

Part 6: Architecture



Alexander Robertson

John Cleveley's painting of Skálholtsstaður og Dómkirkjan in 1772 that, apart from the church and school/manse, most people lived and worked in turfed houses on the south side of the hill sheltered from cold north winds.



The current Skalholt replaced the old on the ridge while the modern architecture of buildings on the north side was presumably designed to shield the large complex from cold north winds.



While the iconic turf houses and barns of Iceland's historic farms such as the abandoned Reynifell á Rangárvöllum are plain enough, the people who occupied them were most often well-educated and sophisticated farmers, such as Helgi Jónsson, who was also an astute politician, while other farmers were notable scholars, scientists, artists and literati, physicians. This is still very much the tradition among rural Icelanders.

In terms of comfort, suffice to say that when the Danes introduced lofty stone buildings, Icelanders considered them drafty and unsuitable for Icelandic weather. The **green-roof movement**, which advocates roof-top lawns to conserve energy and foster aesthetics, is essentially a revival of ancient cool climate Icelandic architecture.



Helgi Jónsson MP
Rang. 1937-1956



Well preserved sheep milking pen in Vaglir Forest in north Iceland. It was last used in the 1950's when the farm was sold to the Iceland Forest Service. Self-seeded birch colonized the site and inter-planted with spruce.



Alexander Robertson

Sheep milking pen, Vaglir.

The sheep and it's lamb enter through the large opening together. To prevent the lamb from being a nuisance during milking, it was chased out through the smaller opening on the right side of the wall.



Ruin of a shieling near Halli, south Iceland. Its outer wall suggests it also served much the same purpose as the sheep milking pen at Vaglir and also as a kind of courtyard.



A collection of fine old historic farmsteads in Iceland.



These reworked fishing stages in Krusavik, which are quite common elsewhere in Iceland, are modelled on the architecture of the traditional turf-roof.



In the 1980's this very comfortable and sturdy turf hut that was very much in general use as part of the B&B and post office in Skaftafell



The old turf hut in the previous is still standing – minus its window and door. Beside it are a couple new turf huts for tourists.



Photo: George Andreo

Most modern farms throughout Iceland have an architecture typically has sleek, clean lines. Many still have their own church and graveyard (where only the dear departed is deserving of shelter under trees).



The classic farmstead beside Skogafoss t-l) a modern “green Roof of the Church in Akyureyri, (l-r) old farmstead replaced with tin roof in Borgar (b-l) and the old , recently vacated farmhouse at Stora Sandfell, near Egillsatdir



Mosfellsbær on the north side of Reykjavik, like most towns in Iceland, is a superbly planned town where parks for sports and recreation with facilities developed to the highest standard – including high and low shelter plantations.



Aron's Hús, situated on the lower slope of Mt. Esja is owned by the Iceland Forest Research Station and used by visiting scientists. It would be directly in the path of fierce katabatic winds were it not sheltered by tree covered escarpment



Halli is a fine dairy farm, with an exceptionally fine restaurant and museum honoring the famous Icelandic writer Þórbergur Þórðarsson (1888 – 1974) who was born there. The back of the Þórbergur Centre is a bookend for every book he wrote. It is on side that gets the cold mountain wind which shelters the tourists



This farmer has gone to great lengths to shelter the farm and house with a pleasant combination of architecture, grassy berms and has planted new hedges and trees



This huge wall with a rough top shelters a farm processing complex from very strong katabatic winds from Esja and persistent easterly valley winds



Katabatic winds originating from the summit of Mt. Esja are pushed through gap resulting fierce turbulence across the plain. Which in turn, requires sturdy architecture for farm buildings.



The triangular building is symbolic of the Mt. Hekla volcano which is constantly monitored by sophisticated sensors to give advanced warning of an impending eruption.



To help understand the complex winds of Mt. Esja, mountain the carving is for modelling winds, particularly the violent katabatic winds, and provide valuable information for forest expansion in the region by Einar Gunnarsson (in the photo) and his colleagues. An article by Mayor of Reykjavik explaining the value of forests for reducing windiness.

Has slowed down wind in Reykjavik

FRÉTTABLAÐIÐ National | 30th January 2012

Líkar þetta 11

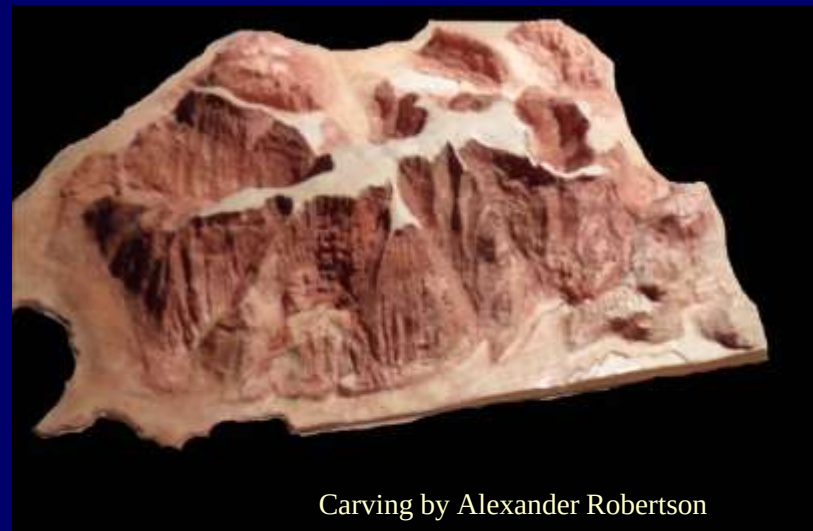
04:00



It is proposed that the Web Better Reykjavik trees are more used to cover the bike paths and sidewalks. Fréttablaðið / GVA

+ "Measurements of wind speed in the city during the past decades show that the wind strength has been declining and it is estimated that vegetation and new building plays an important role in the development," says the Review Planning to address comments from citizens on the Web Better Reykjavik to enhance documents generated by

targeted use of of trees. The capital is better placed to more trees separate the priority routes and sidewalks from umferðargötum to reduce pollution and generate shelter and provide fun atmosphere. Planning Department notes that green scarf called a continuous forest of Esja roots to town. "The region has in recent decades have made vast forestry and the forest is now growing up. It is not unreasonable to assume that the forest green scarf will be similar to the present, for example, in Heiðmörk. The Forestry will have a significant impact to documents generated in the metropolitan area," says planning stage. It appears that the organization of new buildings away on the outskirts of the city was made special study of the weather and the wind carried the organization and the community take note of it. To meet the environmental planning process for all neighborhoods. "As part of the structure relates to the consideration wind and weather conditions in the neighborhoods with the aim to promote better development of shelter." - Gar



Carving by Alexander Robertson

Sandy and Gunnar (a forester with City of Reykjavik forestry Association) sizing up tree planting projects at 400m on Mount Esja to subdue fierce but infrequent katabatic (downslope) winds. Farther downhill are a few tree planters.

Below: top of the inversion across Mt. Esja is the upper tree planting limit at roughly 400m



DALALÆÐA

The lack of wind during a cold calm day can be just as uncomfortable as the occasional gusty katabatic wind. For example, bone-chilling frost hollows can be miserable and of course kill off or at least stunt young trees and sensitive shrubs and herbs.

The damp air of Dalalæða can be as bone - chilling as frost hollows. It is common in open, space. around Reykjavik such as Strandarheiði (right) and eastern Reykjavik (bottom)

If so, the Mayor of Reykjavik is correct to say that Rekjavik is warmer insofar that urban forests & buildings have effectively eliminated dalalæða in much of the region.



Reykjavik is a beautifully planned and spacious city with ample urban forests that shelter communities and open spaces



Dangerous winds on the highway below Ingolfsfjall near Selfoss

On the south side of Ingolfsfjall the north-easterlies diverge round the shoulder of the cliffs resulting in violent turbulence with an angle of 'attack' relative to the road at roughly $10-25^\circ$ due west, which creates an irregular systems of violent, vertical and lateral reverse rollers, similar to von Karman-like vortices around a vehicle which destabilizes it.



Flateyri before the fatal avalanche with some rudimentary avalanche buffers zones that were no match for what was to come. The shelterwoods were not intended for avalanche control but did cushion small boulder slides.



Páll Stefansson



Sæmundur K. Þorvaldsson

GEO-ENGINEERING FLATEYRI'S LANDSCAPE



Oddur Sigurðsson

In 1995 an avalanche killed 30 people in the village of Flateyri. To avoid another disaster, the avalanche defence structure was designed to direct the avalanches away from the village, rather than the impossibility of stopping thousands of tonnes descending snow at speeds of up to 300 km/hour. The avalanche dam adds an interesting dimension to the geodiversity of this beautiful landscape. Trees were planted into the bank and the interior is large community park



Sæmundur Kr. Þorvaldsson

An attractive avalanche protection dyke has most unusual symmetry between the peninsula and the 20m high avalanche dam (which is also a recreational park).



Iceland's churches generally have a simple clean architecture. The top is Reykir with a “hot pot” fed by a hot spring that was used by Snorri Sturlsson who wrote the famous saga the EDDA around 1220 AD. Churches usually don't have any shelter around them lest the faithful be distracted by too many earthly comforts.



Generally, winds at Borg are benign. But there are several clues in the photograph that indicate a windy day; such as the flag (of course), the ripples of reverse rollers on the river (right-centre) and Görtler streaks on the inlet. The sky also suggests an approaching warm front from the south west which means the wind is diverted northwards by the mountains towards Borg. Naturally, paleo winds seem to have been the dominant force that shaped the western flank of the mountains.



Borg church has taken advantage of the topography and shelterwoods, the terrace along river helps to divert the wind away from the church grounds.



Naturally geo-thermals are common feature of most parts of Iceland. Among the oldest in use are the hot springs Hveragerdi (*hot spring town*) is famous for its greenhouse industry. Naturally, the town, known as the garden town, is a famous spa complete with fine gardens and beautiful forest plantations.



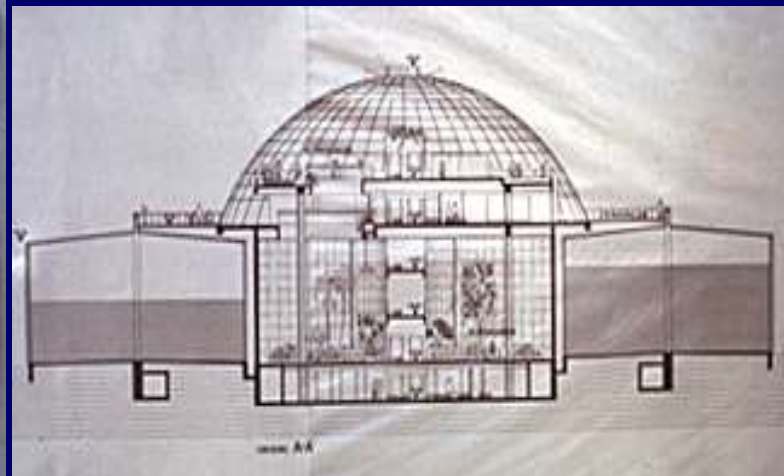
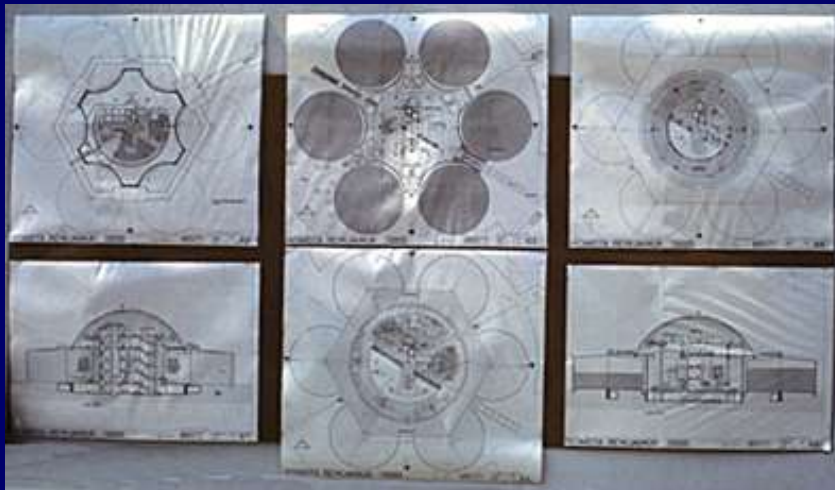
A very old pumping station at Hveragerdi used for heating a residence.



One of the great blessings for Iceland is it's geothermal heat. As one grateful resident remarked "*Without the geothrmal heat Iceland would still only have a population of 70,000 not 300,000+*" Geraldine is admiring Iceland bananas and tropical garden in Hveragerdi.



Reykjavik, like most and towns throughout Iceland, are geo-thermally heated. The interior of the hot water storage tanks is a visitors centre, capped with a glass dome and with a revolving high-class restaurant on the tanks.



Relatively cheap geothermal hot water for heating encourages architects to include imposing glass walls in residential homes



The most amazing glass building in Iceland is the massive Harpa Concert Hall with a spacious car park below the level of the harbour.



One of two geo-thermally heated concert halls in Harpa. Apparently, when a symphony plays in one hall, and a loud Rock Concert in the other – they cannot hear each other.



The distinctive clean lines of Nordic architecture and geothermal heating of the Reykjavik Forest Association's greenhouse. It has the shaped of an over-turned hull of a Viking ship



Alexander Robertson

Many varieties of trees (in this case birch) were bred in this huge geo-thermally heated tree breeding house in Vaglir north Iceland



The Iceland Forest Service's huge geo-thermally heated greenhouse at Vaglirm north Iceland used for tree-breeding – in this case larch.



Alexander Robertson

With so many hot springs in the area, it is not surprising that Hveragerdi is home to a horticultural school – much to the benefit the town's appearance.



The Iceland Forestry Association's iconic tepee-shaped house and round work house are very practical



Keep in mind that trees can either compliment or smother the architecture



Vopna in the east fjords with a very sheltered harbor. While the houses are basically alike, its the naval architecture of small fishing boats are very interesting and attractive.



The gulf stream ensures that Iceland's fishing waters remain ice-free. Husaviks has an extremely neat and tidy harbour famous for their beautiful and famous restaurants along the harbour front with a spectacular view across the fjord



The beautiful fishing town of Husavik in north Iceland with a fine urban forest.



Diversity & Form of Winter Treescapes at Laugardal

These photos dated late February 2005 show not only how quickly the Laugardal shelter woods have grown since 1985 - which is the best age to judge a shelterbelt for its effectiveness and its beauty - as much in winter as in summer.



The rich diversity of Ágúst Hálfðásson's 20 yr old forest, and those of his cooperative neighbours, do not over-power the form or function of architecture, trails and view points along driveway. . 'Agúst has degrees in both engineering and forestry.



Akureyri demonstrates that no hillside is too steep to cultivate biodiversity. While this not a shelter wood, it indicates the range of species and varieties that can be incorporated into the lower strata of a shelter wood.



In new territory it is wise to have a few test shelter woods such those at Núpssalur and Innstatunga (*bottom right*) which serve to indicate what is possible for forest on a larger scale and what architectural style is most appropriate to lessen wind effects



Núpur School
Plantation

Skrúður Memorial
Garden & Plantation

Farm house
shelter belt

Mýrafell farm
plantation



Symbolism in shelter wood and an architectural concept by Alexander Robertson for a forest pavilion on the old nursery fields at Hallormsstaðir. The idea is to blend architectural roughness elements of the bandsand with the garden landscape to dampen vortices created by troublesome winds.



Low shelterwood has been the norm for many decades which, being old and full of gaps, generate wind funneling between the gardens and buildings. So at Hbanneyri at least there is an opportunity for refurbishing the shelterwoods and establishing new ones on the long and often chilly and gusty walk between the old and new schools.



Hvanneyri's long walks between the old and new schools definitely require some sort of shelterwoods. However, because they rely mostly on deciduous trees and shrubs the shelter is not nearly as effective in winter.



Hvanneyri's effective linear shelterbelts along streets and ditches. While curved shelterwoods are more effective and attractive, the linear pattern of shelterbelts is governed by ditches and efficiency for agricultural machinery and streets.



From the ground, the horse-shoe formations have an excellent variety of roughness elements that reduces violent turbulence.



‘Old’ Hvanneyri, has three walled gardens for meditation, bronze sculptures of previous Rectors, and a graveyard, respectively. In Iceland, as in other countries, graveyard trees are often the only ones in a landscape.



Non-linear shelterbelt at Hvanneyri – horse shoes (bottom left) paddock with formal outside border and informal inside border (top) and small naturalistic shelter wood (bottom right) offer pleasant shelter.



The horse shoe patterns provided the most comfortable shelter. However, the parking lot (inset) is exposed to cold north winds and cornering mountain winds from the east.

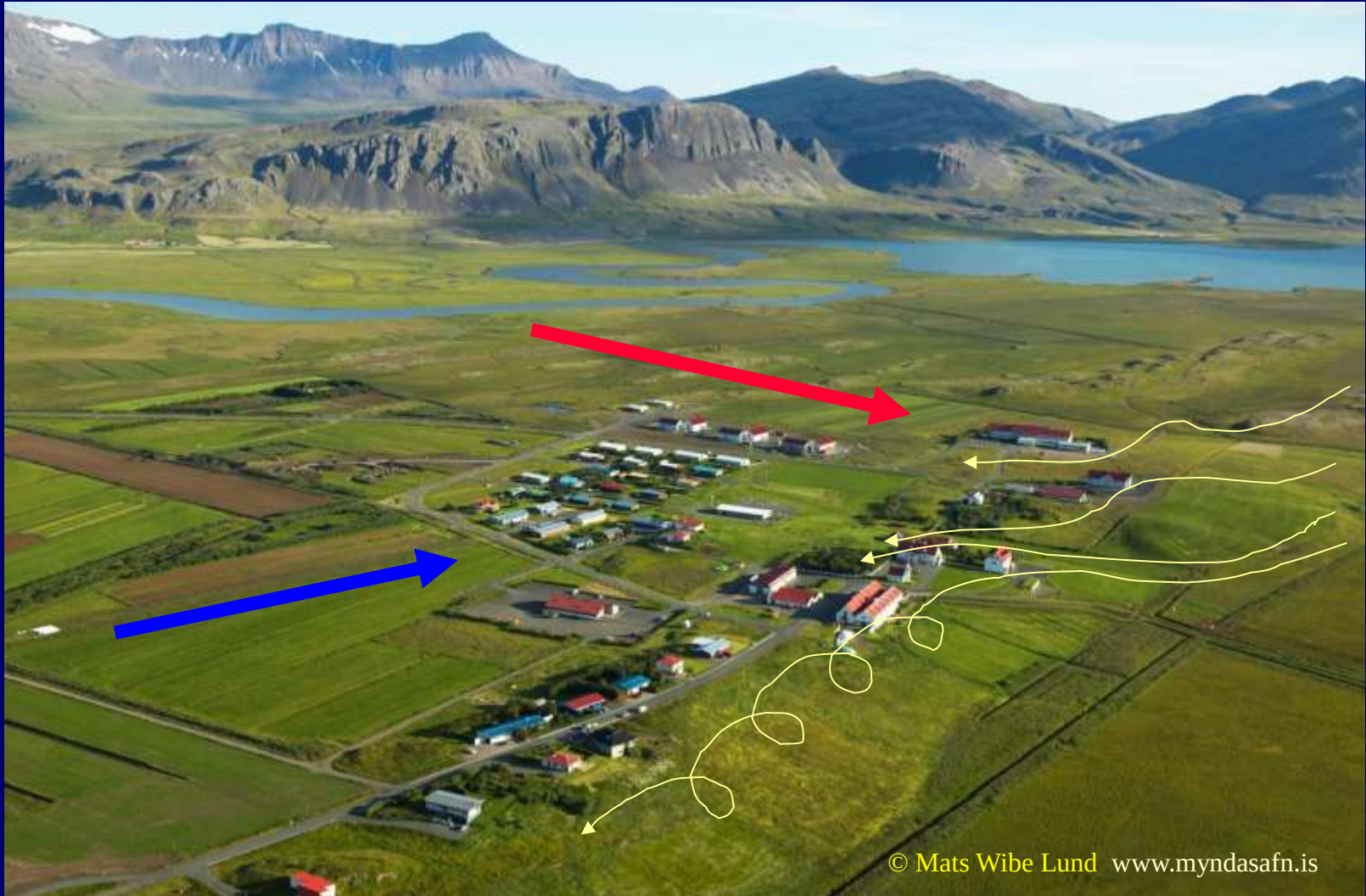


Clip from a video of the Hvaneyri parking lot showing the negative influence of the influence of a building on cornering wind and ineffective shelterbelt

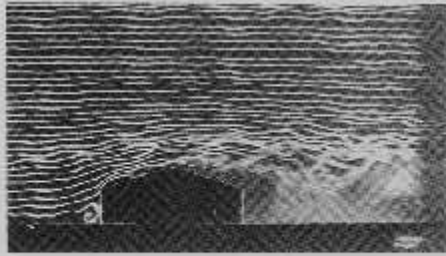


Students of the 2004 class, Landscape & Shelterwood, Agric. University of Iceland, Hvanneyri.

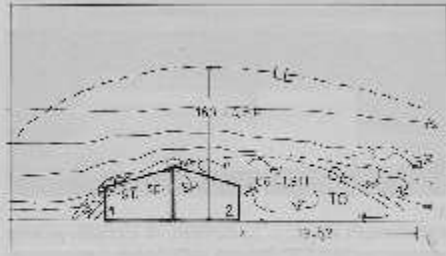
While a low ridge diverts south winds away from, and over, most of the buildings, convergence through a gap in the ridge creates violent turbulence on the southwest flank of the old school and church. Apart from south winds, the most uncomfortable (not necessarily the strongest) winds are from the east and northeast, respectively (large arrows).



A shelterbelt designed for winter is superior year-round

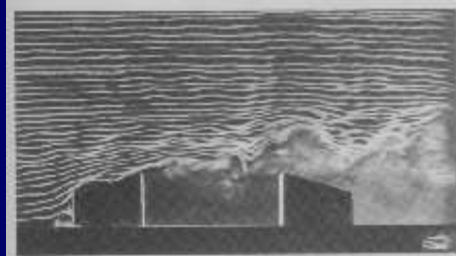


Føreskottet viser en ordinær form med karakteristiske strømningsskjemaer som bl.a. har flere likheter med Evans' forsøk, men med noe utvidet turbulenteskikt. TG.

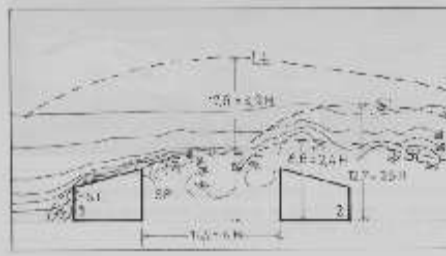


Det er en tydelig rotordannelse på østside, et lite s.punkt i løsegegnens mens hoved-S punktet ligger høyeste gegns. Slak rakneling gir lav SL.

Most snow settles on the leeward side of a structure .



5. Dette føreskottet ser ut til å gi størst utslag i strømningsskjemaet totalt med klare virveldannelser i mellomrommet mellom bygningene. Det viser sterk uro fra turbulenteskikt opp over SL og inn i overgangsskjiktet.



LL ser ut til å holde seg i en jevn høyde gjennom alle forsegningene, mens SL varierer sterkt etter avstanden mellom bygningene.

A gap tends to trap at least some of the snow - the wider the gap, the more snow it traps.



This model shows that snow can drift into spaces between a cluster of buildings but not as much in the lee of the cluster.

A simple technique for studying potential turbulence in architectural concepts



How buildings and shelterbelts affect katabatic (down-slope) wind



Models of wind flow around structures



Students of the Landscape and Shelterwood Course, Agricultural University of Iceland, Hvanneyri

Models for manipulating wind in the landscape



Variations of von Karman vortices as modeled by landscape architecture & agroforestry students (*left*) and their similarity to von Karman vortices generated by natural geomorphology off Lake Carnegie in Australia

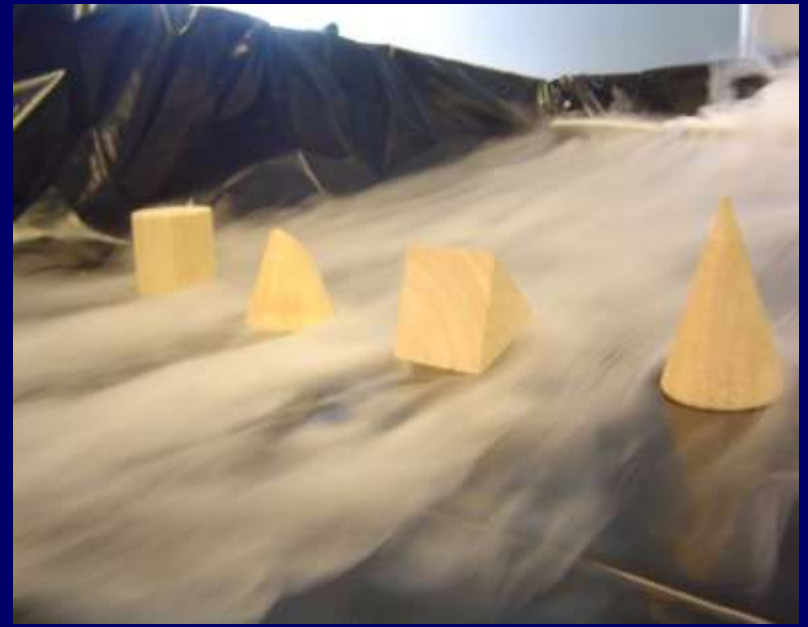


Students of the Landscape and Shelterwood Course, Agricultural University of Iceland, Hvanneyri

Examples of the fine art of manipulating wind flow with structures and shelter woods



Students of the Landscape and Shelterwood Course, Agricultural University of Iceland, Hvanneyri



Students of the Landscape and Shelterwood Course, Agricultural University of Iceland, Hvanneyri

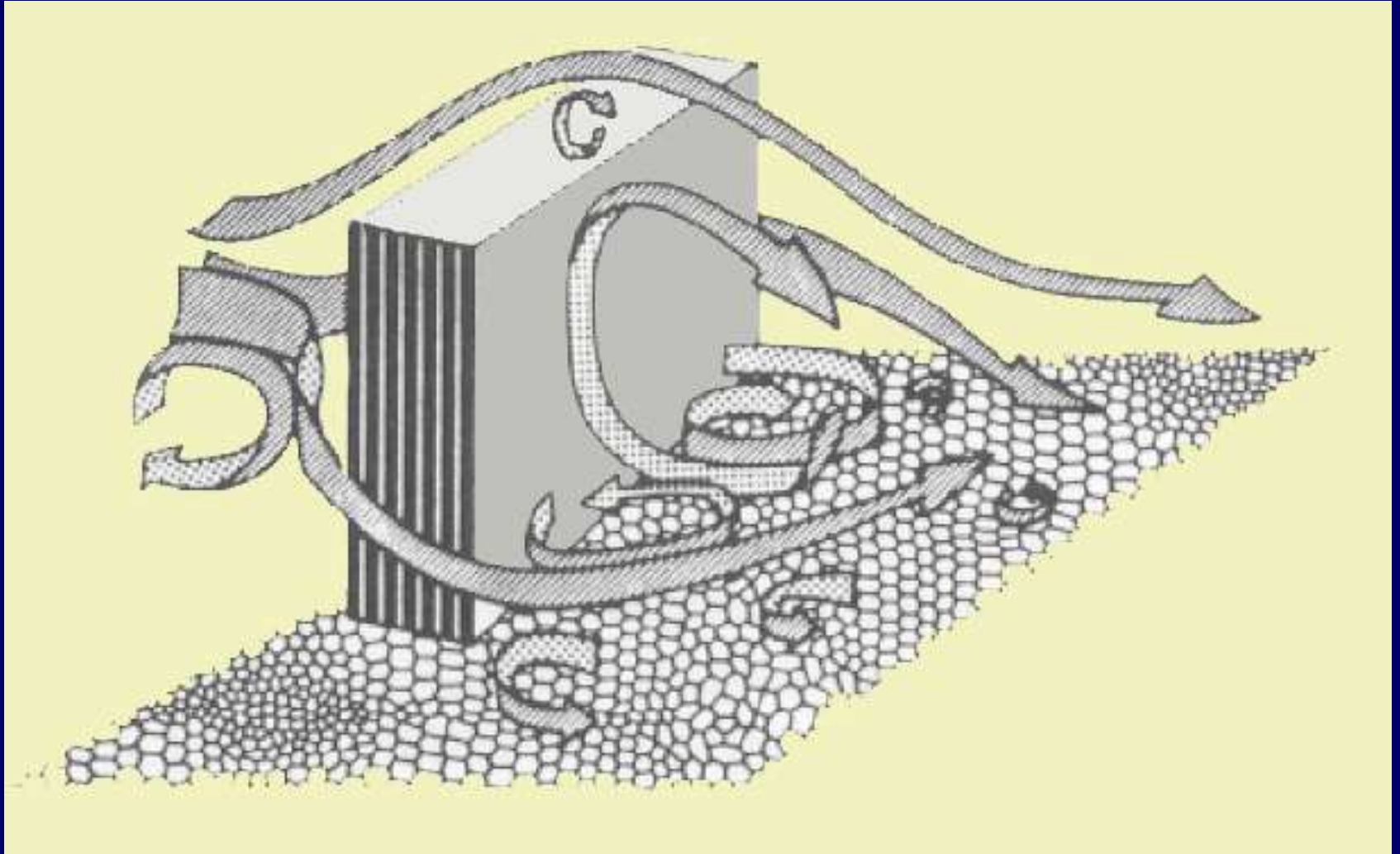
Generally, Icelandic ornamental trees and architecture blend well visually if not aerodynamically



Close inspection of the windswept tree leaning over Miðhús, reveals strong, persistent cornering winds from the west



The problem with blocky buildings is that turbulence is often uncomfortable on the lee side.





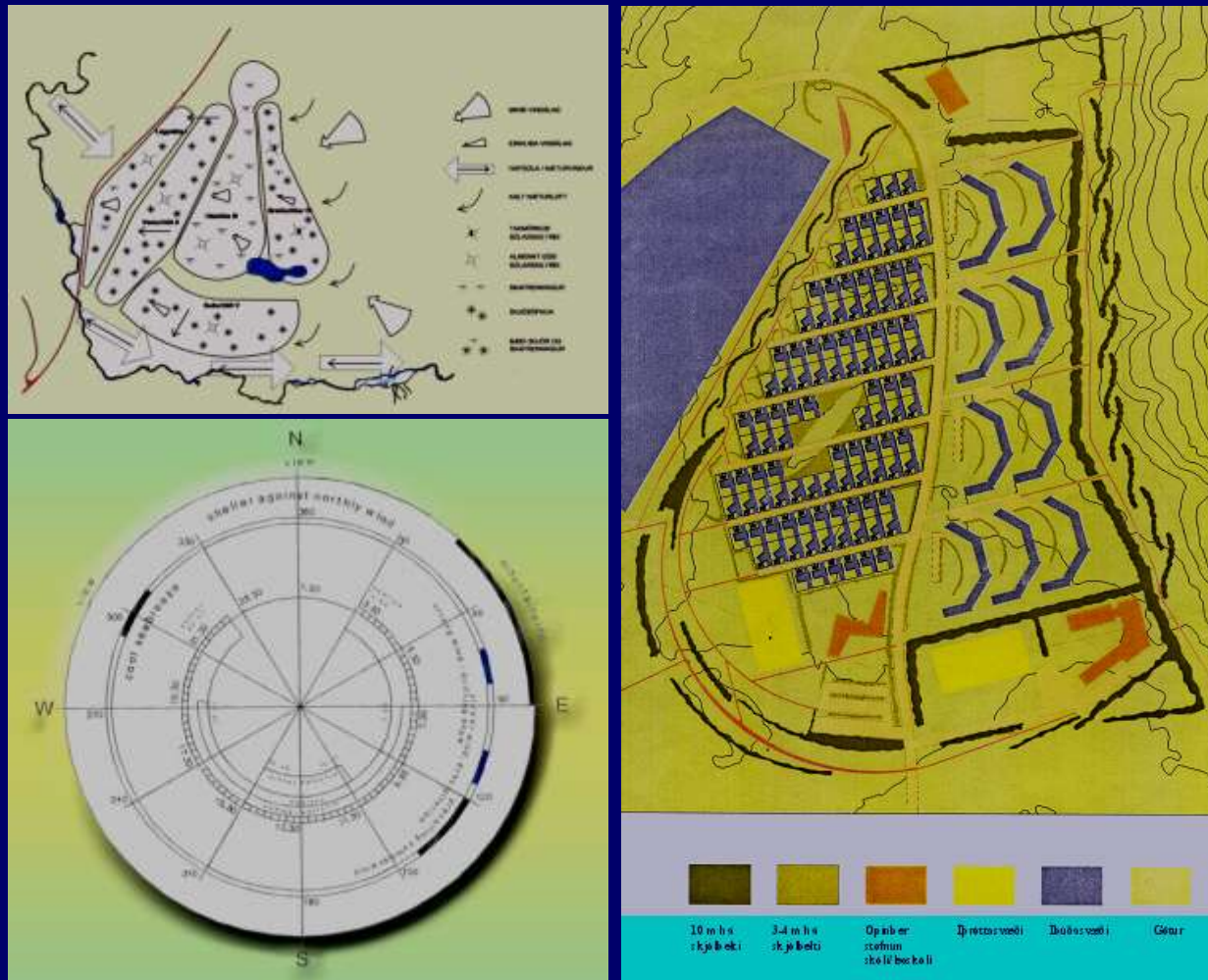
In terms of making it more comfortable for people on the ground, whether by default or by design, the profile of these examples of Russian wooden architecture in the Mayle Karelie Outdoor Museum have a high degree of roughness which, like trees, breaks up streamwise wind flow and reduces turbulence on the leeward

Reflections on the design of Robertson's small, sheltered suburban garden



Definitely **not** the last of the Summer Wine

The essence of good design lies in solving winter city problems which in turn makes for a better summer environment - notably when appropriate shelterwoods designs are incorporated into an holistic approach to architecture, engineering, services and landscape architecture.



The Art of Planting

These very functional, relatively low geometric shelterbelt patterns at Miklatún have not changed since this 1985 photograph was taken, principally because they have been exceptionally well maintained.

The urban forest in the residential areas were obviously well established by 1985



Emil Thor

Tower of Winds – Green College in Oxford

North Wind, BOREAS, wears a thick-sleeved cloak with folds blowing in the air, and high-laced buskins, and is blowing a twisted shell;

Northeast Wind, KAIKIAS, empties a shell full of hailstones;

East Wind, APELIOTES, displays flowers and fruit;

Southeast Wind, EUROS, with his right arm muffled in a cloak, threatens high winds;

South Wind, NOTOS, empties a shower from his urn;

Southwest Wind, LIPS, drives a ship before his gale;

West Wind, ZEPHYROS, bodes showers;

Northwest Wind, SKIRON, bears a bronze vessel with which he dries up the rivers.

Alexander Robertson was a member of Green College whose thesis on effects of wind on forests.



House of Winds



Mission Impossible?



1971



1972



West



East

1973

The Garden is designed principally as a shelterwood and snow trap

It contains roughly 120 species of woody plants (75 trees and 120 shrubs) and a low maintenance, ecologically balanced ground cover of mostly perennial herbs, mosses and lichens. The result is a much improved microclimate and a growing season extended by 2 months and raising the plant hardiness from 5b to 7b (i.e., cool temperate).



The stark lines of essential stone and wood walls are concealed by a dynamic, mostly evergreen arrangement of trees & shrubs – which make a much better and more attractive snow trap than solid structures.



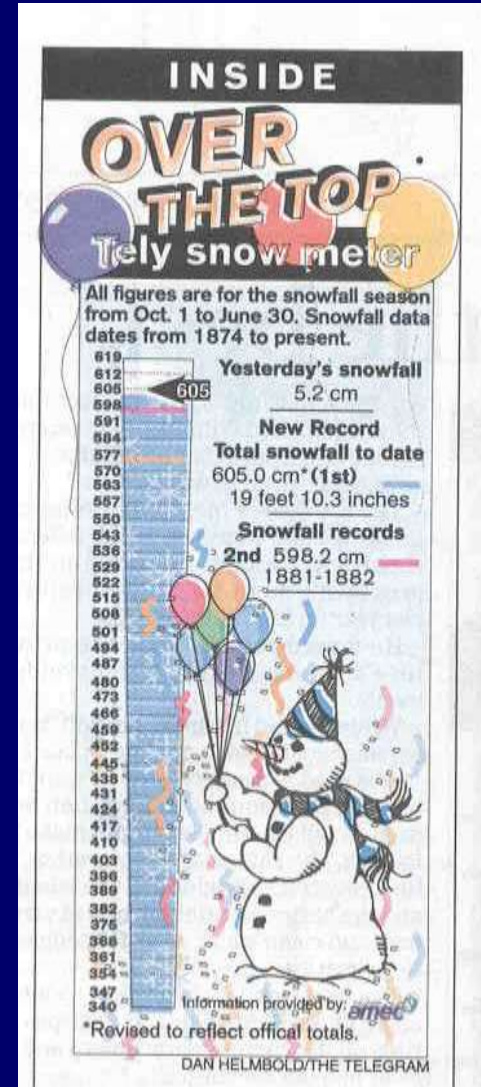
Well-designed shelterwoods are usually attractive and dynamic in all seasons; especially when they are composed of clumps of different species and a few distinctive foliage and flowering trees, shrubs and ground cover. A cheerful landscape for all seasons is the best medicine for cabin fever



This strategically located and attractive garden shed contributes to shelter from west winds. The area behind the shed and adjacent trees and shrubs is kept partially open to the wind for drying clothes



The primary purpose of the garden is to eliminate bothersome snow drifting with a 'snow-trap' shelterwood that is attractive year-round. The total amount of snowfall for the winter of 2002- 2001in St. John's was a record-breaking 6.48 m



Ah well! The street berg season is a good time to go skiing and/or snow-mobiling and let the protective blanket of snow limit frost heaving and protect shrubs, lawn, ground cover and perennials from winter-burn.



Consideration for snow is essential for winter-city landscape architecture



The patio and a lower level serve as secondary snow trap



Since there are so many shrubs, none of them are tied up or covered during the winter. So it is important to design robust planting schemes much like natural woodlands.

While the periwinkle mixed with ivy is an attractive evergreen ground cover it's main purpose is to prevent erosion and serve as a convenient snow dump when clearing off the patio.



The planting scheme on either side of the driveway is essentially a snow-bed community consisting of a tough, evergreen ground cover and shrubs that bend and buckle under a very heavy weight of snow for much the winter



An attractive and robust snowbed landscape - unharmed by the sheer weight of many tonnes of snow and ice for 3-4 months



The mid-level is the main snow trap



The west side of the garden is designed to shelter from persistent westerly winds usually associated with fine, sunny days. In winter brisk westerly wind cause drifting from the neighboring garden, which are funnelled by the cedar hedge such that it clears the driveway of snow and also redirects some of it to the snow trap.



THE ICELANDIC KNOT is Fractal, Lacunar & Heterogeneous

Has all the roughness elements for shelter and to trap snow within it, regardless of the wind direction.

Black poplar and Sitka spruce are planted in curves; i.e., they serve as the mainframe.

The gaps in the knots and lenses are **snow traps** of small trees & shrubs such as willow (viði) and woolly Icelandic willow (in the pattern of a ptarmigan).

The border would be of native birch and small clumps of the taller European birch.

