



# Cold Climate Housing Research Center

## CCHRC Research Snapshot 07-10

*Promoting and advancing the development of healthy, durable, and sustainable shelter for Alaskans and other circumpolar people through applied research.*

## CCHRC Roof Hydrology During Spring 2007 Break-up

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Geo-Watersheds Scientific

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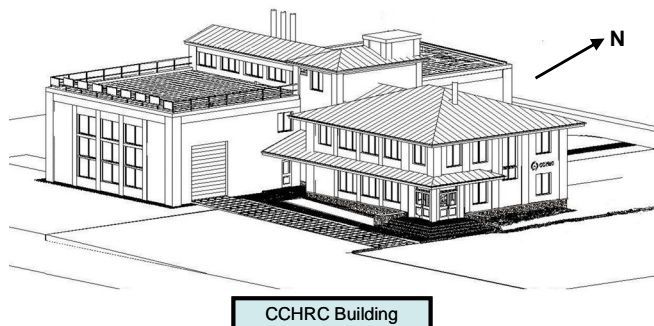


Figure 1. CCHRC Research and Test Facility (RTF). Green roofs are on west side, the main office roof is on the east side.

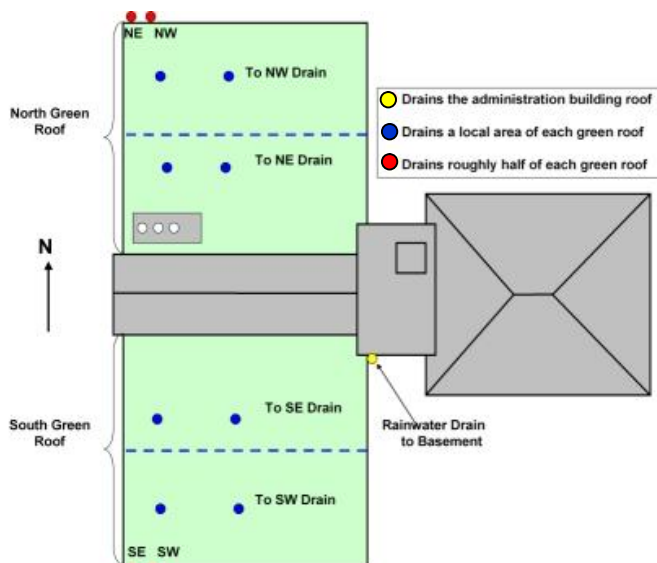


Figure 2. There are two green roof test systems, one on the North Bay, and one on the South Bay. Each of the green roofs has two drainage areas splitting the green roof areas approximately in half. The Office Roof System has gutters that catch runoff from the south and east sides and drains to holding tanks in the basement.

During the 2007 spring break-up, we monitored various snowmelt and runoff processes of the CCHRC building and surrounding grounds. The intent was to gain general knowledge of water dynamics and to look at volumes of available water from both green roofs, and the roof of the administration building (Figure 1, 2).

Snow-pack measurements were made on each green roof (Figure 3) and the snow-water equivalent (SWE) for the end of winter was estimated. This was done by establishing snow-depth transects on each roof and measuring three snow densities at each transect.

Discharge from the roof drains were also measured during snowmelt to calculate the amount of water draining from each roof (Figure 4) Runoff from each drain was measured for the two green roofs and the volumes were added together. The drain from the office shingled roof drains the southern and eastern side of the office roof. Pictures were taken to record the distribution of snow during snowmelt (Figure 5, 6).

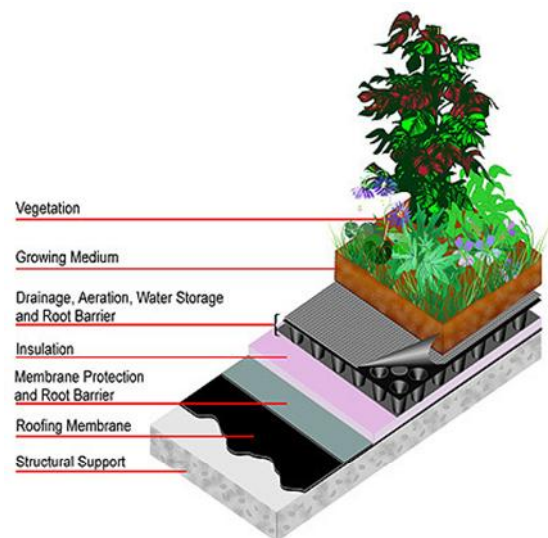


Figure 3. Typical profile through a green roof system.

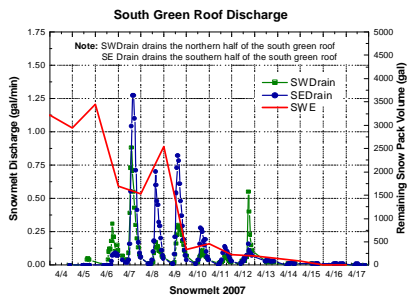
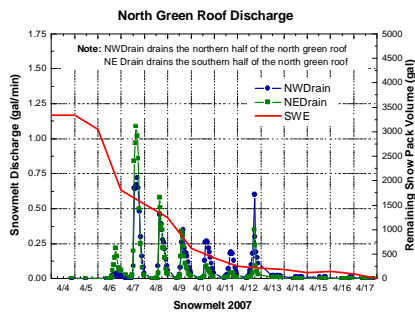


Figure 4. Snowmelt observations from the three roof areas are shown in the graphs to the left and right. The graphs on the right show the reduction in SWE on each roof and the runoff from the roof drains. The diurnal runoff trends can be seen in the individual measurements.

- ◆ Peak runoffs were ~ 1-2 gal/min.
- ◆ One-day time lag between the administration building roof and the green roofs.
- ◆ A rain event on 4/12/07 shows up as a stronger peak on the office roof versus the two green roofs.
- ◆ Preferential melting occurred around the green roof drains.

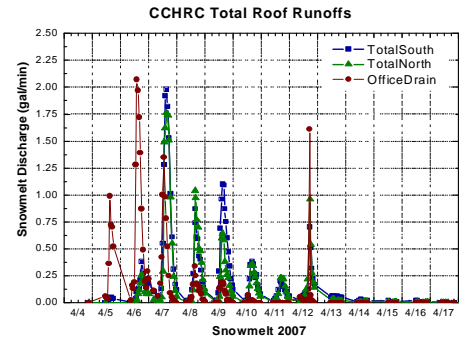
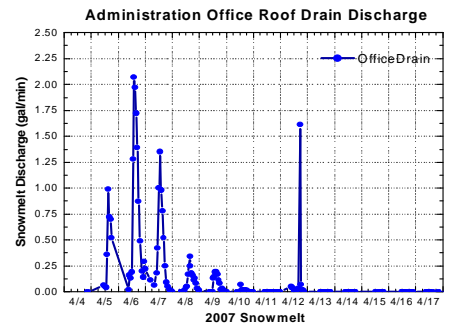


Figure 5. Snow distribution is shown for the North Bay Green Roof. Over the 10 day period shown, most of the snow has melted. The south side of this roof is shaded by the mezzanine roof. The northern side of the north roof melted out earlier due to the sun exposure. Paths also melted out before the shaded southern side of the roof.



Figure 6. Snow distribution is shown for the South Bay Green Roof. This roof receives less shading. Melting around the roof edges can be seen in the middle photograph. Paths and disturbed areas in the snow also melted earlier. The mezzanine roof drain also contributed water during snowmelt.