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OFFICE OF THE CITY CLERK  
CAMBRIDGE, MASSACHUSETTS

## **Pitched Roofs Zoning Petition**

### **Introduction**

The yard setback formula that applies to numerous districts in the Cambridge Zoning Ordinance does not explicitly contemplate pitched roofs and other sloped planes. Since the Ordinance only mentions vertical planes, the Inspectional Services Department – acting conservatively – has treated sloped planes as if they were vertical planes and, thus, pitched roof houses as if they were box-shaped houses in the setback calculations.

Developers have thus been effectively incentivized to build box-shaped houses in C, C-1, and other residential districts, as residents of Cambridgeport, Riverside, and other neighborhoods will attest. Box-shaped houses are not always desirable, as these neighborhoods have many pitched roof houses that afford far more sunshine and sky exposure to neighbors (see Illustration 1). The access to light and air is especially important in the dense neighborhoods in which the yard setback formulas are used. Box-shaped houses may sometimes be appropriate, but there is no reason to disincentivize the construction of pitched roof houses.

Given this lack of clarity in the Code, one can claim that pitched roof houses are nonconforming by treating sloped roofs as an extension of the vertical wall below – and then seek a special permit under Article 8 to convert those pitched roofs into actual vertical walls. This dramatic change in building mass occurs at the expense of light and air for neighbors, most of whom do not have the ability to hire architects to understand or challenge the manipulation of these complicated formulas in the Ordinance.

The current zoning also treats upper story height and first story length the same in determining setbacks, even though upper story massing clearly has a greater impact on direct and indirect sunshine, especially for neighboring backyards.

This petition proposes a simple zoning amendment to recognize the existence of pitched roofs and other sloped planes and treat them in a manner consistent with the intent and purpose of the Ordinance. It also increases the setback requirement for upper stories at the rear of large one- and two-family buildings exceeding 50' in length, encouraging sloped roofs in the rear while preserving the ability to have multiple planes with any geometry facing any given lot or street line. This change reflects the existing housing stock and traditional architecture of the city and allows flexibility for architecturally interesting designs, including curved bays, turrets, and other non-vertical features.

The petition achieves these positive outcomes without any reduction of floor area ratios.

### **Statement of Facts**

Whereas: The Ordinance does not give explicit guidance as to how sloped planes should be treated in the yard formula.

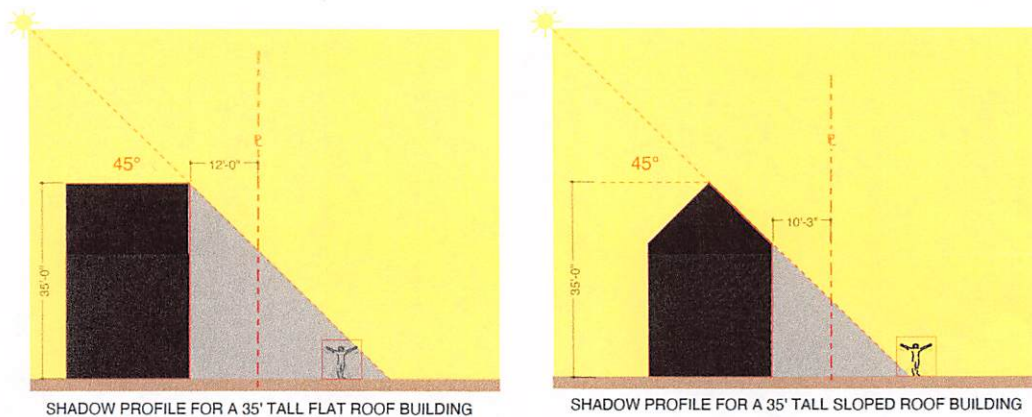
Whereas: The Ordinance stipulates that owners of buildings “may” use “average height” rather than peak height to calculate the setback requirement for buildings with varying roof heights. This has the unintended consequence of allowing owners to choose the setback calculation method that maximizes the setback requirement in order to claim nonconformity. An established nonconformity allows owners to then apply for a special permit to then create that very nonconformity.

Whereas: By treating sloped roofs and vertical walls the same, the Code penalizes the construction of pitched roof houses and incentivizes the construction of boxed-shaped houses. While the latter may sometimes be appropriate, there is no reason to incentivize them, as pitched roofs afford greater light and air for neighboring houses. The treatment of sloped roofs as vertical walls at the eave also creates nonconformity where none actually exists.

Whereas: The Code treats upper story height and first story length the same in determining setbacks, even though upper story massing clearly has a greater impact on direct and indirect sunshine, especially for neighboring backyards. Requiring a pitched setback line near the rear setback would preserve access to sunshine, air, and sky views from backyards without impinging on floor area ratios. Under the current yard formula in 5.24.4, homeowners and developers can compensate for that setback by making minor shifts along other planes that are less obstructive with respect to light, air, and sky views.

Whereas: With the minor change proposed in the petition, the calculation of the setback volume between the sloped plane and the lot or street line will be based on the actual physical location of that sloped plane (see Illustration 2).

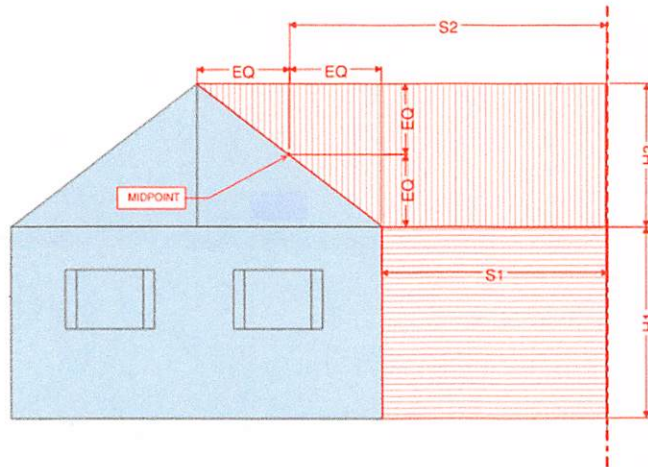
### Illustration 1



Setback calculations for each house in the illustration based on application of the yard setback formula under 5.24.4 as herein amended assuming equivalent building heights of 35' and lengths (not shown) of 49' for each house.

## Illustration 2

The volume between the building and the lot line is shown in red below in two dimensions; one would multiply that by the length of the building. This method calculates the volume between the sloped roof and the lot line as follows:  $(H_2 \times S_2)$  and then multiplies that by the length of the plane. That is because, geometrically, the two vertical EQs are equal to each other at the midpoint of any sloped plane.



Sloped Plane Setback Diagram

Following is the current language of Article 5.24.4

5.24.4 Measurements for minimum yards which are determined by formula shall be made in the following manner:

- (1) "H" is the height of the building, "L" is the length of the wall measured parallel to the corresponding lot or street line. The front yard is measured from the street line, or building line where such has been established, except where otherwise indicated herein. For buildings of forty (40) feet or less in height the denominator in the yard formulas in the Tables in [Section 5.30](#) may be increased by two subject to the minimum yard requirements set forth in footnotes a, b and c of Tables 5-1 and 5-2.
- (2) Where a building consists of various roof levels an average height, or "H", may be used in the required yard formula. Average height is determined by adding the products of the height of each roof level facing the given lot line, (H1, H2, etc.) times the length of each roof level (L1, L2, etc.) and dividing the sum by the sum of the length of the levels (L1, L2, etc.) (see formula below)

$$\text{AVERAGE HEIGHT} = \frac{(H_1 \times L_1) + (H_2 \times L_2)}{L_1 + L_2}$$

- (3) Where a building presents a variety of vertical planes to any given lot or street line, no plane shall be closer to the street or building line or lot line than permitted by the application to such plane of the appropriate formula in the tables of dimensional requirements in [Section 5.30](#). For all planes set forward of the setback line required by said tables for the building if it were constructed in a single vertical plane, other planes must be set behind the setback line so calculated. The result shall be that the sum of the products of the setback required for each plane times the facing area of each plane respectively shall be at least as great as the product of the setback required by the appropriate table for the building if it were constructed in a single vertical plane times the facing area of the building if viewed as a single plane. (see illustration below):  
The product of (setback1 x facing area1) + (setback2 x facing area2) MUST EQUAL OR EXCEED the product of (single plane setback) x (single plane facing area)

**NOW THEREFORE:** We the undersigned respectfully petition the honorable City Council of Cambridge to amend section 5.24.4 of the Cambridge Zoning Ordinance as follows, referring the following amended language shown in blue to the Planning Board and Ordinance Committee for hearing and report:

**5.24.4** Measurements for minimum yards which are determined by formula shall be made in the following manner:

(1) "H" is the height of the building. "L" is the length of the wall measured parallel to the corresponding lot or street line. The front yard is measured from the centerline of the street except where otherwise indicated herein. For buildings of forty (40) feet or less in height the denominator in the yard formulas in the Tables in Section 5.30 shall be increased by two, subject to the minimum yard requirements set forth in footnotes a, b and c of Tables 5-1 and 5-2.

(2) Where a building consists of various roof levels an average height, or "H", shall be used in the required yard formula. Average height is determined by calculating the total area of all building planes facing the given lot line and dividing that area by the total length of the building facing said lot line. Average height "H" and total length "L" shall be used to determine the Single Plane and Single Plane Setback required in items (3) and (4).

~~AVERAGE HEIGHT =  $\frac{(H_1 \times L_1) + (H_2 \times L_2)}{L_1 + L_2}$~~

(3) Where a building presents a variety of vertical, sloped, and other planes facing any given lot or street line, no plane shall be closer to the street line or lot line than permitted by the application to such plane of the appropriate formula in the tables of dimensional requirements in Section 5.30. For all planes set forward of the Single Plane Setback line required by said tables for the building if it were constructed as a Single Plane, other planes must be set behind the setback line so calculated. The result shall be that the volume between the proposed building and a given lot line be at least as great as the volume between the Single Plane and the given lot line.

(4) For One- and Two-Family buildings over (50) feet in length, all portions of the building within 20' of the rear setback line shall be set below a 45-degree bulk plane starting at the intersection of the Single Plane Setback line and a height of 15' above average grade.

PITCHED ROOF ZONING PETITION

Date: April 10, 2023

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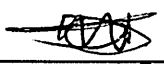
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Date: April 10, 2023

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