetts Energy Compliance Report
- All monies due to the town must be paid
- Modular Homes:** All of the above and see special requirements for Modular Homes
Written certification from the manufacturer for the person responsible for setting the units.
Construction supervisor to obtain permit--homeowner cannot obtain the building permit.

Building Notes:

APPLICANT: FILL IN ALL NON-SHADED INFORMATION-PLEASE PRINT



The Commonwealth of Massachusetts
 State Building Board of Regulations and
 Standards
 Massachusetts State Building Code
 780 CMR



TOWN OF GRAFTON
 Building Department
 30 Providence Road
 Tel: 508 839-5335 X 190
 Fax: 508 839-8543
 Email Address: buildingdept@town.grafton.ma.us

APPLICATION TO CONSTRUCT, RENOVATE, CHANGE OF USE OR OCCUPANCY OF, OR DEMOLISH ANY BUILDING OTHER THAN A ONE OR TWO FAMILY DWELLING

This Section For Official Use Only

Building Permit Number: _____

Date Issued: _____

Signature: _____
 Building Commissioner /Inspector of Buildings

Date _____

SECTION 1 - SITE INFORMATION

1.1 Property Address:

1.2 Assessors Map & Parcel Number:

Map Number _____ Lot/Parcel Number _____

1.3 Zoning Information:

Zoning District _____ Proposed Use _____

1.4 Property Dimensions:

Lot Area (sf) _____ Frontage (lf) _____

1.6 Building Setbacks (l.f.)

Front Yard		Side Yards (R/L)		Rear Yard	
Required	Provided	Required	Provided	Required	Provided
		/	/		

1.7 Water Supply (M.G.L. c. 40 s 54)
 Public Private

1.8 Flood Zone Information
 Zone: _____ Outside Flood Zone

1.9 Sewage Disposal Information
 Municipal On Site Disposal System

SECTION 2 - PROPERTY OWNERSHIP/AUTHORIZED AGENT

2.1 Owner of Record: *(Owner of the property)*

Name: (Print) _____ Address _____

Signature _____ Telephone: _____

2.2 Authorized Agent: *(Agent acting in behalf of the property owner, Manager, Exec Officer, ETC)*

Name: (Print) _____ Address : _____

Signature: _____ Telephone: _____

SECTION 3 - CONSTRUCTION SERVICES

3.1 License Construction Supervisor:

Construction Supervisor: _____
 Address _____
 Signature _____ Telephone _____

Not Applicable

License Number _____

Expiration Date _____

3.2 Registered Home Improvement Contractor:

Not Applicable

_____ Company Name	_____ Registration Number
_____ Address	_____ Expiration Date
_____ Signature	_____ Telephone

SECTION 4 - WORKERS' COMPENSATION INSURANCE AFFIDAVIT (M.G.L. c.152, S 25c(6))

Workers Compensation affidavit must be completed and submitted with this application. Failure to provide this affidavit will result in the denial of the issuance of the building permit.

Signed Affidavit Attached Yes..... No.....

SECTION 5 - PROFESSIONAL AND CONSTRUCTION SERVICES - FOR BUILDINGS AND STRUCTURES SUBJECT TO CONSTRUCTION CONTROL PURSUANT TO 780 CMR 116(CONTAINING MORE THAN 35,000 C. F. OF ENCLOSED SPACE).
5.1 Registered Architect:

_____ Name (Registrant):	Not Applicable <input type="checkbox"/>
_____ Address	_____ Registration Number
_____ Signature	_____ Expiration Date
_____ Telephone	

5.2 Registered Professional Engineer(s):

_____ Name	Not Applicable <input type="checkbox"/>
_____ Address	_____ Area of Responsibility
_____ Signature	_____ Registration Number
	_____ Expiration Date
_____ Name	Not Applicable <input type="checkbox"/>
_____ Address	_____ Area of Responsibility
_____ Signature	_____ Registration Number
	_____ Expiration Date
_____ Name	Not Applicable <input type="checkbox"/>
_____ Address	_____ Area of Responsibility
_____ Signature	_____ Registration Number
	_____ Expiration Date
_____ Name	Not Applicable <input type="checkbox"/>
_____ Address	_____ Area of Responsibility
_____ Signature	_____ Registration Number
	_____ Expiration Date

5.3 GENERAL CONTRACTOR

Company Name _____	Not Applicable <input type="checkbox"/>
Responsible In Charge of Construction _____	
Address _____	
Signature _____ Telephone _____	

SECTION 6 - DESCRIPTION OF PROPOSED WORK (Check all applicable)

New Construction <input type="checkbox"/>	Existing Building <input type="checkbox"/>	Repairs <input type="checkbox"/>	Alterations <input type="checkbox"/>	Addition <input type="checkbox"/>
Accessory Bldg. <input type="checkbox"/>	Demolition <input type="checkbox"/>	Other <input type="checkbox"/> Specify: _____		

Brief Description of Work _____

SECTION 7 - USE GROUP AND CONSTRUCTION TYPE

USE GROUP (Check as applicable)		CONSTRUCTION TYPE	
A Assembly	<input type="checkbox"/> A-1 <input type="checkbox"/> A-2 <input type="checkbox"/> A-3 <input type="checkbox"/> <input type="checkbox"/> A-4 <input type="checkbox"/> A-5 <input type="checkbox"/>	1A 1B	<input type="checkbox"/> <input type="checkbox"/>
B Business E Educational F Factory	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> F-1 <input type="checkbox"/> F-2 <input type="checkbox"/>	2A 2B 2C	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
H High Hazard I Institutional	<input type="checkbox"/> <input type="checkbox"/> I-1 <input type="checkbox"/> I-2 <input type="checkbox"/>	3A 3B	<input type="checkbox"/> <input type="checkbox"/>
M Mercantile	<input type="checkbox"/>	4	<input type="checkbox"/>
R Residential S Storage	<input type="checkbox"/> R-1 <input type="checkbox"/> R-2 <input type="checkbox"/> R-3 <input type="checkbox"/> <input type="checkbox"/> S-1 <input type="checkbox"/> S-2 <input type="checkbox"/>	5A 5B	<input type="checkbox"/> <input type="checkbox"/>
U Utility	<input type="checkbox"/> Specify: _____		
M Mixed Use	<input type="checkbox"/> Specify: _____		
S Special Use	<input type="checkbox"/> Specify: _____		

SECTION 8 - COMPLETE THIS SECTION IF EXISTING BUILDING UNDERGOING RENOVATIONS, ADDITIONS, AND/OR CHANGE OF USE

Existing Use Group: _____	Proposed Use Group: _____
Existing Hazard Index 780 CMR 34: _____	Proposed Hazard Index 780 CMR 34: _____

SECTION 9 - BUILDING HEIGHT AND AREA

BUILDING AREA	Existing (if applicable)	Proposed
Number of Floors or stories include basement levels		
Floor Area per Floor (sf)		
Total Area (sf)		

Total Height (ft)		
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SECTION 10 - STRUCTURAL PEER REVIEW (780 CMR 110.11)

Independent Structural Engineering Structural peer Review Required		Yes..... <input type="checkbox"/>	No..... <input type="checkbox"/>
SECTION 10a Structural Engineer of Record: (780 CMR 1705)		Section 10b (780 CMR 1705.3.1)	
Name _____		SER must submit a program of structural tests and inspections in accordance with 780 CMR 1705.3.1	
Address _____			
City _____	State _____		
		Program submitted	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>

SECTION 11a - OWNER AUTHORIZATION - TO BE COMPLETED WHEN OWNERS AGENT OR CONTRACTOR APPLIES FOR BUILDING PERMIT

To be filled out by property owner or authorize agent

I, _____ as owner of subject
 Property hereby authorize

 to act on my behalf, in all matters relative to work authorized by this building permit application

Signature of Owner/Agent _____ Date _____

SECTION 11b - OWNER/AUTHORIZE AGENT DECLARATION *(Contractor or Authorized Agent pulling Permit)*

I, _____ as Owner/Authorize Agent
 hereby declare that all statements and information on the foregoing application are true and accurate, to the best of my knowledge and belief.
 Signed under the pains of penalties of perjury.

Print Name _____

Signature of Owner/Agent _____ Date _____

SECTION 12 - ESTIMATED CONSTRUCTION COST

Item	Cost	For Official Use Only	Amount
1. Building		(a) Building Permit Fee	
2. Electrical		Estimated Cost (Dollars) to be completed by permit applicant	
3. Plumbing		Building Permit Fees (a)+(b)	
4. Mechanical (HVAC)		Check Number	
5. Fire Protection			
Total= 1+2+3+4+5			

Fee: _____ Permit # _____ Date Issued _____

Approved _____ Date _____
(Building Official)

