Maximize the open space

Discover the possibilities of using stacked space with Nophadrain Utility Roof Systems





A green area above 760 parking spaces,

One location, two rarities

The Netherlands' deepest underground car park is located at the Kruisplein square, directly opposite Rotterdam Central Station. This is a very busy place where parking possibilities and greenery are scarce. This makes it extra important that any available space is used optimally. The roof of the car park has been built using the Nophadrain Parking Deck System. This system provides optimal protection of the roof surface and offers a stable and durable underlayer for the intensive vegetation and pavements on top. The roof of the busy Kruisplein has been transformed into a green pedestrian boulevard lined by rows of trees. The greenery creates an attractive and natural environment in the middle of a busy city, while at the same time the car park beneath offers 760 parking spaces hidden from view. The use of stacked space at the Kruisplein is a perfect example of the efficient use of limited urban space.



right in the city centre

Optimal use of urban surface space

Rotterdam City Council contracted Nophadrain to fit the roof of the Kruisplein car park. Nophadrain is an experienced consultant, producer, and supplier of green roof systems for pedestrian and vehicular pavements. We offer both development and production 'in-house' and that means we can guarantee the best results. This enables Nophadrain to be very flexible in meeting the needs and wishes of our clients and responding to new developments. We develop the ideal solution for each project in collaboration with the client. An example of this is the main entrance of Rotterdam Central Station.



Relaxing in the 8 hectare city park above 1.2 kilometres of shopping boulevard

Photo left Roof park access. Photo right Intensive vegetation on a roof park.





Photo left Themed garden on roof park.

Enjoy greenery in a busy environment

Rotterdam Delfshaven, location Vierhavenstrip: a unique location with a double function. While shoppers enjoy the many shops on the 1.2 kilometre boulevard, many families, couples, and teenagers can relax on the roof of this old railway yard. And that is unique. This is the largest roof park in Europe! It has a surface area of no less than 80,000 m². The roof contains fountains, play areas, and a number of themed gardens with free access for everyone.

This has been made possible thanks to the Nophadrain Intensive Green Roof System, which forms the basis for the paving and intensive vegetation of the city park. The Vierhavenstrip: a special and highly successful project that is enjoyed by countless people every day.



Photo right Fountain on roof park.







550 houses above 10,000 m² of shopping area above 1,250 parking spaces

Photo Meerrijk shopping boulevard.







The newly built estate Meerrijk: optimal use of stacked space

The Meerrijk area in Eindhoven (NL) is an eye-catcher in the cityscape. Apartments, houses, and shops, spread out among greenery and surrounded by water. Both residents and visitors love to shop here. But what is not immediately obvious is the unique car park below grass level. Under the entire surface area of Meerrijk there is a huge car park, covered with pavements combined with large plant containers. A broad boulevard, with low-density traffic, has been created for residents and the shopping public. The Nophadrain Parking Deck System ensures that the roof boulevard is accessible for heavy goods vehicles, making it possible to provide the shops with their daily supplies. This is a smart system in a cleverly designed area in Eindhoven.







Photo left Meerrijk car park. Photo right Access road to Meerrijk.





Nophadrain has a worldwide reputation as the specialist in utility roof decks. Under the motto of 'Maximize the open space' Nophadrain develops and produces smart roof systems for any situation.

Research, development and production

Nophadrain develops and produces systems 'in-house' that enable the installation of vegetation and pavements on roofs and underground constructions such as subterranean car parks. The core of the utility roof systems is formed by our smart high-compressive drainage systems, in which we have combined multiple functional layers into one product.

Nophadrain uses high impact polystyrene (HIPS) as the base material in the ND Drainage Systems because this material has excellent creep resistance when put under pressure over an extended period of time. The manufacturing process developed by Nophadrain guarantees a constant wall thickness of each dimple. Combined with the conical dimple geometry, the ND Drainage Systems achieve a high compressive strength to resist the shear forces caused by backfill and soil settlement.



Graph: deliberate choice of materials - HDPE versus HIPS

Experience, consultancy and engineering

Realization



Every situation is unique. As a result of our longstanding experience and expertise in many countries, we are able to offer the best solution for each project, in consultation with you. Our advisers will guide you through each step of the building process: from design to execution.

When designing a utility roof, the key factors that decide the success of your project are the underlying roof structure, insulation, and waterproofing membrane to be installed, and their protection. Our specialists will give you advice that takes into account every facet of the construction process, from information about guidelines and regulations, to advice about the choice of vegetation and/or pavements. In addition, our specialists can help ensure the correct installation of the Nophadrain Utility Roof System on location.

The core of each Nophadrain Utility Roof System is the smart ND Drainage System. This system combines the multiple functional layers of a utility roof into one product. This means that our systems are simple and easy to install.

We can supply and install the complete system. For this turnkey product we collaborate exclusively with specialist companies that are highly familiar with our systems. You will have one contact person throughout the entire process, ensuring that everything runs in a structured and smooth manner, from consultancy to execution.

All-in-one drainage system: the core of each Nophadrain Utility Roof System

The heavy-duty Nophadrain Drainage Systems combine multiple functional layers, such as the filter, drainage, and protection layers, into one product that can be rolled out. This ensures a fast, simple, and safe installation, a tidy building site and an optimal end result.





ID 200 / 220	ND 200h / 220h	ND 200sv	ND 600 / 620	ND 620hd	ND 600sv / 600hdsv	ND 4+1h	ND 5+1	ND 6+1
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d for roofs with an pavements and decks.	For roofs with pedestrian pavements and podium decks with limited fall, and for roofs where extensive drainage lengths are required.	Standard for inverted roofs with pedestrian pavements.	Standard for roofs with vehicular pavements (cars).	Standard for roofs with vehicular pavements (heavy goods vehicles).	Standard for inverted roofs with vehicular pavements (cars/heavy goods vehicles).	Standard for roofs with extensive or intensive vegetation.	For roofs with extensive or intensive vegetation with limited fall, and for roofs where extensive drainage lengths are required.	For roofs with extensive or intensive vegetation with an extra-large water reservoir with limited fall, and for roofs where extensive drainage lengths are required.
32 m x 1 25 m	approx 30 m x 1 25 m	approx .32 m x 1.25 m	approx .32 m x 1.25 m	approx .32 m x 1.25 m	approx .32 m x 1.25 m	approx 30 m x 1 25 m	approx 20 m x 1 25 m	approx 20 m x 1 20 m
/Ω m² roll	approx. 37.5 m ² roll	approx /0 m² roll	approx /0 m ² roll	approx /0 m² roll	40 m ² roll	approx 37.5 m ² roll	approx 25 m ² roll	approx. 26 m² roll
908 / 913 a/m ²	approx. 908 / 913 g/m ²	approx. $995 a/m^2$	approx. 1 189 / 1 19/ g/m ²	approx. $136/(a/m^2)$	$\frac{1}{2}$ approx $\frac{1}{2}$ $\frac{2}{9}$ $\frac{1}{1}$ $\frac{1}{31}$ $\frac{1}{100}$	approx. 1.017 g/m^2	approx. 257 m^2	approx. $1.22/(a/m^2)$
12.5 mm	approx. 16 mm	approx 13 mm	approx 12.5 mm	approx 12.5 mm	approx. 13 mm	approx 17 mm	approx 27.5 mm	approx. 7,224 g/m
700 kPa	approx. /50 kPa	approx. 700 kPa	approx. 900 kPa	approx. 1 200 kPa	approx. 900 kPa / 1 200 kPa	approx /50 kPa	approx /80 kPa	approx 300 kPa
act polystyrana (HIPS)	high impact polyctyrane (HIPS)	high impact polystyrene (HIPS)	high impact polystyrene (HIPS)	high impact polystyrane (HIPS)	high impact polystyrene (HIPS)	high impact polystyrene (HIPS)	high impact polystyrene (HIPS)	high impact polystyrene (HIPS)
	nghimpact polystyrene (nii 3)		nglypropylopo (PP)		ngh impact polystyrene (im 3)	nglynrapylona (PP)	ngh impact polystyrene (mi 3)	
		potypropyterie (FF)			potypropytene (FF)	potypropyterie (FT)	potypropytene (FF)	
Jytelle (FF) (IND 220)		-			- nalvarandana (DD)	-	- nalunranulana (PD)	
	-		-					
	-	approx. 1,540, Ø 6.3 mm	-	-	approx. 1,540, Ø 6.3 mm	approx. 1,540, Ø 6.3 mm	approx. 5/5, Ø 15.8 mm	approx. 1,048, Ø 2.8 mm
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Extensive green roofs

Extensive green roofs are lightweight roofs covered with low-maintenance vegetation, such as succulents, herbs, and grasses that are specially adapted to the extreme weather conditions on roofs. They give the roofs a natural and friendly green look and increase the quality of the living environment.

Green roofs are not only aesthetically pleasing, but also highly functional. For example, extensive green roofs slow down water drainage at peak precipitation, e.g. during the more frequently occurring heavy downpours, thus relieving the sewage system. In addition, green roofs prevent the so-called heat island effect: Unlike concrete roofs, green roofs do not fully convert solar energy into heat, but into water vapour, which has a cooling effect on the environment. The vegetation also helps dampen noise from the environment. The costs of installing and maintaining extensive green roofs are low and more durable than conventional roofs. The low vegetation of our extensive green roofs is nursed in our own sedum nursery.

The Nophadrain Extensive Green Roof System

The ND 4+1h Drainage System is the ideal under layer for an extensive green roof. This multifunctional, CE-marked drainage system with high compressive strength protects the vegetation from water stagnation, while at the same time storing water for dry periods in the built-in water reservoir. In addition, the ND 4+1h Drainage System protects the roof covering system from a build-up of hydrostatic pressure and mechanical loads, both during and after installation.



Standard composition of Nophadrain Extensive Green Roof System



*optional ND WSB-50 Root-Resistant Sheet: if the waterproofing membrane is non-root-resistant

ND Drainage System



Standard: ND 4+1h Drainage System



For roofs with limited fall: ND 5+1 Drainage System



For roofs with extra water reservoir: ND 6+1 Drainage System





Installation 'Fire Station' Sint-Michielsgestel (NL) ✓ 'De Vlinder' Vaals (NL)



Central Library' Rotterdam (NL)



Intensive green roofs

Intensive green roofs are comparable to soil-bound green areas, such as gardens and park landscapes. The vegetation for this roof needs a lot of water and regular maintenance. The vegetation consists of lawns, shrubs, and trees and can easily be combined with pedestrian and vehicular pavements.

Intensive green roofs are not only found on buildings, but also over underground constructions such as car parks. The space taken up by the buildings and underground constructions is indirectly returned by installing an intensive green roof. The quality of the living environment is significantly increased by making use of stacked space, particularly in urban areas.

An intensive green roof offers many advantages in addition to the optimal use of the space. More green means that the sewage system is less strained

during heavy downpours thanks to the storage and delayed drainage of the rain water. More green also helps reduce heat build-up in the city.

The Nophadrain Intensive Green Roof System

The core of the Nophadrain Intensive Green Roof System is the ND 4+1h Drainage System. This multifunctional, CE-marked drainage system with high compressive strength protects the roof covering from water stagnation while at the same time, in combination with the WSM-50 Water Reservoir Panels, storing water (44 l/m²) for dry periods. In addition, the ND 4+1h Drainage System in combination with the ND TSF-100 Slip and Protection Sheet protects the waterproofing membrane against mechanical loads.

Go to **www.nophadrain.com** for more information and our technical guides.



Intensive vegetation ND DGS-I Substrate Intensive ND WSM-50 Water Reservoir Panel ND 4+1h Drainage System ND TSF-100 Slip and Protection Sheet (optional) Root-resistant waterproofing membrane*

> * optional ND WSB-80 Root Barrier: if the waterproofing membrane is non-root-resistant.

ND Drainage System



Standard: ND 4+1h Drainage System

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For roofs with limited fall: ND 5+1 Drainage System





Nistallation roof park 'Vierhavenstrip' Rotterdam (NL)

'Meerrijk' Eindhoven (NL) 'Europapark'
 Groningen (NL)

Centre Plan' Schaesberg (NL)





In order to prevent damage to the landscaping, it is important to install the landscaping on a drainage system with a high compressive strength. Poor drainage of rain water can result in scale development on the pavement that is difficult to remove. The landscaping can also suffer from discolouration as well as freezing.

#### The Nophadrain Podium Deck System

The core of the Nophadrain Podium Deck System is the ND 220 Drainage System. This multifunctional, CE-marked drainage system with high compressive strength prevents the stagnation of water under the pavement. This protects the pavement from scaling and discolouration. The ND 220 Drainage System also prevents frost damage as a result of freezing of the underground and thus provides a stable under layer for the pavement.

The ND 220 Drainage System also prevents the build-up of hydrostatic pressure on the roof covering system. The drainage system contains a sheet that spreads the pressure, which, in combination with the ND TGF-20 Separation and Slip Film, protects the roof covering system against mechanical loads.



#### Standard composition of Nophadrain Podium Deck System

Flexible paving Laying course or levelling layer ND 220 Drainage System ND TGF-20 Separation and Slip Film\* Waterproofing membrane \*optional ND TSF-100 Slip and Protection Sheet:

if a base course is being applied.

#### ND Podium Deck System



Standard: ND 220 Drainage System



For roofs with limited fall: ND 220h Drainage System



For inverted roof construction: ND 200sv Drainage System





Vinstallation 'Tennis Courts Grijpskerk' Zuidhorn (NL)

Entrance underground parking 'Vredenbergh' Breda (NL)

ÓDe Veranda' Rotterdam (NL) Entrance underground parking 'Europapark' Groningen (NL)





### **Parking Decks**

A parking deck system enables the installation of vehicular pavements on roofs. Parking decks are often combined with intensive vegetation. This means that the existing environment around a building can be extended onto the roof of the construction. This way the roof blends seamlessly into the environment and creates new usage possibilities for the roof, thus making optimal use of the available space.

#### The Nophadrain Parking Deck System

The extremely high compressive strength of the Nophadrain Parking Deck Systems makes them suitable not only for cars, but even for emergency services and heavy goods vehicles. The core of the Nophadrain Parking Deck System is the ND 620 Drainage System (for cars) or the ND 620hd Drainage System (for emergency services and heavy goods vehicles), both with high compressive strength. These drainage systems prevent the build-up of hydrostatic pressure on the waterproofing membrane. The drainage systems, in combination with the ND TSF-100 Slip and Protection Sheet, protect the waterproofing membrane against static and dynamic traffic loads.

The ND 620 / ND 620hd Drainage Systems ensure excellent water drainage from the foundation layer and prevent freezing and scaling in the hard landscaping. This means they offer a stable and durable under layer for the hard landscaping. Nophadrain Parking Deck Systems have been subjected to long-term dynamic load tests at the Technical University of Munich (D).



### Standard composition of Nophadrain Parking Deck System

Flexible paving
Laying course

– Sub-base layer

#### ND 620 Drainage System (cars) ND 620hd Drainage System (heavy goods vehicles)

ND TSF-100 Slip and Protection Sheet

Root-resistant waterproofing membrane\*

\*optional ND WSB-80 Root-Resistant Sheet: if the waterproofing membrane is non-root-resistant

#### ND Parking Deck Systems



Standard: ND 620 Drainage System (cars) ND 620hd Drainage System (heavy goods vehicles)



For inverted roof construction: ND 620sv Drainage System (cars) ND 620hdsv Drainage System (heavy goods vehicles)



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Spijkenisse (NL)

Parking Garage Colosseumweg / Essalam Mosque' Rotterdam (NL)

'Westerhaghe' Rijnsburg (NL)





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