



SHADOW STUDY – STEP-BY-STEP INSTRUCTIONS

Last Updated October 3, 2019

Step 1: Depending on which day of the year is used for shadow study (June 21 or December 21) and time of day (2 hours after sunrise, noon, or 2 hours before sunset), determine the direction of shadow lines in degrees (i.e., on December 21, 2 hours after sunrise, the shadow line is 321.3 degrees from the North arrow). See Diagram 1 below to determine angles.

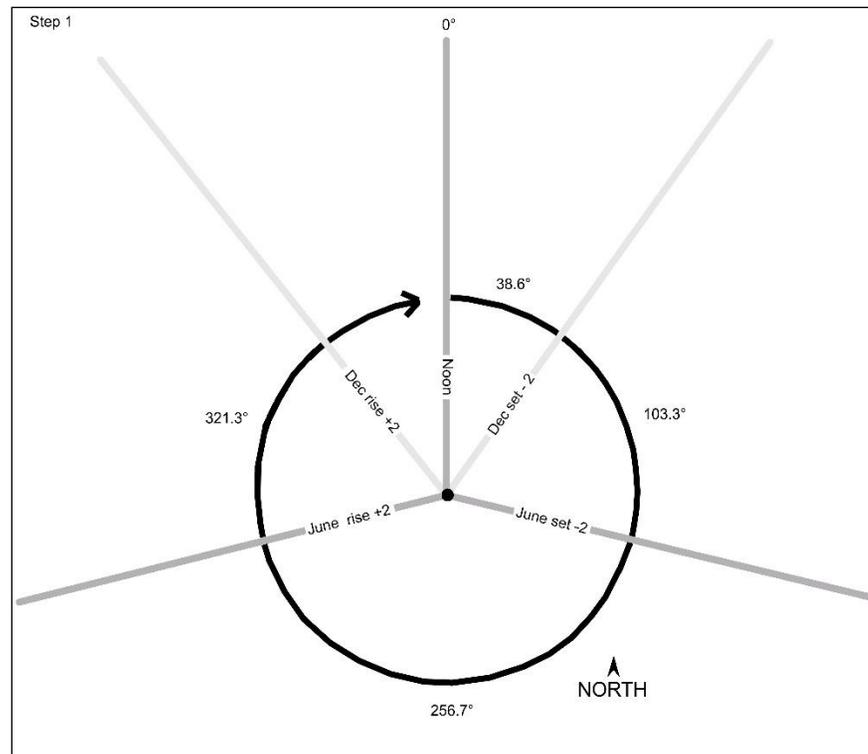


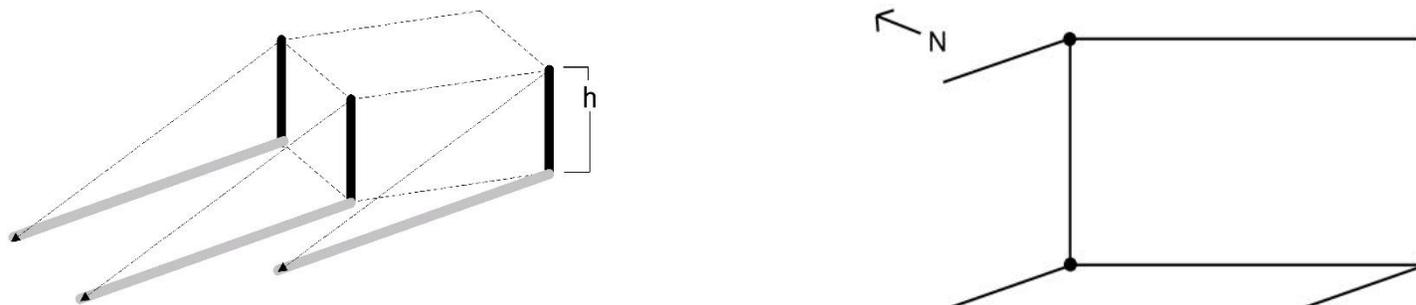
Diagram 1

Step 2: Draw building walls as posts and draw shadow lines using the degrees from North arrow in Step 1. The length of the shadow is determined by using the corresponding Multiplier from Chart 1 and the height of each wall post. Multiply the height of each post by the corresponding 1/tan number according to the chart.

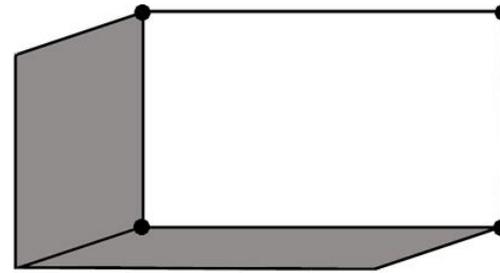
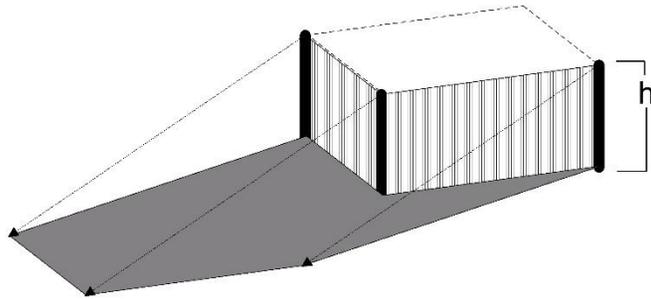


Chart 1	Multiplier	
	June 21	Dec. 21
2 hours after sunrise	2.49	3.10
Noon	0.26	1.83
2 hours before sunset	2.49	3.10

Step 3: Draw all building walls, using posts as guidelines. All shadow lines are parallel to one another, and each posts' length is determined by its height multiplied by the corresponding multiplier number.

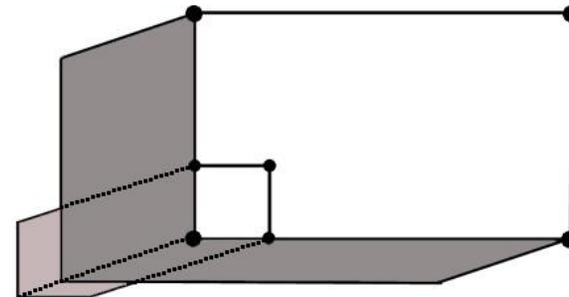
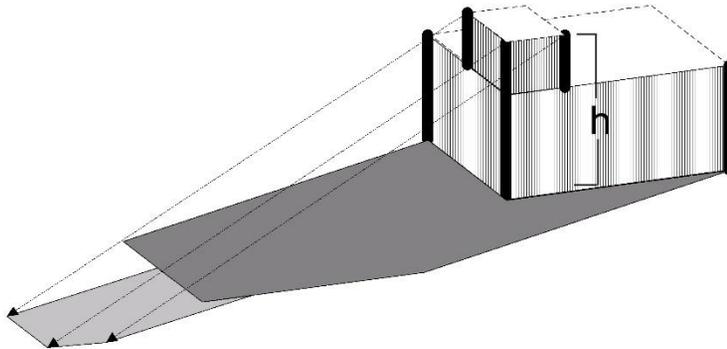


Step 4: Connect all shadows as shown to create a darkened shadow.

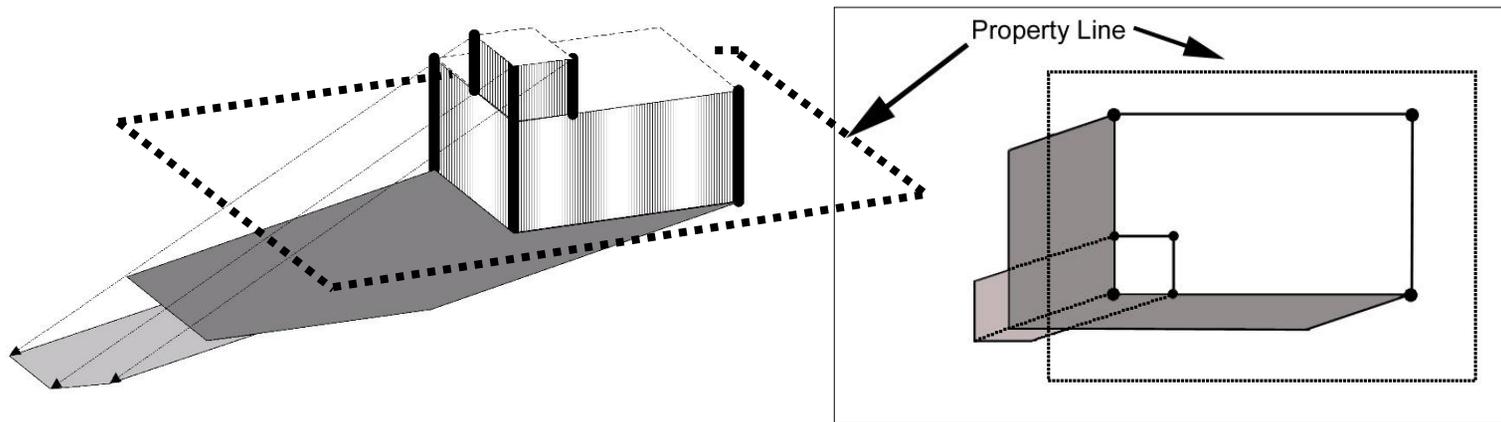


Step 5: All existing and new shadows should be drawn and differentiated in order to see a new project's impact on existing shading conditions.

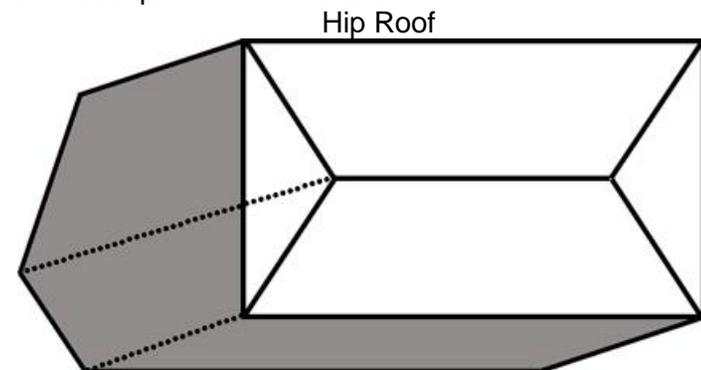
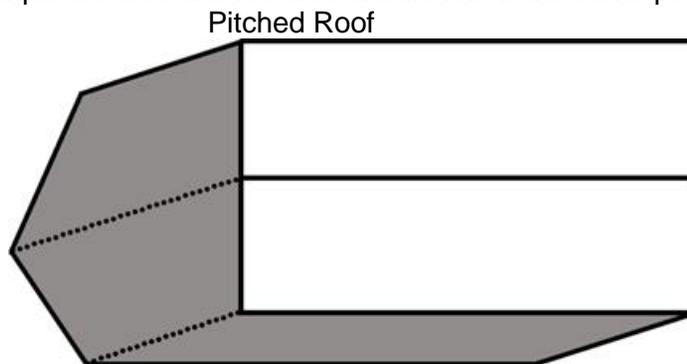
Step 6: Varying heights are calculated similarly.



Step 7: Add building footprints on any surrounding properties that are affected by the existing and/or new shadows. If a shadow hits a habitable building, indicate where there are windows on the walls affected on a separate sheet drawn in elevation view, and if possible, the use of those rooms.



Step 8: Unique architectural features should follow the same procedures. Some examples are as follows:



Shadow Study Requirements –

Required for:

- Any buildings exceeding 14 feet in average height, located in or adjacent to a residential (R) district (excluding ADUs);
- Additions exceeding 14 feet in average height on sites adjacent to a residential use; and
- Projects located in either the Commercial-Telegraph (C-T) or -Downtown Mixed Use (C-DMU) Districts which require a Use Permit to increase the maximum building height/number of stories.

The project planner may waive the requirement if it is determined that no significant view or bulk/massing impacts would occur, based on a request to waive the requirement submitted by the project applicant.

Submit: A shadow study that meets the following requirements.

1. Provide diagrams showing shadows cast by the project prior to construction and after construction. Indicate shadows for each of three times of day (2 hours after sunrise, noon, and 2 hours before sunset). Calculate shadows for three times of year – the summer and winter solstices, and the application date (or +/- 1 week of submittal date).
2. Include a photo of the structures to be affected showing the existing shadows at the application date (or there about) to corroborate the accuracy of the shadow study.
3. Overlay (in the same diagram) the existing shadows and those projected for the proposed structure, for each scenario required in #1 above, indicating clearly the incremental shadow due to the proposed project.
4. Show all structures that the shadows from the proposed project will hit. Indicate in writing that all buildings being shadowed are shown on the diagram.
5. If a shadow (existing or future) hits the wall of an adjacent structure, provide a drawing in elevation view to (1) show where the existing shadow hits the wall, and (2) indicate locations of windows on walls affected.
6. If increased shadowing caused by the proposed project would affect any windows on residential buildings, then indicate the use of those windows (i.e., garage, bedroom, bathroom, kitchen, living room).