CITY OF NEWTON

IN BOARD OF ALDERMEN

ZONING & PLANNING COMMITTEE REPORT

MONDAY MARCH 28, 2011

Present: Ald. Johnson, Lennon, Baker, Yates, Shapiro, Swiston
Absent: Ald. Sangiolo, Lappin
Also Present: Ald. Crossley, Hess-Mahan
City Staff: Candace Havens (Director of Planning & Development), John Lojek (Commissioner, ISD), Seth Zeren (Chief Zoning Code Official), Jen Molinsky (Interim Chief Planner for Long Term Planning), David Norton (Zoning Enforcement Official), Marie Lawlor (Assistant City Solicitor), Rebecca Smith (Committee Clerk)

#17-11 TERRENCE P. MORRIS, JOSEPH PORTER, BRUCE BRADFORD, GEORGE COLLINS, VERNE T. PORTER, JR., MICHAEL PEIRCE proposing an amendment to the zoning ordinance for the purpose of changing the definition of "Grade Plane" and adding a new definition for "Average Grade". [12-28-10 @ 10:22AM]

ACTION: HELD 6-0

NOTE: Seth Zeren, Chief Zoning Code Official, gave a presentation to the Committee on the petitioner's proposal relating to "grade plane". The petitioners propose revisions for the definition for "grade plane" and a creation of a definition of "average grade". Mr. Zeren's presentation outlined the petitioners' proposal and the Planning Department's analysis of it, along with their recommendations. The presentation is attached to the end of this report. "Grade plane" is intended to represent the average grade around a structure; it is the baseline for how we determine the height of a building. Grade plane is also important in determining if an area counts as a basement; an area is counted as a basement if it is more than half underground compared to the grade plane.

This petition came forward as a response to the interpretation put forth by the Inspectional Services Department in their December memo. The ISD memo laid out a concrete method for carrying out the City's current ordinance since David Norton, Zoning Enforcement Official, discovered that those measuring grade plane were doing it differently and often times in ways that would be the most beneficial for their individual project. The issue with ISD's current interpretation and with the ordinance in general is that a true average grade is not being reached. To mitigate this issue, the petitioners have proposed a length-weighted mean formula which would determine an average grade by figuring the average grade of each segment of each wall (by averaging the high and low point of the segment), multiplying the average grade of the segment by its length, and then averaging all the segments of the walls together. This approach is used in Sudbury and Wayland. Commissioner Lojek, Mr. Norton, and the Planning Department agree with the petitioners that the length-weighted mean formula is the most accurate way of

determining grade plane and the one that will lead to the most consistency throughout the City by eliminating the ability for people to calculate grade plane differently. Mr. Norton stated that if a length weighted mean formula is implemented, then everyone has to calculate things the same way, and people won't be free to interpret the ordinance to their benefit as they have been doing.

Ald. Baker stressed that he is concerned about the potential unintended consequences caused by a change like this. His biggest concern is related to the small chance that adopting the length-weighted means system could create basements out of what are currently considered buried first floors. Ald. Baker is concerned that if the first floor is made a basement, then the homeowner can then add an additional floor to the structure. His concern did not appear to be shared by the Planning Department or ISD. Mr. Zeren responded by stating that it could be possible to expand a 2 floor home to a 2 ½ story with a basement component if the grade plane was low enough, but height restrictions will keep structures from gaining much height or mass. Ald. Baker also brought up the fact that the definition of grade plane and height had been discussed in 1999. He requested that the reports and the planning memos be included in the packet preceding the public hearing on April 25th. He also requested that the Planning Department provide the Committee with an explanation of the implications between the current interpretation of the ordinance and the proposed length-weighted means system.

Mr. Zeren explained a little of the history that Ald. Baker referred to. He told the Committee that, in 1996, an item was docketed in response to concerns about the scale of development potential. In 1997, three major changes were made: the height definition was revised, the building height was lowered to 30 feet to the peak, and the definition of grade plane was added. The recommendation that the three story limit be amended to 2 ½ stories was also proposed. In 1999, in response to similar concerns, there was a revision to the height definition which measured the height limit as the space between the ridge of the roof and the line of the wall plane, not at the peak of the building. In 1999, the definition of grade plane was amended to its current definition.

Ald. Johnson requests 3D-images for the hearing on April 25th to assist the Committee and the public. Ald. Johnson also asked Candace Havens to relay to the Chair of the Planning Board that we need them present at these preliminary meetings before we go to public hearings so that they understand the thought and discussion that's already gone into items such as this.

Terrence Morris, 57 Elm Road, co-docketer of the item, addressed the Committee. He spoke to the fact that this method would yield a true average. He also addressed Ald. Baker's concern over the amount of points taken for the length-weighted mean calculation. Mr. Morris stated that if you look at legislative history of previously docketed grade plane items, the reports and memos talk about wanting to calculate grade plane in 5ft increments. Those documents are the only ones in the records that Mr. Morris could find that indicate how this current ordinance should be interpreted; there is nothing saying that just two points be taken, as is the practice now. Mr. Morris made it clear that he respects Ald. Baker's approach, but disagrees with the idea that the way the ordinance has been interpreted was intended by the Aldermen at the time.

Joe Porter, 132 Adams Street, also a co-docketer of the item, echoed Mr. Morris in his support for this change, stating that the length-weighted mean formula would create a true average around the building.

Ald. Johnson reiterated that she'd like to see some pictorial examples of what these changes will look like if implemented. The Committee then voted to hold the item. The item will go to public hearing on the 25th of April.

#65-11 TERRENCE P. MORRIS & JOSEPH PORTER proposing an amendment to the zoning ordinance to change the definition of "height" with a concomitant increase in the height to the pre-1997 limits; to make height exceptions in accessory buildings subject to special permit rather than a variance. [03-01-11 @ 1:27PM]

ACTION: HELD 6-0

NOTE: Mr. Zeren gave his second presentation on height. This presentation also contained the petitioner's proposal as well as the Planning Department's recommendation. That presentation is also attached to the end of this report. The definition for height is the method for calculating the height of a building. Height is calculated as the measurement from the grade plane to the mid-point between the roof peak and the intersection of the walls and roof planes (see slide 2 of presentation). Changing this definition would affect all structures including accessory structures. ISD and the Planning Department take issue with the current definition because it can be manipulated to change peak height. Currently, changes to the shape of a roof can alter your height even though it doesn't change your peak (see slide 3).

Mr. Zeren explained the three parts to the petitioner's proposal. The first part is to change the definition of height so that height is measured to the peak. The second piece is to change the height limits back to the pre 1997 limit of 36 ft. The third and final element is to allow height limits for accessory structures to be waived by special permit instead of variance, which is the practice now.

Mr. Zeren went through each element. He first addressed measuring height to the peak of the roof. The Planning Department did an analysis of this and it would apply to all properties in the city with primary impacts on residential structures. Measuring from the peak would be consistent with many surrounding communities which measure to the highest point of the roof.

In regards to the second element of the proposal, Mr. Zeren explained that the change in the height limit would only affect Multi-Resident and Single Resident Districts. In most neighboring communities, residential height limits are 35 ft. In some cases, such as in Wellesley and Watertown, 45 ft. in a residential district is allowed. Weston's peaked roofs are a maximum of 37 ft. Changing our limit back to 36 ft would have limited impact.

Changing the height limit would affect accessory structures which are currently limited to 18ft. The Planning Department recommends that the accessory buildings' roofs be capped at 22 ft. David Norton explained that giving an absolute height to accessory buildings will lessen the mass of the buildings. Right now, though the height limit is 18ft, a structure will have a greater mass because people play with the pitches of the roof. With the absolute height a resident can still have a ½ story and can still have pitched roof. Doing this won't take away any rights it's just bringing the accessory building lower.

The third and final element concerns accessory apartments and how we provide relief for accessory structures. The petition proposes that if the height limit is to be

waived, it should be done so through the special permit process. Through his research, Mr. Zeren discovered that there is no precedent in the surrounding areas for accessory structures receiving special permits for height limit relief. The Planning Department, ISD, and the Law Department don't see an adequate rationale for making the height of accessory structures an exception to the current rule.

Mr. Zeren noted that in addition to changes in the height limits in Table 1 of 30-15, there are also height limits in Table 4 for rear lot development. Changes would need to be made consistently throughout the ordinance. Additionally, some setback requirements in 30-15, Tables 1 and 2, are derived from building height. It's possible that increasing height could change setbacks but it is unlikely.

Mr. Zeren also pointed out that there is a scrivener's error in the definition which will also need to be corrected. The error is that "wall plate" is written in the ordinance in place of "wall plane". If you go back through the memos, the phrase was always wall plane but somehow wall plate is what made it into the actual ordinance. This is significant because wall plate is an actual construction feature. Marie Lawlor, Assistant City Solicitor, confirmed that this was a scrivener's error and that if we don't correct it now, it will have to wait until recodification in 2012.

Mr. Zeren closed by stating that he and the Planning Department recommend the adoption of the first and second sections of the petitioners' proposal but do not recommend section 3, pertaining to special permits for accessory structures.

Ald. Baker stated that changes in the methods in which we deal with accessory building are not necessary. He went on to state that there are many exceptions in what is counted in height. He suggests we take a look at how changing the place from which we measure may affect those exceptions. Ald. Crossley shared the same thought. She believes it would be interesting and worthwhile to look at each category of exceptions and see what difference it would make. Ald. Crossley stated that the Committee should think about giving height waivers through the special permit process. There may be situations where this could be warranted. She also suggested that perhaps an averaging method could be used for height as it is for setbacks (in certain scenarios the setback of a home is determined by averaging the setbacks of the neighboring structures).

Ald. Johnson echoed Ald. Baker's opinion about accessory buildings. She would also like to have some more explanation about the impact that may result from changing the point of measurement from the cross section to the peak.

Ald. Hess- Mahan shared his belief that an absolute height is essential but that relief through the special permit could be something we want to consider. Not allowing a waiver of this kind would be an unfortunate decision.

Terrence Morris, co-docketer, shared his observation that there was no reluctance to expand the ordinance in the past in regards to special permit relief and that creating the need for variances is bad policy. He stated that going to the ZBA is difficult process to have people go through. The ZBA has 4 criteria that are very hard to meet; we should be trying to reduce need for variances. Mr. Morris also asks that the Planning staff look closer at the language of 30-15(m). The language needs clarification since it states that no space above the maximum height shall be habitable without the grant of a special permit, yet one is not allowed to exceed that maximum height; only with a variance could that occur; this is inconsistent.

Ald. Yates moved hold which carried unanimously. The item will be brought to public hearing along on April 25, 2011 where discussion will continue.

#81-11 ALDERMEN JOHNSON, CROSSLEY, HESS-MAHAN, LAPPIN & DANBERG requesting the Director of Planning & Development and the Chair of the Zoning Reform Scoping Group provide updates on the Scoping Group's Progress. These updates will occur at the frequency determined by the Chair of the Scoping Group and the Chair of the Zoning and Planning Committee. [3/14/2011 @ 11:16PM]

ACTION: HELD 6-0

NOTE: Ald. Crossley, as the Chairman of the Zoning Reform Task Force, joined the Committee at the table to briefly discuss their progress thus far. She shared that the Task Force held their first meeting which all members attended. At this meeting, the members got to know each other and brainstormed about the task before them. Ald. Crossley stated that an interesting and wide variety of points were made about clarity or lack thereof in the ordinance, and the many purposes it serves. All members were in agreement that the ordinance needs structure to make it easier to use and enforce. The general objectives of this Task Force are to brainstorm ways to create clarity, and give structure and intention to the zoning ordinance; the Task Force does *not* have a role in creating policy. The next meeting is on April 7th from 7-9pm.

The Zoning and Planning Committee will revisit this item periodically to receive updates from Ald. Crossley on the Task Force's progress. Ald. Yates moved hold on the item which carried unanimously.

#49-11 ALD. JOHNSON, Chair of Zoning and Planning Committee, on behalf of the Zoning and Planning Committee requesting that the Director of Planning & Development and Commissioner of Inspectional Services review with the Zoning & Planning Committee the FAR data collected during the eight months prior to the new FAR going into effect and the 12 months after. This committee review should occur no less than bi-monthly but could occur as frequently as monthly, based on the permits coming into the departments. [02-15-2011 @8:44AM]

ACTION: HELD 6-0

NOTE: Jen Molinksy, Interim Chief Planner for Long Term Planning, and Candace Havens, Director of Planning and Development, updated the Committee on the progress of data collection for FAR calculations as well as communication to the public on the implications of the FAR amendment to take effect in October. Ms. Molinsky and Ms. Havens explained that the Planning Department and ISD will be holding staff training on the FAR changes on Wednesday so that they will be able to assist the public with whatever questions they may have. In addition to that, there are a number of things that the departments are doing for the public to learn about this change: they will be holding sessions for professionals who are interested in learning more detail about the

FAR; they've developed an online calculator; they've drafted a FAQ worksheet for anyone who comes to the counter with the website link on it which will lead them to the materials and calculator.

Ald. Lennon asked for assurance that data will be gathered, though we don't have any yet. Ms. Molinsky and Ms. Havens stated that there will be data; they hope that people will submit information on the worksheet available at ISD to see whether or not they should do their project now or later. If they don't complete this information, then data can be extracted from plans submitted to ISD

The Zoning and Planning Committee we will be discussing this item at their second meeting of each month. A motion to hold was made which the Committee carried unanimously.

Respectfully Submitted,

Marcia Johnson, Chairman

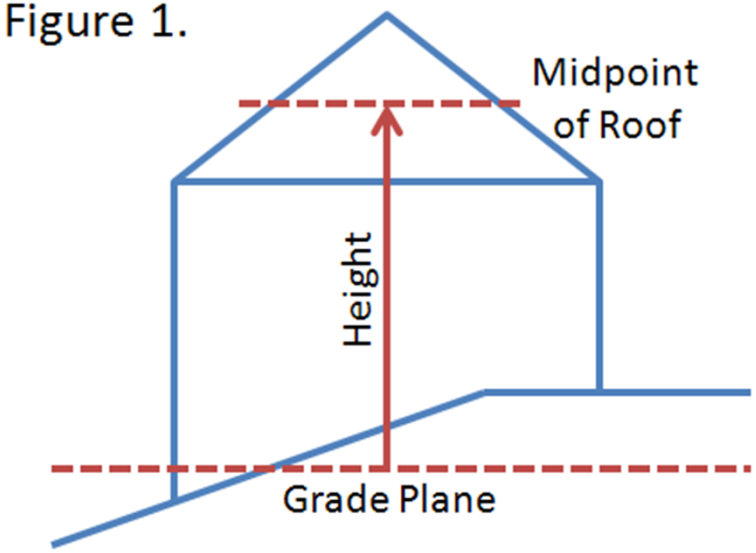
Department of Planning and Development

Revisions to Grade Plane Definition

Petition #17-11. Terrence P. Morris, Joseph Porter, Bruce Bradford, George Collins, Verne T. Porter, Jr., and Michael Peirce, proposing an amendment to the zoning ordinance for the purpose of changing the definition of “grade plane” and adding a new definition of “average grade.”

Grade Plane Definition

Figure 1.



- "Grade Plane" represents the average grade around a structure
- Benchmark from which height is measured
- Also affects the determination of basements

Current Interpretation of Grade Plane Definition

Figure 3.

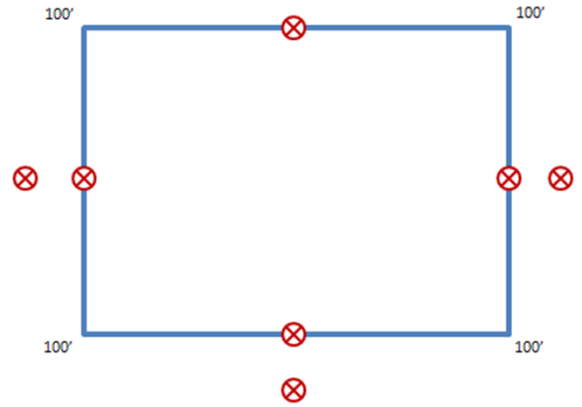
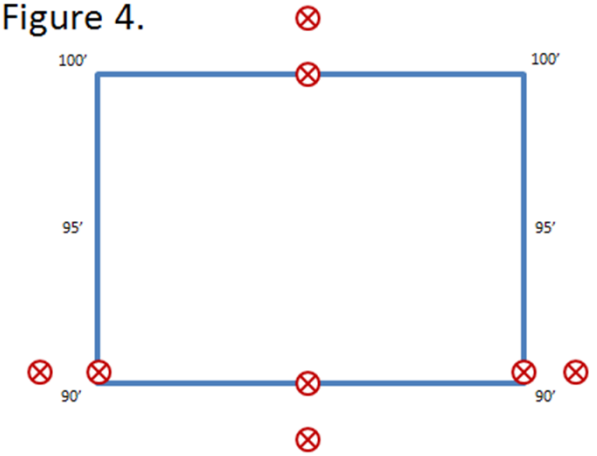
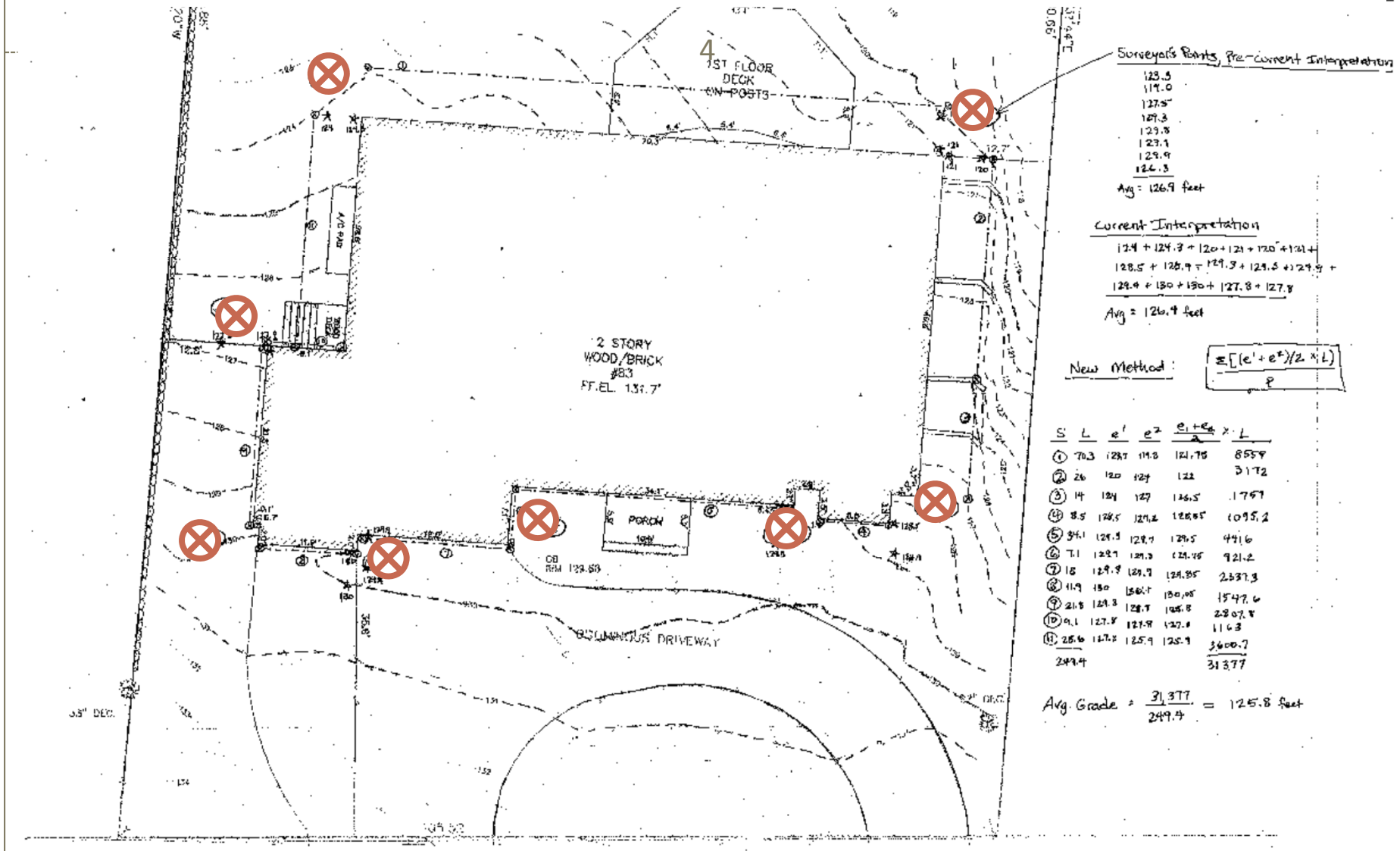


Figure 4.



- In December, ISD in consultation with the Law Department, issued a clarification of existing ordinance
- Current definition of Grade Plane:
  - Confusing and difficult to verify
  - When calculated correctly, can be too low
  - When manipulated, can be too high
  - Does not yield a true average grade

Specific Example of Grade Plane Problems



Proposal: Length-Weighted Mean Method

Length-weighted mean method:

- Divide each wall into segments of consistent grade or slope
- Determine average grade for each segment
- Weight each segment by multiplying the average grade by the length
  - (thus a wall that is 40 feet long would "count" four times as much as another wall that is only 10 feet long)
- Average together all segments together

Equation: $$\frac{\Sigma[(e1 + e2)/2 \times L]}{P}$$

Analysis: Merits and Comparisons

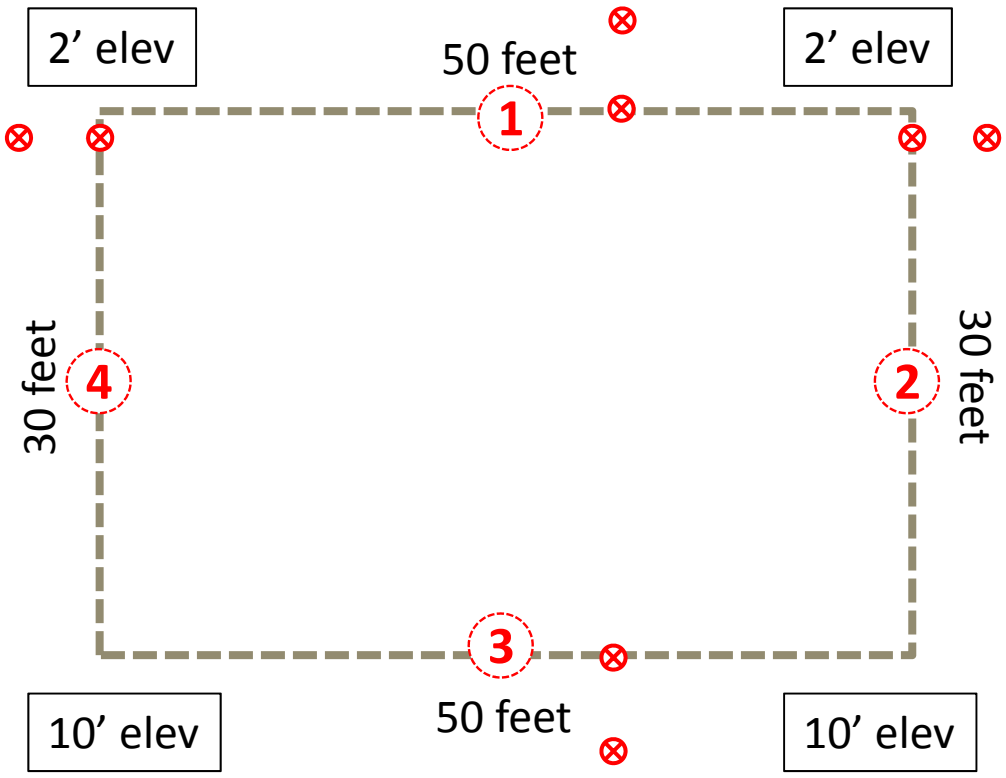
- Achieves a fairer and more representative average Grade Plane
- More accurate for buildings on lots with varying grades
  - E.g. homes with basement garages or sloping lots
- Comparisons with neighboring communities:
  - We looked at the ordinances of Sudbury, Weston, Brookline, Needham, Wellesley, Waltham and Watertown
  - Sudbury and Weston use the length-weighted mean approach and reported that the method is clear and consistent and reduces “gaming” of the system
  - The other communities use methods that have many of the same problems as Newton’s current definition

Analysis: Impacts

- We tested both the current method and the proposed method:
  - On a flat lot – both methods produced the same grade plane
  - For both sloping grade and garage-under examples – the proposed method yields truer averages of grade, which are slightly higher than those calculated under current definition

- New proposal:
  - More consistent and verifiable
  - More likely to produce a true average grade
  - More likely to result in a buried floor being counted as a basement

Example 1: Sloping Down



Length Weighted Mean Equation:

$$\frac{\Sigma[(e1 + e2)/2 \times L]}{P}$$

	L	e1	e2	$\frac{e1+e2}{2}$	x L
1	50	2.0	2.0	2.0	100
2	30	2.0	10.0	6.0	180
3	50	10.0	10.0	10.0	500
4	30	10.0	2.0	6.0	180
TOTAL	160				960

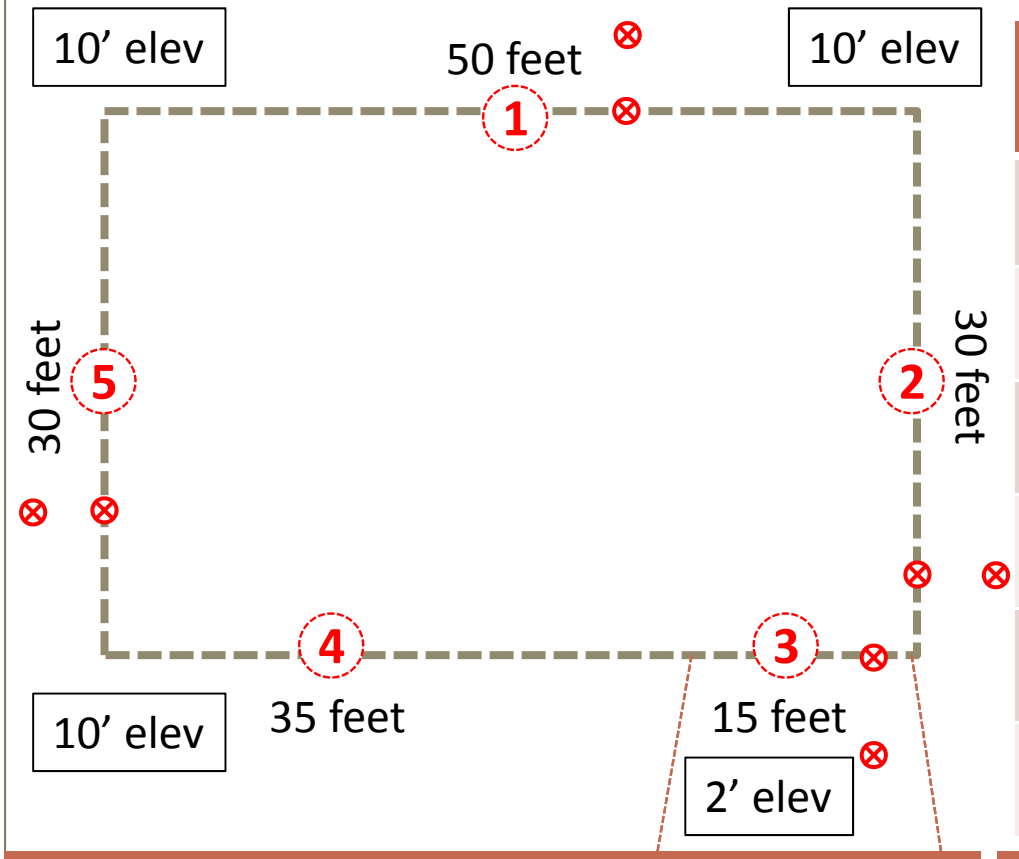
Average Grade under current method: $\frac{(10 + 2 + 2 + 2)*2}{8}$ = 4.0’

Average Grade under proposed method: $\frac{960}{160}$ = 6.0’

Example 2: Garage Under

Length Weighted Mean Equation:

$$\frac{\Sigma[(e1 + e2)/2 \times L]}{P}$$



	L	e1	e2	$\frac{e1+e2}{2}$	x L
1	50	10.0	10.0	10.0	500
2	30	10.0	10.0	10.0	300
3	15	2.0	2.0	2.0	30
4	35	10.0	10.0	10.0	350
5	30	10.0	10.0	10.0	300
Total	160				1480

Average Grade under current method: $\frac{(10 + 10 + 10 + 2)*2}{8}$ = 8.0’

Average Grade under proposed method: $\frac{1480}{160}$ = 9.2’

Proposed Language

- *"Grade Plane:* A horizontal reference plane for a building as a whole, passing through the elevation of the finished Average Grade around the perimeter of a building, from which building height is determined."

- *"Average Grade:* The average of the grade elevations around the perimeter of a building, as determined by the following length-weighted mean formula: the sum of [(e1+e2)/2 x L]/P, where S is a segment of the building perimeter with a consistent grade or slope; e1 and e2 are the grades at the respective ends of the segment; L is the corresponding length of the segment; and P is the length of the total building perimeter. In calculating said average, the elevation of each point used to define each segment shall be determined by using the lowest elevation of finished ground level with in the area immediately adjoining the building and either the lot line or a distance six (6) feet from the building, whichever is closer to the building, as illustrated in the diagrams below."

Recommended Changes to Proposed Language

- *Grade Plane:* A horizontal reference plane for a building as a whole, passing through the elevation of the finished Average Grade around the perimeter of a building, from which building height is determined."

- *Grade, Average:* The average of the grade elevations around the perimeter of a building, as determined by the length-weighted mean formula below. All walls of length greater than six feet shall be included in segments of consistent grade or slope.

$$\frac{\Sigma[(e1 + e2)/2 \times L]}{P}$$

Where:

- Σ sums the length-weighted means of all segments
- e1 and e2 are the elevations of the finished ground level at the respective ends of each segment, determined as the lowest point at each end of the segment within six feet of the foundation or the lot line, whichever is closer
- L is the corresponding horizontal length of the segment
- P is the total horizontal length of all segments

Summary

- Planning Department recommends changes to the definition of Grade Plane to ensure more consistent, verifiable measurement of true average grade, using language as revised by the Inspectional Services, Law, and Planning Departments

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Candace Havens
Director

M E M O R A N D U M

DATE: March 25, 2011

TO: Alderman Marcia T. Johnson, Chairman, and
Members of the Zoning and Planning Committee

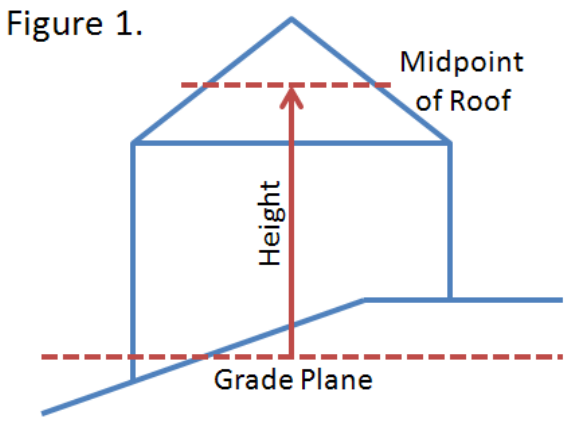
FROM: Candace Havens, Director of Planning and Development
Jennifer Molinsky, Interim Chief Planner for Long-Range Planning
Seth Zeren, Chief Zoning Code Official

RE: **Working Session**
Petition #17-11. Terrence P. Morris, Joseph Porter, Bruce Bradford, George Collins, Verne T. Porter, Jr., and Michael Peirce, proposing an amendment to the zoning ordinance for the purpose of changing the definition of "Grade Plane" and adding a new definition of "Average Grade."

On February 28, 2011, the petitioners presented a proposal, which relates to the definition and measurement of "grade plane." This memo presents the Planning Department's analysis of the proposal. The Department agrees that the current definition of grade plane can be improved with the changes proposed in petition #17-11, though we have recommendations about the specific language discussed in this memo. We further recommend that this petition be heard together with petition #65-11, proposing a change to the Zoning Ordinance's definition of "height," as the two items are closely related.

I. Current Grade Plane Definition

In the Zoning Ordinance, "grade plane" represents the average grade of a structure at ground level. It is a single number that is calculated from points surrounding a structure. It is important because the grade plane is the level from which maximum allowed height is measured. On a sloping lot, someone seeking to maximize height would want as high an average grade plane as possible from which to measure maximum allowable height (see Figures 1 and 2 below).



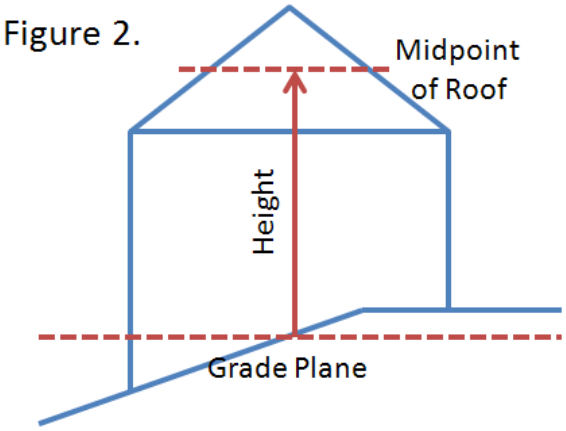


Figure 1 and Figure 2 show the effect of different Grade Plane calculations on the overall height of a building. Maximum allowed height is measured from the grade plane. A higher grade plane calculation leads to a taller building if built to allowable height.

Grade plane is also used in determining whether a story counts as a basement or a first story, of particular importance on sloping lots where large portions of basement walls may be above grade (such as walk-out basements). Whether or not a story counts as a basement is meaningful for FAR calculations (both under the current FAR system and the system coming into effect on October 15, 2011) and because the Zoning Ordinance excludes basements from the maximum allowed number of stories.

The current definition of grade plane in the Zoning Ordinance is as follows (with interpretation of this language in parentheses in bold):

> *"Grade Plane*: A reference plane for a building or structure as a whole **(that is, a plane that encircles the building or structure)** representing the average of finished ground level adjoining the building or structure at all exterior walls **(at least one measurement must be taken at each exterior wall)**. In calculating said reference plane, the elevation of each point used to calculate said average shall be determined by using the lowest elevation of finished ground level with in the area **(wall)** immediately adjoining the building or structure **(flush against the wall)** and either the lot line or a point six (6) feet **(perpendicular)** from the building or structure, whichever is closer to the building or structure, as illustrated in the diagrams below."

As a result, a measurement of a rectangular building with four exterior walls requires at least eight measurements: one flush against each wall at the lowest point (four total) and one six feet out from those four spots (for a total of eight) (see Figure 3 below).

Figure 3.

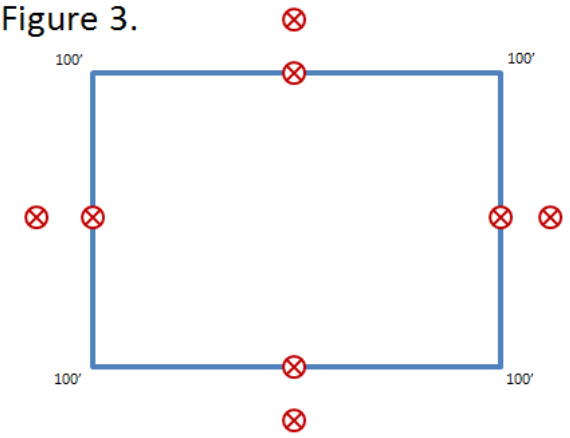
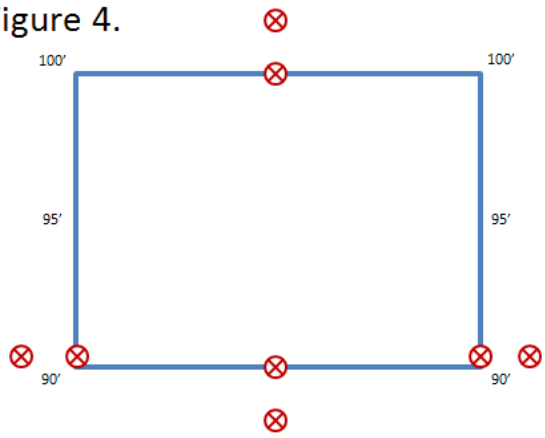


Figure 4.



According to the Inspectional Services Department (ISD), there are two related problems with the current definition of "grade plane" in the Zoning Ordinance:

1. **The calculation of grade plane, as defined in the current Zoning Ordinance, has been manipulated by those measuring it to produce a more desirable base from which to measure height.** Over the years, ISD has regularly received plans from engineers who have used a variety of interpretations of the Zoning Ordinance's definition of grade plane in their calculations. The measurements have been inconsistent and difficult to verify. To remedy this problem, ISD issued detailed guidance in December 2010, based on a close reading by ISD and the Law Department of the existing definition of "grade plane" to ensure a more standardized application of the grade plane definition.

2. **When the definition of grade plane is applied as directed by the existing definition, it may not produce an *average* grade**. Instead, it can produce a grade plane that is actually *lower* than the average grade around a property. Under the current definition, the grade plane calculation may not result in a true average grade on a sloping lot, because the measurements must be taken at the *lowest* elevation on a given side. A simplified example (see Figure 4 above) assumes that the property slopes evenly from 100' in the rear to 90' in the front. Under the current grade plane definition, the measurements would be taken at the lowest point of each wall (both against the wall and six feet out). Averaging these eight points produces a lower grade plane (92.5 feet) than the actual average (95 feet) of all the elevations.

II. Proposal

In order to improve the calculation of grade plane and ensure that it produces a true average, Petition #17-11 proposes replacing the current definition with a length-weighted average method similar to that used by the Town of Weston. The length-weighted mean approach first calculates the average grade for each wall segment (by averaging the two ends) and then weights each segment grade by the length of the segment (thus a wall that is 40 feet long would "count" four times as much as another wall that is only 10 feet long). All of these segment grades are then averaged together to produce the final average grade plane.

The petition proposes deleting the current definition of grade plane (shown above) and replacing it with the following:

"Grade Plane: A horizontal reference plane for a building as a whole, passing through the elevation of the finished Average Grade around the perimeter of a building, from which building height is determined."

"Average Grade: The average of the grade elevations around the perimeter of a building, as determined by the following length-weighted mean formula: the sum of [(e1+e2)/2 x L]/P, where S is a segment of the building perimeter with a consistent grade or slope; e1 and e2 are the grades at the respective ends of the segment; L is the corresponding length of the segment; and P is the length of the total building perimeter. In calculating said average, the elevation of each point used to define each segment shall be determined by using the lowest elevation of finished ground level with in the area immediately adjoining the building and either the lot line or a distance six (6) feet from the building, whichever is closer to the building, as illustrated in the diagrams below."

III. Analysis

The Planning Department's analysis involved the following:

- Examining the general merits and the specific language of the proposed method for calculating grade plane
- Researching how other communities calculate grade plane, including how the length-weighted mean approach has worked for those communities that use the method
- Considering the impact the change in method might have on building outcomes in Newton
- Examining the Zoning Ordinance as a whole to identify any potential unintended consequences

The Inspectional Services and Law Departments worked closely with the Planning Department in its analysis.

Proposed Method for Calculating Grade Plane

The proposed length-weighted mean method of calculating grade plane achieves a fairer and more representative average grade plane than the current method. By using wall segments in the calculation rather than requiring a single point on each side, it is possible to accurately calculate grade plane along walls with varying grades (as in the case of homes with basement garages or sloping lots).

Comparisons with other communities

The applicants stated in the presentation to the Committee on February 28th that they were drawing upon a practice used by Sudbury and Weston, MA. The Planning Department conducted phone interviews with the inspectors/zoning enforcement officers from both towns to better understand how the length-weighted mean approach has worked in their communities. Staff from both communities reported that the method works well; staff from Weston reported that the method is clear and consistent and reduces "gaming" of the system.

The Planning Department also studied the zoning ordinances of neighboring communities. Some municipalities (Needham and Wellesley) do not define a specific calculation for grade plane other than to indicate that it is the grade adjoining the building. Brookline, Watertown, and Waltham do define a calculation. Brookline's approach varies depending on the status of adjoining lots and the relative relationship to the street grade. Watertown requires that the grade be averaged from measurements along each wall (30 foot increments) and at each corner. Waltham requires measurements every 20 feet around the perimeter and limits "berming" near structures.

Impact of Proposed Method of Calculating Grade Plane

The Planning Department performed sample calculations using both the existing definition and the proposed approach on three hypothetical representative houses: a house on a flat lot, a house on a lot with a sloping grade from front to rear exposing a walk-out basement, and a house with a basement garage in the front on a largely flat lot.

The analysis found that, on a flat lot, the current and proposed calculations produced the same grade plane calculation. In both the sloping grade and the basement garage examples, the proposed calculation gave grade plane values one to two feet higher than the City's current calculation (see Attachment A). However, it should be noted that until December 2010, when ISD issued guidance on interpreting the current grade plane definition, grade plane calculations were often manipulated to produce higher grade planes from which to measure height. Therefore there may be little actual change in building height if the new proposal is adopted. (See Attachment A for an example of how the new grade plane would be calculated.)

ISD and the Planning Department concur that the general method of taking a weighted average of grades surrounding a property is better than the current method laid out in the Zoning Ordinance. It is less easily manipulated and more likely to produce a true average grade. In general the new method may allow for higher grade planes for buildings on sloping lots than the current definition, but as the resulting grade plane is actually an average grade plane, the Planning Department does not see this as a problem.

As noted earlier, grade plane also matters in calculating whether or not a story is considered a basement under the Zoning Ordinance. For one- and two-family residences, a story is a basement if one-half or more of the distance between the floor and ceiling of the floor above lies below the average grade plane; for all other buildings, the story must be two-thirds below the average grade to count as a basement. One possible result of changing the grade plane definition is that, for structures on sloping lots, it could be slightly easier for a story to count as a basement rather than a first story, because the average grade plane would likely be slightly higher than it would be if calculated under the current definition.

Suggested Changes to Proposed Method of Calculating Grade Plane

The Planning Department recommends some revisions to clarify the proposed language, as set out below:

> *Grade Plane:* A horizontal reference plane for a building as a whole, passing through the elevation of the finished Average Grade around the perimeter of a building, from which building height is determined."
>
> *Grade, Average:* The average of the grade elevations around the perimeter of a building, as determined by the length-weighted mean formula below. All walls of length greater than six feet shall be included in segments of consistent grade or slope.
>
> $$\frac{\Sigma[(e1 + e2)/2 \times L]}{P}$$
>
> Where:
> - Σ sums all segments
> - e1 and e2 are the elevations of the finished ground level at the respective ends of each segment, determined as the lowest point at each end of the segment within six feet of the foundation or the lot line, whichever is closer
> - L is the corresponding horizontal length of the segment
> - P is the total horizontal length of all segments

This revised language builds off of the language of the petition (which itself is derived from the Weston, MA zoning by-law) and adapts it for Newton. In particular, Newton's existing approach of measuring, either at the wall or the lowest point within six feet of the wall, is preserved as a tool to prevent "creative" berming around houses being used to inflate the grade plane and, thus, allowed height. The title of the definition has been adjusted so that it will be located next to the other grade-related definitions in the Ordinance. ISD suggests that several diagrams, similar to the ones already present in the ordinance, would be included with the definition in the Zoning Ordinance to make clear how the definition should be applied.

Conformity with the Ordinance

As indicated above, the proposed definition change significantly connects to definition of "height" and "basement." The Planning Department examined the ordinance for other potential consequences from the proposed change and found none.

IV. Recommendations

The Planning and Inspectional Services Departments recommend the adoption of the definition as revised in this memorandum. This new length-weighted mean approach has been proven to be effective in other cities and towns. The new approach makes calculations of grade plane more certain, more fair, and less prone to "gaming." Planning and ISD also encourage the Committee to consider petition #65-11 concerning revision of the "height" definition alongside petition #17-11 as both would work together to significantly affect the measurement and regulation of building height in Newton.

#417-11

DRAFT

11 MAR -1 P 1:21

CITY CLERK
NEWTON, MA. 02159

CITY OF NEWTON

IN BOARD OF ALDERMEN

PROPOSED ORDINANCE NO. ____

BE IT ORDAINED BY THE BOARD OF ALDERMEN OF THE CITY OF NEWTON AS FOLLOWS:

That the Revised Ordinances of Newton, Massachusetts, 2009, as amended, be and are hereby further amended with respect to Chapter 30, Zoning, as follows:

1. By deleting from Section 30-1 **Definitions**, the definition of *Grade Plane*, and inserting in its place the following language:

   Grade Plane: A horizontal reference plane for a building as a whole, passing through the elevation of the finished Average Grade around the perimeter of a building, from which building height is determined.

2. By adding to Section 30-1 **Definitions**, the following new definition:

   Average Grade: The average of the grade elevations around the perimeter of a building, as determined by the following length-weighted mean formula: the sum of [(e1 + e2) /2 x L] /P, where S is a segment of the building perimeter with a consistent grade or slope; e1 and e2 are the grades at the respective ends of the segment; L is the corresponding length of the segment; and P is the length of the total building perimeter. In calculating said average, the elevation of each point used to define each segment shall be determined by using the lowest elevation of finished ground level within the area immediately adjoining the building and either the lot line or a distance six (6) feet from the building, whichever is closer to the building, as illustrated in the diagrams below.

Approved as to legal form and character:

_____

City Solicitor

GRADE PLANE CALCULATION WORKSHEET

Sample

A	B	C	D	E	F
Segment	Length of Segment (feet)	Height of High Point of Segment	Height of Low Point of Segment	E=(C+D)/2 Average Segment Height	F=BxE
1	42.10	103.75	103.75	103.75	4367.875
2	16.80	103.90	103.85	103.88	1745.10
3	6.60	101.50	101.30	101.40	669.24
4	7.00	101.50	101.40	101.45	710.15
5	28.10	99.04	99.04	99.04	2783.02
6	7.00	101.50	101.40	101.45	710.15
7	6.60	101.50	101.30	101.40	669.24
8	16.80	103.90	103.90	103.90	1745.52
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
Total	131.00 Lin Ft of Bldg				13400.30

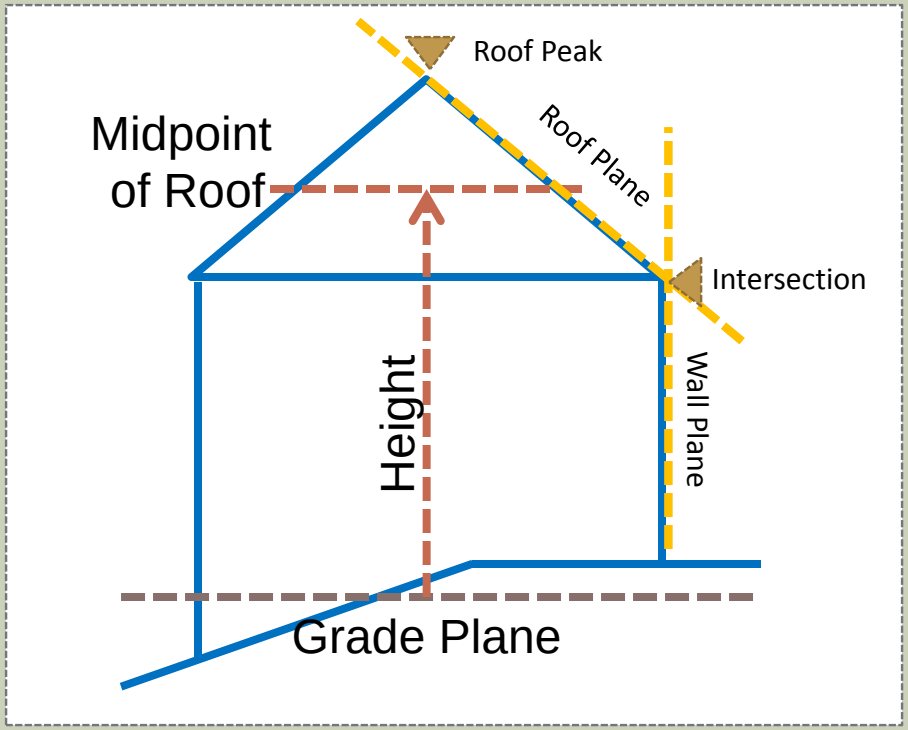
Total Col. F / Total Col. B = Height 102.29

Department of Planning and Development

Revisions to Height Definition

Petition #65-11. Terrence P. Morris and Joseph Porter proposing an amendment to the zoning ordinance to change the definition of "height" with a concomitant increase in the height to the pre-1997 limits; to make height exceptions in accessory buildings subject to special permit rather than a variance."

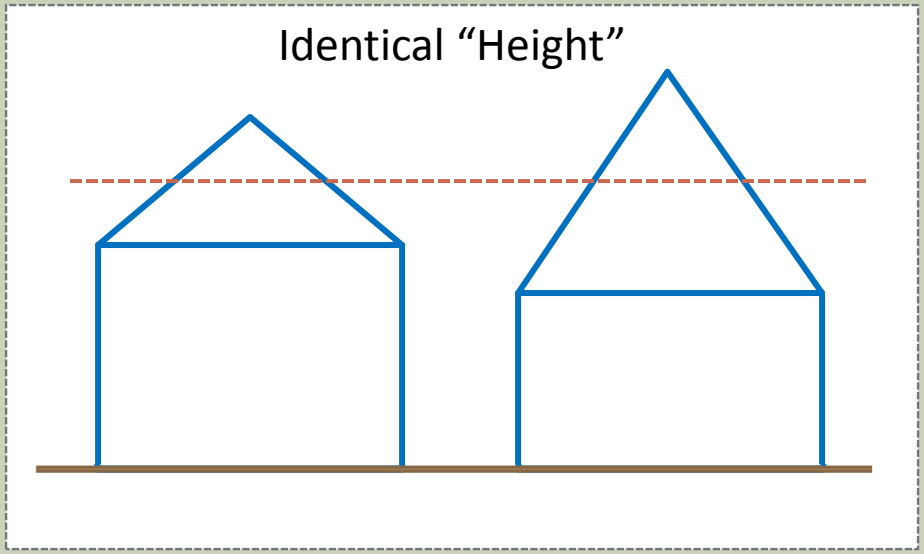
Height Definition



- Method for calculating height is provided in definition of “height”
- Height is measured from the Grade Plane to the midpoint between the roof peak and the intersection of the wall and roof planes
- Change would affect all structures in the City, including accessory structures

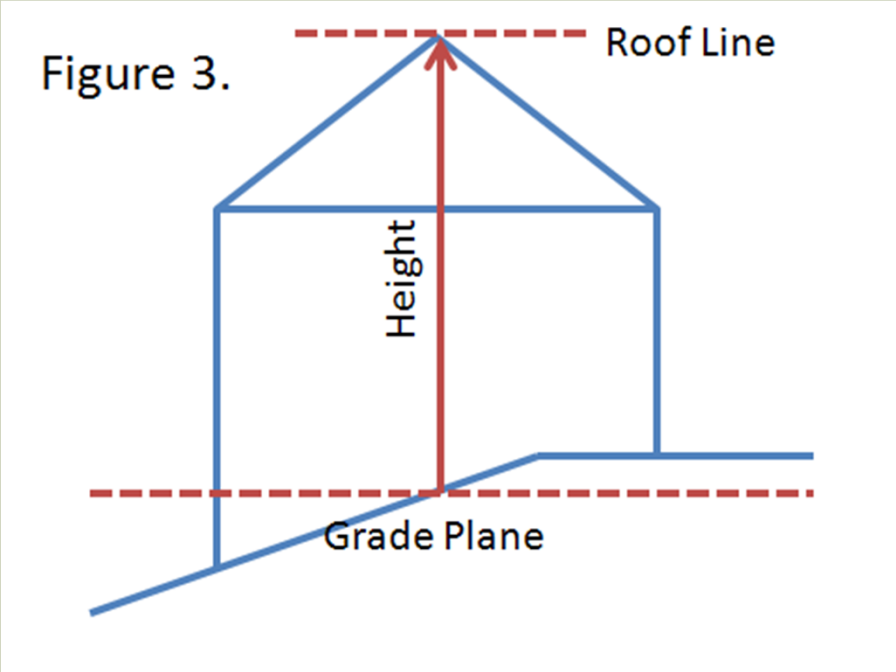
Summary of Problems With Current Definition

- Can be manipulated to increase peak height
- Term “wall plate” likely a scrivener’s error; intended term was “wall plane”
  - Term contributes to confusion and allows manipulation of definition
- Does not actually regulate the absolute height of a structure
  - The peak height of a conforming structure can vary considerably depending on the shape of the roof
  - Buildings with steeply pitched roofs may have a taller peak height than those with flatter roofs



Proposal: In Three Parts

Petition #65-11 proposes three separate revisions to the zoning ordinance:



I. Change the definition of height in Section 30-1 to measure from Grade Plan to “peak of the roof line”

II. Change the height limits of 30 feet in Section 30-15, Density/ Dimensional Regulations - Table 1 to the pre-1997 limit of 36 feet

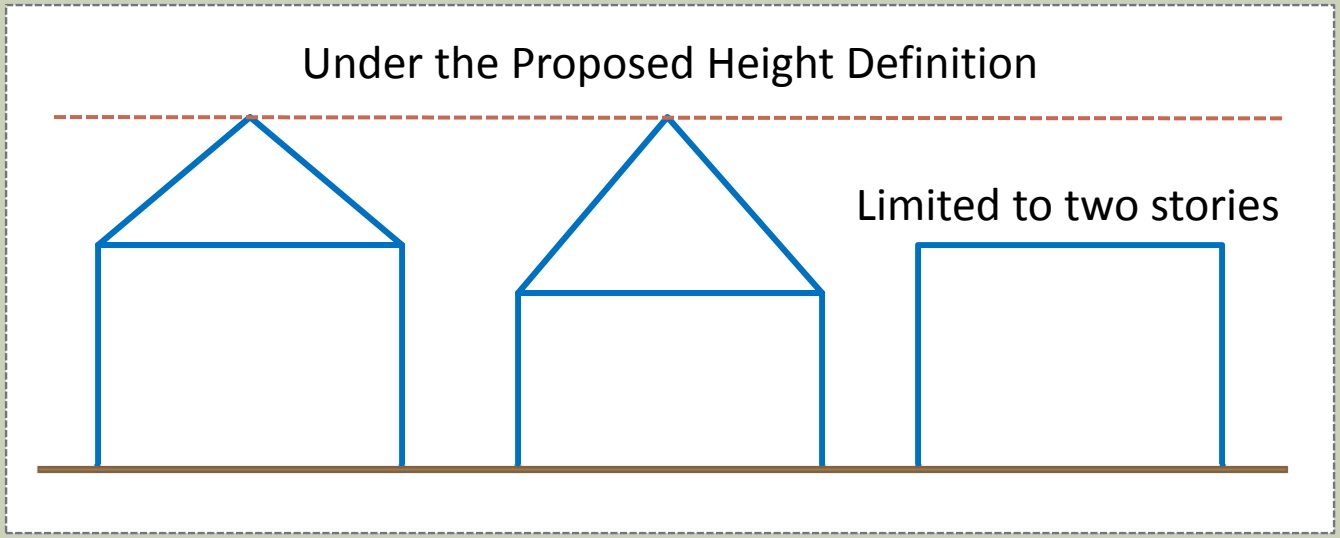
III. Allow height limits for accessory structures to be waived by special permit rather than by variance

Proposed Revised Definition

- *"Height*: The vertical distance between the elevations of the following: (a) the average grade plane and (b) ~~the midpoint between the highest point of the ridge of the main building roof and the line formed by the intersection of the top of the main building wall plate and the main roof plane~~ *the peak of the roof line*. Not included in such measurements are 1) cornices which do not extend more than five (5) feet above the roof line; 2) chimneys, vents, ventilators and enclosures for machinery of elevators which do not exceed fifteen (15) feet in height above the roof line; 3) enclosures for tanks which do not exceed twenty (20) feet in height above the roof line and do not exceed in aggregate area ten (10) per cent of the area of the roof; and 4) towers, spires, domes and ornamental features."

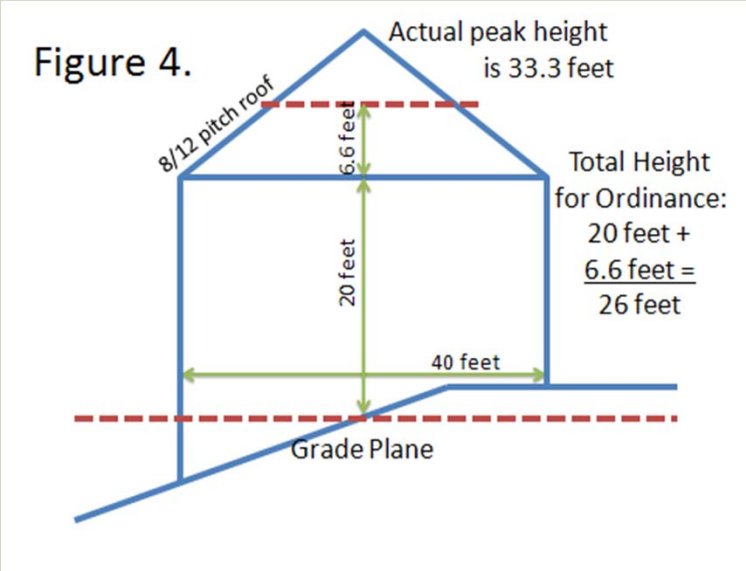
Analysis: Height Definition

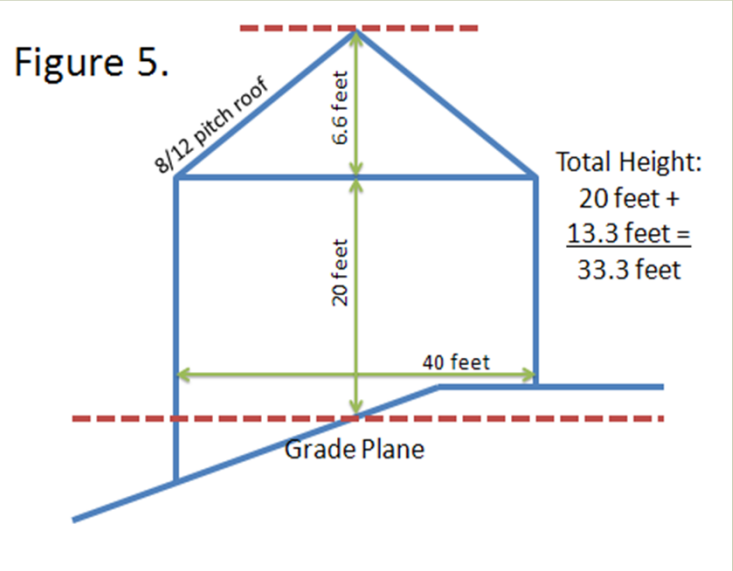
- The majority of surrounding communities clearly define height as measured to the “highest roofline” or similar
- The proposed definition change would apply to all properties
  - Half stories above the second story may only be built under a sloping roof
  - In practice, flat-roofed commercial structures are not affected



Analysis: Height Limit

- Height limit changes would only apply to SR and MR zones
- The most neighboring communities allow 35 feet of building height for residential structures – in a few cases as much as 45 feet
- Combined with the above redefinition of height, a return to a height limit of 36 feet would have limited impact on new construction or existing homes





Analysis: Height Limit, Accessory Structures

- A change to the height definition would affect accessory structures as well
- Accessory structures are currently limited by Section 30-15(m) to a maximum height of 18 feet
- As for primary structures, change in definition suggests increase in limit:
  - ISD and Planning reviewed likely and appropriate garage configurations
  - Recommend 22 feet as an appropriate new height limit for accessory structures
  - An increase of four feet; less than the proposed six foot increase for primary structures as accessory structures are smaller and require significantly less total height
  - A 22 foot limit would allow a 24 x 24 foot garage a 12:12 pitch roof

Analysis: Accessory Structure Relief

- Petition proposes allowing relief from height limit for accessory buildings by special permit rather than variance
- Staff research revealed no precedent in surrounding communities
- Currently **no** structures have access to special permit relief to build above the height limit (or any other density or dimensional standard)
  - Except residential FAR, which may exceed limit by special permit
- The Planning Department, ISD, and the Law Department see no adequate rationale for making the height of accessory structures an exception from the rule

Analysis: Consistency with the Ordinance

Reviewed Zoning Ordinance:

- In addition to the "height" definition, there is a definition of "height, contextual" which is used only by the Planned Mixed-Use Business Development (PMBD) section of the Zoning Ordinance
  - The "height, contextual" definition also uses the "midpoint" approach to measuring height
  - The committee may want to consider revising this definition to match the proposed new definition of height
- In addition to the height limits in Section 30-15, Table 1, the limits in Table 4 for rear lots should also be revised
- Some setback requirements in Section 30-15, Table 1 and Table 2 are derived from building height
  - The change in height calculation is unlikely to significantly affect such properties

Summary

- The Planning and Inspectional Services Departments recommend the adoption of the revised definition and height limits as presented in this memorandum
  - Revised definition provides a specific, clear, verifiable benchmark for measuring height
  - Revised height regulations for SR and MR zones respond to changed height measurement method to preserve consistent outcomes
- The Planning and Inspectional Services Departments recommend against changing the allowed relief for accessory structures
  - No adequate rationale for special treatment

Setti D. Warren
Mayor

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Candace Havens
Director

M E M O R A N D U M

DATE: March 25, 2011

TO: Alderman Marcia T. Johnson, Chairman, and
Members of the Zoning and Planning Committee

FROM: Candace Havens, Director of Planning and Development
Jennifer Molinsky, Interim Chief Planner for Long-Range Planning
Seth Zeren, Chief Zoning Code Official

RE: **Working Session**
Petition #65-11. Terrence P. Morris and Joseph Porter proposing an amendment to the zoning ordinance to change the definition of "height" with a concomitant increase in the height to the pre-1997 limits; to make height exceptions in accessory buildings subject to special permit rather than a variance.

On February 28, 2011, the Committee heard from the petitioners of item #17-11, which relates to the definition and measurement of "grade plane." Grade plane defines baseline from which the height of a building is measured. During the discussion of potential revisions to the grade plane definition, the overall topic of building height was raised. In response, a second petition, #65-11 was docketed to consider revisions to the definition of height in the zoning ordinance. The proposed changes primarily impact the regulation of height of structures and accessory structures in Residence zones.

History of Height Regulations and Definitions

In 1997, Ordinance V-111 revised the definition of height to measure height to the "highest roof surface" and lowered the allowed height to 30 feet (from 36 feet) to lower development potential and protect existing structures. In 1999, Ordinance V-232, changed the definition of height to its current definition of the midpoint between the peak and the intersection of the roof and wall planes with the intent of encouraging pitched-roof designs.

I. Current Height Definition

The definition of height in Section 30-1 of the Zoning Ordinance lays out the method for calculating building height, which is regulated in Section 30-15, Density/Dimensional Controls. Under the current definition, height is calculated as the distance between the "average grade plane" and the midpoint between the roof peak and the intersection of the roof and the wall plate (see Figure 1 and Figure 2).

Figure 1.

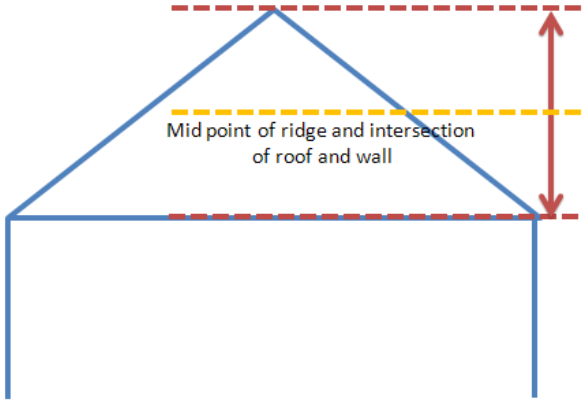


Figure 2.

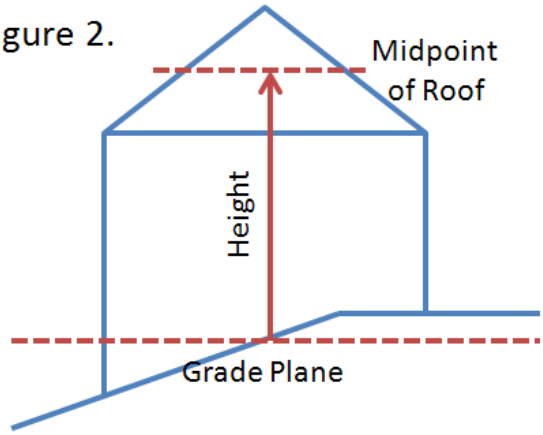


Figure 1 and Figure 2 show how building height is measured. Figure 1 shows how the midpoint between the roof peak and the intersection of the roof and wall is calculated. Figure 2 shows how the midpoint and the grade plane together describe the height of a building.

According to the Inspectional Services Department (ISD), there are several issues with the current definition of "height" in the Zoning Ordinance:

1. **The current method of measuring building height, as defined in the Zoning Ordinance, is confusing and can be manipulated by those measuring it to increase peak height.** The term of art, "wall plate," used in the definition is actually a construction feature. ISD believes that this language was a scrivener's error and that the intended language was "wall plane," describing the geometry of the wall and the intersection of two planes (the roof and the wall). By lowering the point where roof and wall "intersect," the peak height can be increased while keeping the midpoint at the same required height.

2. **The current method does not actually regulate the absolute height of a structure.** The peak height of a conforming structure can vary considerably depending on the shape of the roof. Because the midpoint of the roof is higher on structures with steeply pitched roofs, buildings with steeply pitched roofs may be taller than those with flatter roofs.

The current definition of grade plane in the Zoning Ordinance is as follows:

> *"Height*: The vertical distance between the elevations of the following: (a) the average grade plane and (b) the midpoint between the highest point of the ridge of the main building roof and the line formed by the intersection of the top of the main building wall plate and the main roof plane. Not included in such measurements are 1) cornices which do not extend more than five (5) feet above the roof line; 2) chimneys, vents, ventilators and enclosures for machinery of elevators which do not exceed fifteen (15) feet in height above the roof line; 3) enclosures for tanks which

do not exceed twenty (20) feet in height above the roof line and do not exceed in aggregate area ten (10) per cent of the area of the roof; and 4) towers, spires, domes and ornamental features."

II. Proposal

Petition #65-11 proposes three separate revisions to the zoning ordinance. First, the petition calls for changing the definition of height in Section 30-1 of the Zoning Ordinance so that height is measured to the roof peak. Second, it calls for a commensurate increase in the allowed heights in Section 30-15, Density/Dimensional Requirements to account for the increase in height measured. Third, the petition calls for a change in how relief is provided from height requirements in accessory structures.

1. **Redefine Height.** ISD and the Planning Department suggest the following revised definition of "height:"

   "Height: The vertical distance between the elevations of the following: (a) the average grade plane and (b) the peak of the roof line. Not included in such measurements are 1) cornices which do not extend more than five (5) feet above the roof line; 2) chimneys, vents, ventilators and enclosures for machinery of elevators which do not exceed fifteen (15) feet in height above the roof line; 3) enclosures for tanks which do not exceed twenty (20) feet in height above the roof line and do not exceed in aggregate area ten (10) per cent of the area of the roof; and 4) towers, spires, domes and ornamental features."

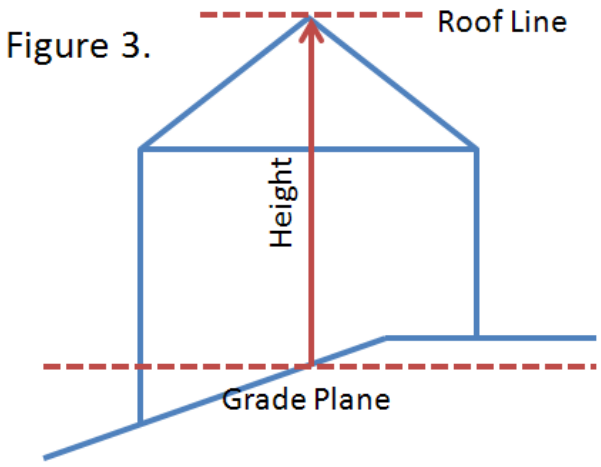


Figure 3 shows how height would be calculated under the proposed revision to the definition.

2. **Increase height limit.** The petition suggests an increase in the height limit to the pre-1997 limit of 36 feet.

3. **Allow height limits for accessory structures to be waived by special permit.** An addition to Section 30-15(m)(2) is required that allows the maximum height requirement to be waived by special permit from the Board of Aldermen. Without such a clause, the default relief for height beyond that allowed would be through a variance from the Zoning Board of Appeals.

III. Analysis

The Planning Department's analysis involved the following:

- Examining the general merits of a revision in the definition and regulation of height
- Researching how other communities measure and regulate residential height
- Considering the impact the change in method might have on building outcomes in Newton
- Examining the Zoning Ordinance as a whole to identify any potential unintended consequences

The Inspectional Services and Law Departments worked closely with the Planning Department in its analysis.

Overview

Our analysis takes each of the three potential changes individually. ISD and the Planning Department agree that measuring height to the roof peak rather than the roof midpoint represents a significant improvement over the current definition. Based on Newton's own ordinance history and our research of other communities' ordinances, ISD and the Planning Department also feel confident that the proposed height limit of 36 feet in residential areas is appropriate. However, ISD and the Planning Department feel strongly that the third part of the petition does not materially improve the regulation of height in Newton and originates from a particular project seeking extraordinary relief from zoning requirements through an ordinance change.

1. Redefinition of height

Comparisons with other communities

We examined the definitions of height in the surrounding communities of Brookline, Needham, Sudbury Waltham, Watertown, Wellesley, and Weston. No community defines height as Newton currently does. The majority clearly define that height is measured to the "highest roofline" or similar.

Impact of proposed change

The proposed changes would mainly affect residential properties; most new commercial properties are flat-roofed. The current definition favors sloping roofs by allowing them higher total peak heights. The proposed change eliminates this preference. However, the Planning Department does not expect significantly different roof designs in response to a change in the height measure. Other elements of the Zoning Ordinance help to ensure a sloping roof on residential properties. For example, the "half story" requirement, which limits the area on the third story, requires a sloping roof.

Suggested changes

The Planning Department recommends the proposed definition above. The committee may also want to consider renaming the definition "height, building" as "height" is used frequently throughout the Ordinance for other issues, such as retaining walls, fences, wireless communications equipment and so forth.

2. Increase in height limit

Comparisons with other communities

We examined the definitions of regulation of height for residential areas in the surrounding communities of Brookline, Needham, Sudbury Waltham, Watertown, Wellesley, and Weston. The majority of communities allowed 35 feet of building height for residential structures, and in a few cases as much as 45 feet.

Impact of proposed change

Combined with the above redefinition of height, a return to a height limit of 36 feet would have limited impact on new construction or existing homes. It is possible that some currently conforming structures would be made nonconforming, particularly structures that have already maximized height and have a steeply pitching roof (see Figure 4 and Figure 5 below).

Figure 4.

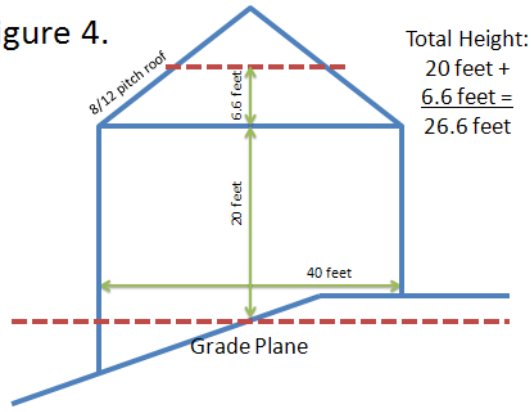
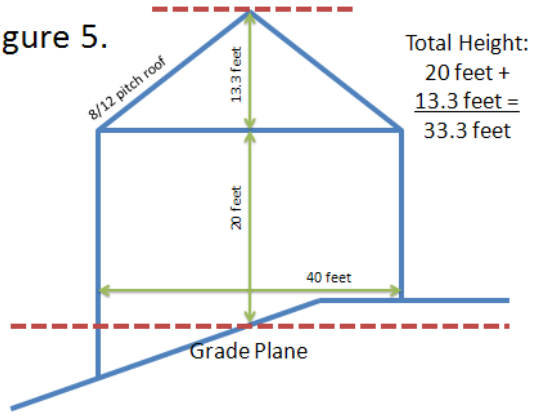


Figure 5.



Figures 4 and 5 compare how "height" would change for the same structure from the current definition (Figure 4) to the proposed definition (Figure 5). In both cases the structure is conforming. If the first two floors were 3.4 feet taller, creating a total height of 30 feet under the current rule, then the structure would be nonconforming under the new rule with a total height of 36.7 feet.

Being nonconforming is not entirely a burden; while it can lead to a special permit requirement where expansions would increase the degree of nonconformity, it also allows structures to attain relief for exceeding zoning requirements through a special permit (under Section 30-21) rather than pursue a much more difficult variance. Furthermore, no special relief would be required for a house that is nonconforming with regard to height that desired other by-right additions or renovations.

Suggested changes

The Planning Department suggests that a revised height limit of 36 feet be inserted into the Density and Dimensional Controls Tables in Section 30-15, returning the requirement to the pre-1997 level.

In examining the ordinance for consistency and clarity, it should be noted that the redefinition in #1 above would affect the measurement of height for accessory structures as well. Currently the accessory structure height limit is 18 feet. To match the proposed change in the method of measuring building height, the Planning Department and ISD suggest increasing the maximum height of accessory structures by four feet to a maximum of 22 feet. This height increase would allow a 12:12 pitch roof over a regularly sized two-car garage (24 feet x 24 feet).

3. Change in relief for height restrictions of accessory structures

The third proposed change in Petition #65-11 is to allow the waiving of the height requirement for accessory structures by special permit rather than by variance. The Planning Department, ISD, and the Law Department concur that there is no adequate reason for this change.

Our research of neighboring municipalities revealed no precedent in surrounding communities for such a change. In the Newton Zoning Ordinance, it is the case that in Residential districts, exceeding *any* dimensional or density requirement without prior legal nonconformity requires a variance, except where specifically noted (e.g., residential FAR). We see no adequate rationale for making the height of accessory structures an exception from the rule.

4. Consistency with Ordinance

The following definition of "height, contextual," a part of the Planned Mixed-Use Business Development (PMBD) section of the Zoning Ordinance, uses a similar approach to calculating height to that of the "height" definition. The Committee may want to consider revising this definition to match the new definition of height proposed above.

> Existing:
> *"Height, Contextual:* The vertical distance between the elevations of the following: (a) the Newton Base Elevation utilized by the city as implemented by the engineering division of the department of public works and (b) the mid-point between the highest point of the ridge of the roof and the line formed by the intersection of the wall plane and the roof plane. Not included in such measurements are 1) cornices which do not extend more than five (5) feet above the roof line; 2) chimneys, vents, ventilators and enclosures for machinery of elevators which do not exceed fifteen (15) feet in height above the roof line; 3) enclosures for tanks which do not exceed twenty (20) feet in height above the roof line and do not exceed in aggregate area ten (10) per cent of the area of the roof; and 4) towers, spires, domes and other ornamental features."
>
> Proposed:
> *"Height, Contextual:* The vertical distance between the elevations of the following: (a) the Newton Base Elevation utilized by the city as implemented by the engineering division of the department of public works and (b) the peak of the roof line. …"

IV. Recommendations

The Planning Department and ISD recommend the adoption of the revised definition and height limit as proposed in this memorandum, and consider amending the PMBD's definition of "height, contextual." The Planning Department and ISD recommend that the Committee reject part three of the petition.

11 MAR -1 P 1:27

CITY CLERK
NEWTON, MA. 02159

DRAFT
#65-11

CITY OF NEWTON

IN BOARD OF ALDERMEN

PROPOSED ORDINANCE NO. ____

BE IT ORDAINED BY THE BOARD OF ALDERMEN OF THE CITY OF NEWTON AS FOLLOWS:

That the Revised Ordinances of Newton, Massachusetts, 2009, as amended, be and are hereby further amended with respect to Chapter 30, Zoning, as follows:

1. By deleting from Section 30-1 **Definitions**, the first sentence of the definition of *Height*, and inserting in its place the following language:

   Height: The vertical distance between the elevations of the Average Grade and the highest point of the ridge on the main building roof.

2. By deleting the number "30" as it now appears under the column headed "BUILDING HEIGHT" in section 30-15 Table 1 and inserting in its place the number "36".

3. By deleting the number "36" as it now appears under the column headed "BUILDING HEIGHT" in section 30-15 Table 1 and inserting in place thereof the number "42".

4. In section 30-15(m)(2), by deleting the words "eighteen (18) feet." at the end of the first sentence and the words, "No space above this maximum height shall be habitable" beginning the second sentence and inserting in place thereof the following language: "twenty-four (24) feet and no space above the first story shall".

Approved as to legal form and character:

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City Solicitor