

CARLISLE'S  
**HYDROPACK**  
ROOF GARDEN SYSTEM

**Table of Contents**

July 2011

	Page
<b>Part I - General</b>	
1.01 Description .....	3
1.02 Design Guidelines.....	3
1.03 Quality Assurance.....	4
1.04 Submittals .....	4
1.05 Warranty .....	4
1.06 Job Conditions .....	4
<b>Part II - Products</b>	
2.01 General .....	5
2.02 Carlisle Hydropack Module Specifications .....	5
2.03 Related Carlisle Materials.....	5
2.04 Growth Media Properties .....	5
2.05 Plants.....	6
2.06 "Hardscape" Items (Optional) .....	6
<b>Part III - Execution</b>	
3.01 General .....	7
3.02 Installation of Carlisle Protection Fabric .....	7
3.03 Application of Hydropack Modules .....	7
3.04 Maintenance .....	8
<b>Attachments</b>	
Hydropack Maintenance Attachment .....	9
Installation Details.....	10





# Carlisle Roof Garden Hydropack® System

July 2011

## PART I - GENERAL

### 1.01 DESCRIPTION

The Carlisle Hydropack Roof Garden System incorporates pre-planted “modules” in lieu of traditional components used above an adhered roofing membrane installed in accordance with Carlisle’s Roof Garden Waterproofing Specification.

The Hydropack modules are installed over a slip sheet of CCW 300HV protection fabric, which is installed directly over the Carlisle Membrane. Hydropack modules are lightweight, composed of recycled plastics (100% post industrial recycled high-density polyethylene - HDPE), and arrive at the building site ready for installation. Tray size is 24” X 15.6” with a depth of 3.6”

A shallow planting system (using Hydropack tray modules) pre-planted with 9 different types of plants. The sedum types are chosen for the specific climate zone and the anticipated weight above the membrane assembly is approximately 17.5 pounds per square foot, or 45 pounds per module, in a fully saturated state.

For information about the Hydropack modules, weights, planting types, and growth media, refer to Part 2, Products.

### 1.02 DESIGN GUIDELINES

- A. For 10 or 15-year warranties, the assembly requires the use of 60-mil Sure-Seal EPDM, 60-mil Sure-Weld TPO, 60-mil Sure-Flex PVC, FleeceBACK® 100, or AFX FleeceBACK membrane installed in an adhered fashion.
- B. For 20-year warranties, the assembly requires the use of 75 or 90-mil Sure-Tough™ Reinforced EPDM, 80-mil Sure-Weld® TPO, 80-mil Sure-Flex PVC, FleeceBACK 115 or AFX FleeceBACK Plus membrane installed in an adhered fashion.
- C. An EPDM, TPO or PVC membrane shall be fully adhered, typically to polyisocyanurate insulation, with layers of insulation set in adhesive. As an option, bottom layers of insulation can be mechanically fastened to the roof deck with the top layer set in adhesive.
- D. Refer to Carlisle’s Roof Garden Waterproofing System specifications for specific requirements concerning membrane adhesion and splicing criteria, insulation type and securement methods, product delivery, storage and handling guidelines, and applicable installation of all materials and details.
- E. To facilitate drainage, a **minimum roof slope of ¼” in 12”** must be provided at the waterproofing membrane level.
- F. Proper decking shall be provided by the building owner. The building owner or its designated representative must ensure the building structure is investigated by a registered engineer to ensure its ability to withstand the total weight of the specified roofing system, as well as construction loads and live loads, in accordance with all applicable codes. The specifier must also designate the maximum allowable weight and location for material loading and storage on the roof.
- G. Unless otherwise accepted by Carlisle, Hydropack modules shall be installed between April 1<sup>st</sup> and October 15<sup>th</sup>. Installation must be after the last frost day in the spring or before the first frost day in the fall.
- H. Prior to installing the Hydropack modules, a slip sheet of Carlisle CCW 300HV Protection Fabric shall be installed over the roofing membrane at all areas where the modules will be placed.
- I. When trays are to be installed in high wind areas, Carlisle should be contacted regarding appropriate methods to prevent tray movement. The trays are designed to lock together to increase stability and arrive with extremely high vegetative coverage to prevent growth media erosion issues.

### 1.03 QUALITY ASSURANCE

- A. A **pre-installation meeting** should be coordinated by the specifier and attended by the roofing applicator, membrane manufacturer's representative and other trades working on the roof system both before and after membrane installation. The purpose of this meeting is to discuss the necessity of ensuring proper membrane protection during all phases of installation and to review other applicable requirements or unusual field conditions.
- B. Upon request by the Authorized Applicator, an inspection will be conducted by a Field Service Representative of Carlisle to ascertain that the membrane roofing system has been installed according to Carlisle's specifications and details. This inspection shall be coordinated **prior to installing the Hydropack components** (Carlisle CCW 300HV Protection Fabric and the Hydropack modules) so that access to the membrane is not impaired.

**Note: The roofing applicator must notify Carlisle at least 3 weeks in advance of applicable inspection dates for coordination purposes.**

- C. A final inspection will be conducted after application of the Hydropack modules to ensure proper installation.
- D. Flood testing, electronic testing, or other leak detection means are **required** to check the waterproof integrity of the membrane prior to installing the Roof Garden components (Carlisle CCW 300HV Protection Fabric and the Hydropack modules).

### 1.04 SUBMITTALS

- A. To ensure compliance with Carlisle's warranty requirements, **all projects should be forwarded to Carlisle for review** prior to installation.
- B. **A dimensioned layout of Hydropack modules and all field splices shall be included** along with the project submittals (shop drawing and Request for Warranty).
- C. For all projects, prior to project inspection by Carlisle, a final shop drawing must be approved by Carlisle.

### 1.05 WARRANTY

- A. A **10, 15 or 20-year System Warranty** is available for a charge on commercial buildings and applies only to **products manufactured or marketed by Carlisle SynTec Incorporated**. The membrane system is defined as membrane, flashings, adhesives, sealants, and other Carlisle brand products utilized in this installation. For a complete description of these products, refer to the "Products Section".
- B. The 10, 15 or 20-year System Warranty includes overburden replacement or removal of the Hydropack system in the event of a claim.
- C. The formation or presence of mold or fungi in a building is dependent upon a broad range of factors including, but not limited to, the presence of spores and nutrient sources, moisture, temperatures, climatic conditions, relative humidity, and heating/ventilating systems and their maintenance and operating capabilities. These factors are beyond the control of Carlisle and Carlisle shall not be responsible for any claims, repairs, restoration or damages relating to the presence of any irritants, contaminants, vapors, fumes, molds, fungi, bacteria, spores, mycotoxins, or the like in any building or in the air, land, or water serving the building.

### 1.06 JOB CONDITIONS

- A. Coordination between various trades is essential to avoid unnecessary rooftop traffic over sections of the roof and to prevent damage to the membrane. Heavily traveled areas must be protected by placing temporary protection courses to prevent damage to the membrane.
- B. The use of a vapor retarder to protect insulation and reduce moisture accumulation within an insulated roofing assembly should be investigated by the specifier. Consult the latest publications by ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.) and NRCA (National Roofing Contractors Association) for specific information.

## PART II - PRODUCTS

### 2.01 GENERAL

The components of this roofing system are to be products of Carlisle. The installation, performance, or integrity of products by others is not the responsibility of Carlisle and is expressly disclaimed by the Carlisle Warranty.

### 2.02 CARLISLE HYDROPACK® MODULE SPECIFICATIONS

Hydropack modules are black in color, made from 100% recycled material and contain a filter fabric and drainage layer already placed in the module. Modules are pre-planted with growth media and plant species appropriate for the project climate. Physical properties are as follows:

Element	Description
Depth of Modules	3.6"
Module Size	24" X 15.6"
Weight of Planted Modules (fully saturated weights)	17.5 pounds per square foot
Module Material	150-mils HDPE (100% of material derived from recycled post industrial HDPE)
Module Clearance above Roofing Surface	1.2"
Color of Modules	Black
Drainage/Filter Fabric Layer	3 oz. Nonwoven Polypropylene Geotextile
Growth Media	Proprietary rooftop blend consisting of organic and inorganic components conforming to FLL guidelines
Required underlayment for modules	Carlisle CCW 300HV (16 oz/yd <sup>2</sup> polypropylene fabric)
Plants	Sedums or perennial/annual species specifically selected for climate, hardiness zone, color, and size.
Edge Treatment	Aluminum, pavers, recycled composite wood, or other specialty materials
Average Installation Time	860 square feet per person per day

### 2.03 RELATED CARLISLE MATERIALS

- A. Refer to the Carlisle Roof Garden Waterproofing specification for products related to the installation of the waterproofing system.
- B. **Protection Fabric (Carlisle CCW 300HV)** - A 16 oz/yd<sup>2</sup> polypropylene non-woven needle-punched fabric which is stabilized to resist soil chemicals, mildew and insects, and is non-biodegradable. It is used as a protection sheet beneath the Hydropack planting modules. Available in rolls 12.5" wide by 200" long and 39" wide by 200" long.

### 2.04 GROWTH MEDIA PROPERTIES

The Growth Media mix provides stable soil structure, high porosity, and high moisture holding properties. The growth media also provides excellent drainage while remaining lightweight.

Properties	Unit	Hydropack Growth Media
<b>Granulometric Distribution</b>		
• d<0.063 mm	mass %	8.1
• d>2.0 mm	mass %	56.0
<b>Volume Weight</b>		
• When dry	g/cc	0.8
• At max. water capacity	g/cc	1.33
<b>Water &amp; Air Management</b>		
• Total pore space	vol %	69.6
• Max water capacity	vol %	55.5
• Air content at max water capacity	vol %	14.0
• Water permeability	cm/sec	0.023
<b>Nutrients</b>		
• Organic content	mass %	4.3
• Phosphorus (P <sub>2</sub> O <sub>5</sub> )	mg/L	157.5
• Potassium (K <sub>2</sub> O)	mg/L	431.9
• Magnesium (Mg)	mg/L	146.4
• Nitrate + Ammonium	mg/L	8.6

**Notes:**

- Formulations are based on German FLL (The Landscaping and Landscape Development Research Society), "Guidelines for the Planning, Execution and Upkeep of Green-Roof Sites."
- Nutrients & pH adjusted and buffered to meet specifications or the FLL standards.
- Growth Media properties can vary due to biological factors, however the Growth Media utilized in Hydropack modules will always be within FLL standards.

## 2.05 PLANTS

A. Hydropack recommended design mix of groundcovers and perennials that can thrive in a non-irrigated, ultra-extensive/shallow environment based on the project location. Plants to be selected according to the USDA hardiness zone classification.

- The standard Hydropack system comes with 9 different types of plantings as follows:
  - Sedum Album „Coral Carpet“
  - Sedum Reflexum „Blue Spruce“
  - Sedum Sexangular
  - Sedum Rupestre „Angelina“
  - Sedum Ellacombianum
  - Sedum „John Creech“
  - Sedum Aizoon
  - Sedum Spurius
  - Allium Shoenoprasum
- Planting density: All Hydropack modules are pre-grown to achieve a minimum 80% vegetative coverage.

B. Custom planting schedules can be ordered. However, a minimum 12-week lead time is required for pre-growing the modules to 80%-90% vegetative coverage. This is classified under Special Order. Non-custom Hydropack orders generally have a lead-time of 3 weeks. Special patterns may be accomplished with various plant species to give a pattern look for color, plant height, etc.

## 2.06 “HARDSCAPE” ITEMS (optional)

A. **Carlisle Prest Pavers** - - 2' x 2' x 2" thick precast concrete pavers weighing 25 psf with a compressive strength of 8500 psi. Absorption is less than 5% and Flexural is 1,100 psi. Additional standard and custom made sizes available.

- B. **Carlisle Pedestal Paver** - 2" x 2" x 2.25" thick precast concrete pavers weighing 22 psf and an elevated clearance of 1/2" from incorporated footing.
- C. **Carlisle Guardian Paver** - Developed for high wind and special conditions. The paver is 2"x2"x2" or 3" thick and weighs 25 psf to 38 psf.
- D. **Carlisle RockCurb** - transition component between paver system/hard capped areas and adjoining roof garden assembly. Rock Curb comes in three standard heights (8", 12", and 16") and is manufactured either straight or with a radius.
- E. **Carlisle Paver Accessories** - High Tab Pedestal with shims, EPDM Pedestal with shims, Compensator, Elevator Coupler, and Elevator Pedestal.
- F. **Sure-Seal Rubber Paver** – A 2" by 2" by 2" thick rubber paver weighing approximately 24 pounds per unit (6 pounds per square foot) manufactured from recycled rubber which provides a resilient, shock absorbing, weather resistant surface. Available in colors of terre cotta (red) and black. Optional sizes and colors are also available.
- G. **Carlisle Stained Glass Stone** –Stained Glass Stone is 100% post-consumer recycled & tumbled glass in a 1"- 2" particle size used as a special effects accessory for Roof Gardens and Plazas. Available in 12 different colors, Stained Glass Stone can be utilized around perimeters, penetrations or even to create colorful logos in any size or shape. Stained Glass Stone is applied at a minimum rate of 10 pounds per square foot over a minimum 1" thick drainage composite such as Carlisle MiraDRAIN G4.

## PART 3 EXECUTION

### 3.01 GENERAL

- A. Refer to Carlisle's Roof Garden Waterproofing System specifications for specific requirements concerning membrane adhesion and splicing criteria, insulation type and securement methods, product delivery, storage and handling guidelines, and applicable installation of all materials and details.

**Note:** Overlayment of field membrane splices will not be required when splices are shingled to avoid bucking of water. If field splices will buck water or if they are located in areas of ponded water, they shall be overlaid. Use 6" wide Sure-Seal Pressure-Sensitive Cured Cover Strip for Sure-Seal EPDM and FleeceBACK membranes and 6" wide Sure-Weld Pressure-Sensitive Cover Strip for Sure-Weld TPO membrane.

- B. Flashing/detailing at walls, curbs, skylights and all other penetrations through the membrane must be flashed in accordance with Carlisle's published specifications/details for the applicable membrane specified.

### 3.02 INSTALLATION OF CARLISLE CCW 300HV PROTECTION FABRIC

**Installed prior to installation of the Hydropack modules and after Carlisle's inspection of the membrane system.**

- A. **Sweep** all debris, foreign material, etc. from the membrane surface.
- B. **Unroll CCW 300HV Protection Fabric** directly over the membrane and provide a minimum 2" side and end overlap.
- C. Under windy conditions, provide temporary ballast to prevent wind disturbance. It is recommended to install the additional Hydropack modules over the protection fabric soon after its placement to prevent disturbance.

### 3.03 APPLICATION OF Hydropack MODULES

Unless otherwise accepted by Carlisle, Hydropack modules shall be installed between April 1<sup>st</sup> and October 15<sup>th</sup>, but not when the daytime temperature is below 50°F.

- A. **Remove** all debris from the slip sheet surface.
- B. **Place** modules over the slip sheet in the desired locations as indicated on the shop drawings.

**Note:** Care must be exercised when placing modules to avoid damaging the slip sheet or underlying membrane. **Do not drag** modules into position. Modules must be **lifted** and gently positioned.

- C. Modules have interlocking „male“ and „female“ tabs on all sides. Simply line up the tabs and allow the module to vertically slide into place adjacent to modules already on the roof. This allows all modules to be connected, preventing most wind issues.
- D. After installing modules in designated locations, all modules shall be sufficiently watered with a fine spray to ensure growth. Water must be free of contaminants or substances harmful to plant growth. Hoses or other methods of transporting water to the roof shall be furnished by the applicator. **Do not install** modules over saturated roof surfaces or under freezing conditions without prior approval from Carlisle.
- E. Modules **must** be fully saturated on the day of installation. Visual confirmation of full saturation can be established by lifting one corner of the filter fabric in the modules to see that the 1.2" reservoirs are filled.
- F. If planted during a time of the year when maximum daytime temperatures exceed 80°F, modules should be irrigated once per day for 30 minutes during the first 14 days following installation. This will ensure that the plants are properly established.

### 3.04 MAINTENANCE

Maintenance is the responsibility of the building owner. Maintenance service can be arranged by Carlisle, or the owner may choose to use an outside firm or their own staff. In all cases, the requirements outlined below must be followed:

#### A. Maintenance

- 1. After installation, keep traffic over the modules to a minimum. If a high traffic area develops that was not expected, replace trays in this area with pavers to offer a sturdy walking surface.
- 2. Check drains at each visit for debris, root, and plant intrusion to assure there are no obstructions to prevent water flow to the drain.

#### B. Long-Term Maintenance – Hydropack Modules:

Refer to Hydropack Maintenance Attachment.

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# Carlisle Roof Garden Hydropack® Maintenance

March 2011

## Immediately After Installation

1. Water/irrigate the roof to the point of run-off. Lift the filter fabric of one tray to make sure the water reservoirs are filled with water.
2. If the Hydropack modules were installed during the hotter months (mid-June to mid-September) they must be irrigated 30 minutes per day for the next 10-15 days after installation.
3. If irrigation is an option for the duration of the first growing season, Roof Garden plants will thrive and faster vegetative coverage will be obtained. Watering can occur twice a week for 30 minutes.
4. During extremely hot, dry, drought type conditions, regularly check the Hydropack system for signs of stress. If the plants seem to be thirsty where they crumple between your fingers and the water reservoirs are empty, you must irrigate. This should be done twice a week in the evenings until the drought period is over.

## First Season

1. Six to eight weeks after installation, all weeds and non-specified plant material must be pulled from the growth media and removed from the rooftop.
2. During weed removal events, all drains must be inspected. If Carlisle Roof Garden Drain Boxes are utilized, remove the four Phillips head screws on the lid and remove to visually inspect the drain internals.
3. After the local trees have dropped their leaves, a final Autumn inspection must be performed. All debris must be removed from the Roof Garden and drains must be given a final inspection for the season.

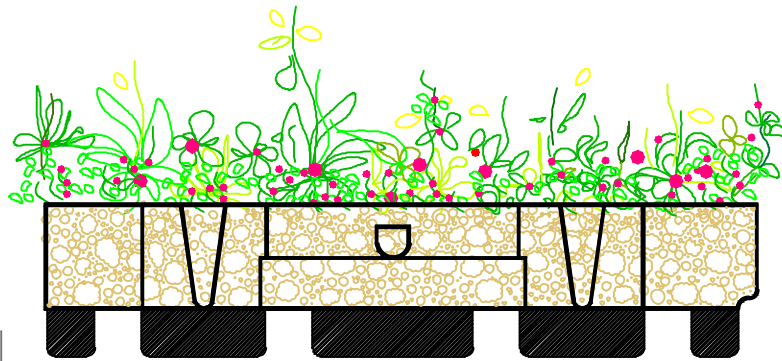
## Second Season

1. If in USDA climate 7 or above, a Spring fertilizer application may be given. Granular **organic** fertilizer can be used at the full rate recommended on the packaging. Petrochemical-based time-release fertilizer (Osmocote, Miracle-Gro, etc.) can be used at **half** the rate recommended on the packaging. Organic fertilization will result in a lower water requirement for the plants. On all-sedum roofs, fertilization should not be needed.
2. A mid-Spring weed removal and drain inspection event must occur. A total of two weed removal and drain inspection events should occur during the second season
3. If irrigation is available during the second season, it will serve to enhance the growth of your Carlisle Roof Garden.
4. After the local trees have dropped their leaves, a final Autumn inspection must be performed. All debris must be removed from the Roof Garden and drains must be given a final inspection for the season.

## Third season

1. A Spring fertilizer application may be given, if needed.
2. One weed removal event must occur, in the mid-Spring
3. During the Autumn maintenance event, all foreign debris must be removed from the roof

If possible, monitor your Carlisle Roof Garden by visual examination at least once a month to make sure that the plants appear healthy. Should your Hydropack modules experience any health-related issues, contact Carlisle SynTec Inc. for support. Once established, your Carlisle Roof Garden should provide you with decades of beautiful service.



CARLISLE HYDROPACK MODULAR ROOF GARDEN SYSTEM

CCW 300HV PROTECTION FABRIC

MIN. 60-MIL EPDM OR TPO ADHERED\*

BONDING ADHESIVE

APPROVED INSULATION: MIN. 25 PSI (172 kPa)  
POLYISOCYANURATE OR ACCEPTABLE COVER BOARD

APPROVED ADHESIVE

APPROVED INSULATION: AS AN ALTERNATE TO  
ADHESIVE ATTACHMENT, SECUREMENT OF FIRST  
LAYER CAN BE INSULATION FASTENERS &  
PLATES

APPROVED ADHESIVE

STRUCTURAL DECK

\*NOTE:

MEMBRANE THICKNESS IS DEPENDENT UPON WARRANTY LENGTH.

REFER TO "ROOF GARDEN ATTACHMENT" FOR SPECIFIC REQUIREMENTS.

DETAIL(S) NOT TO SCALE

JULY 26, 2011

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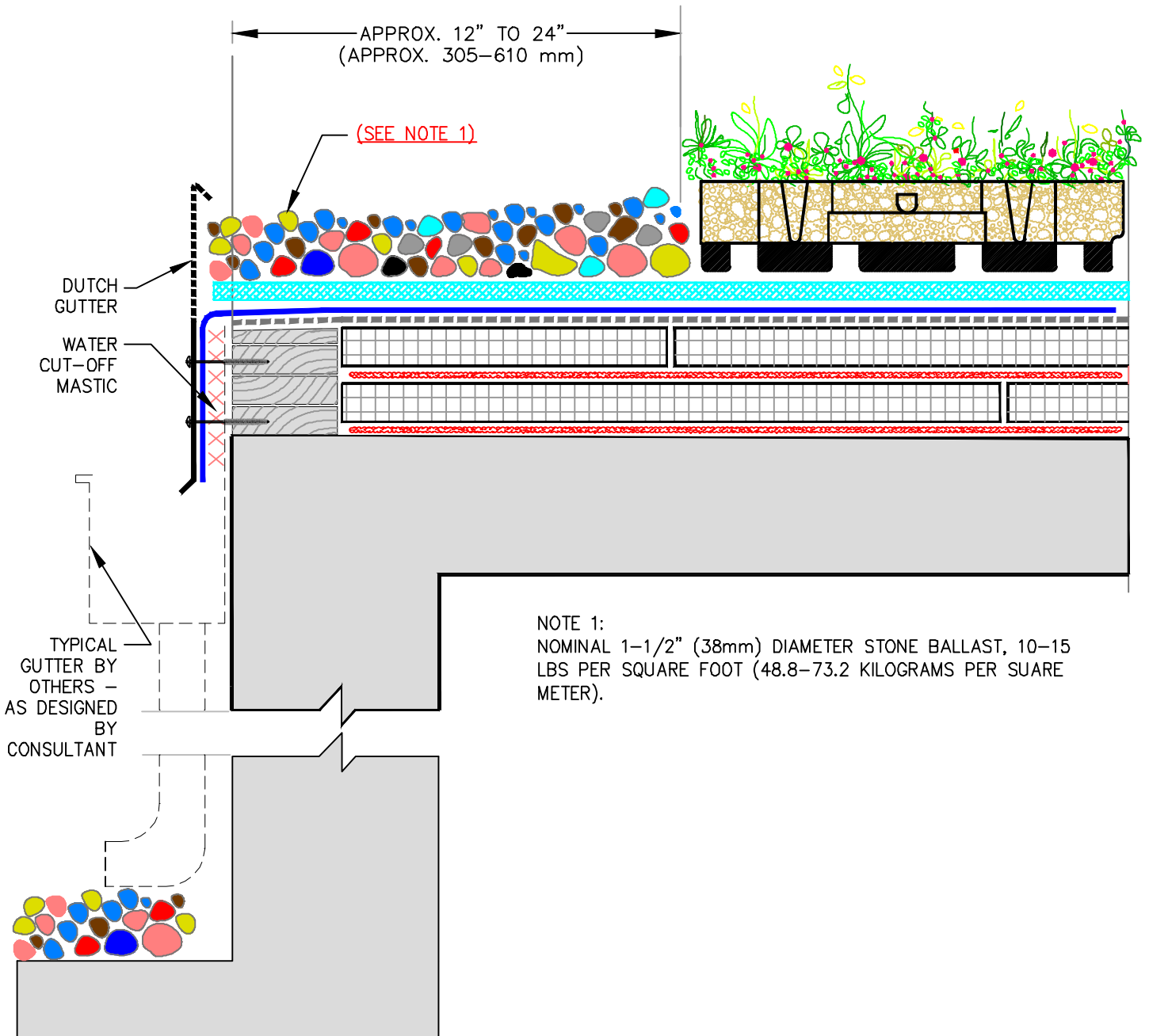
ROOF GARDEN  
DETAILS

GREEN GRID  
SYSTEM

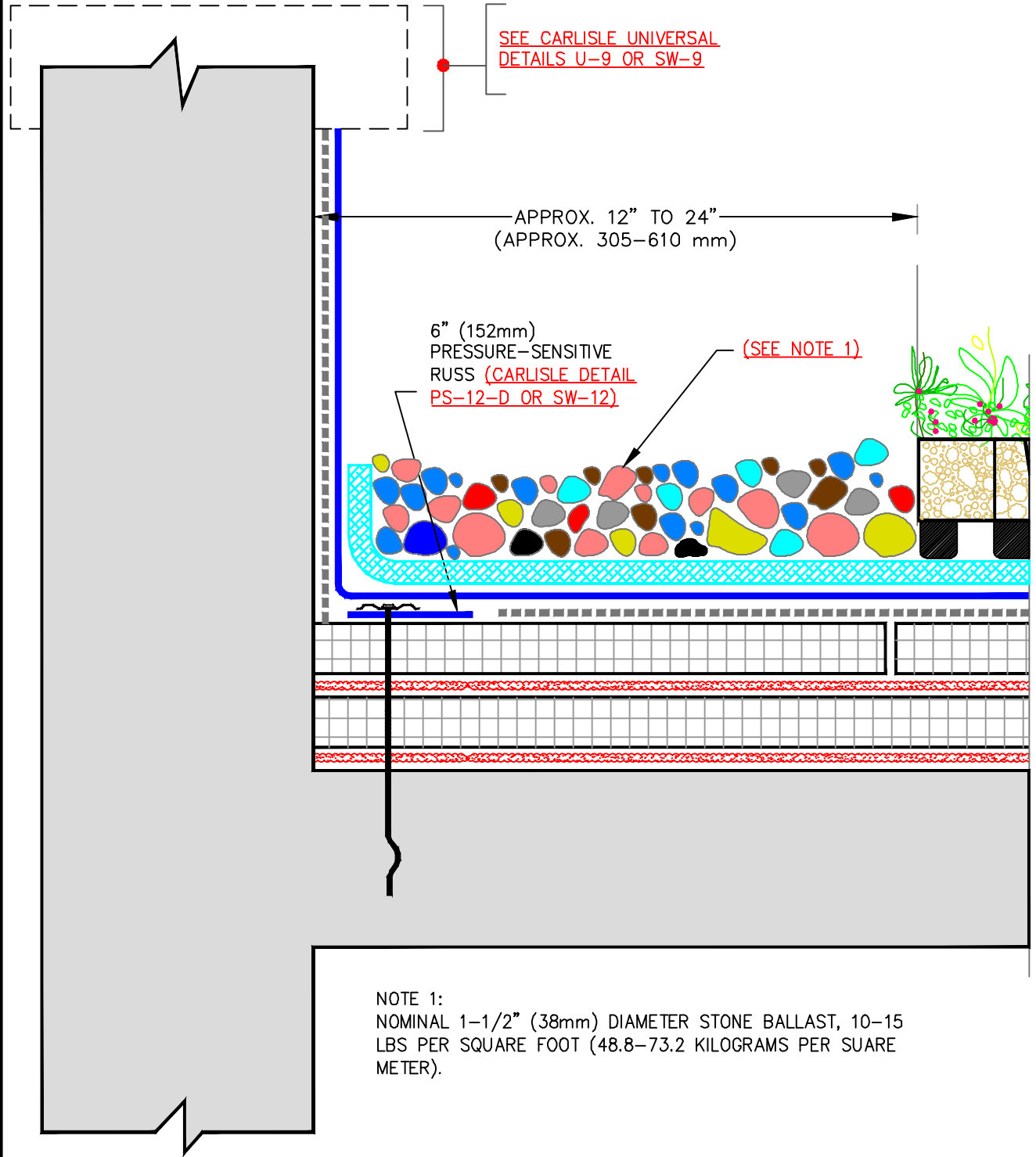
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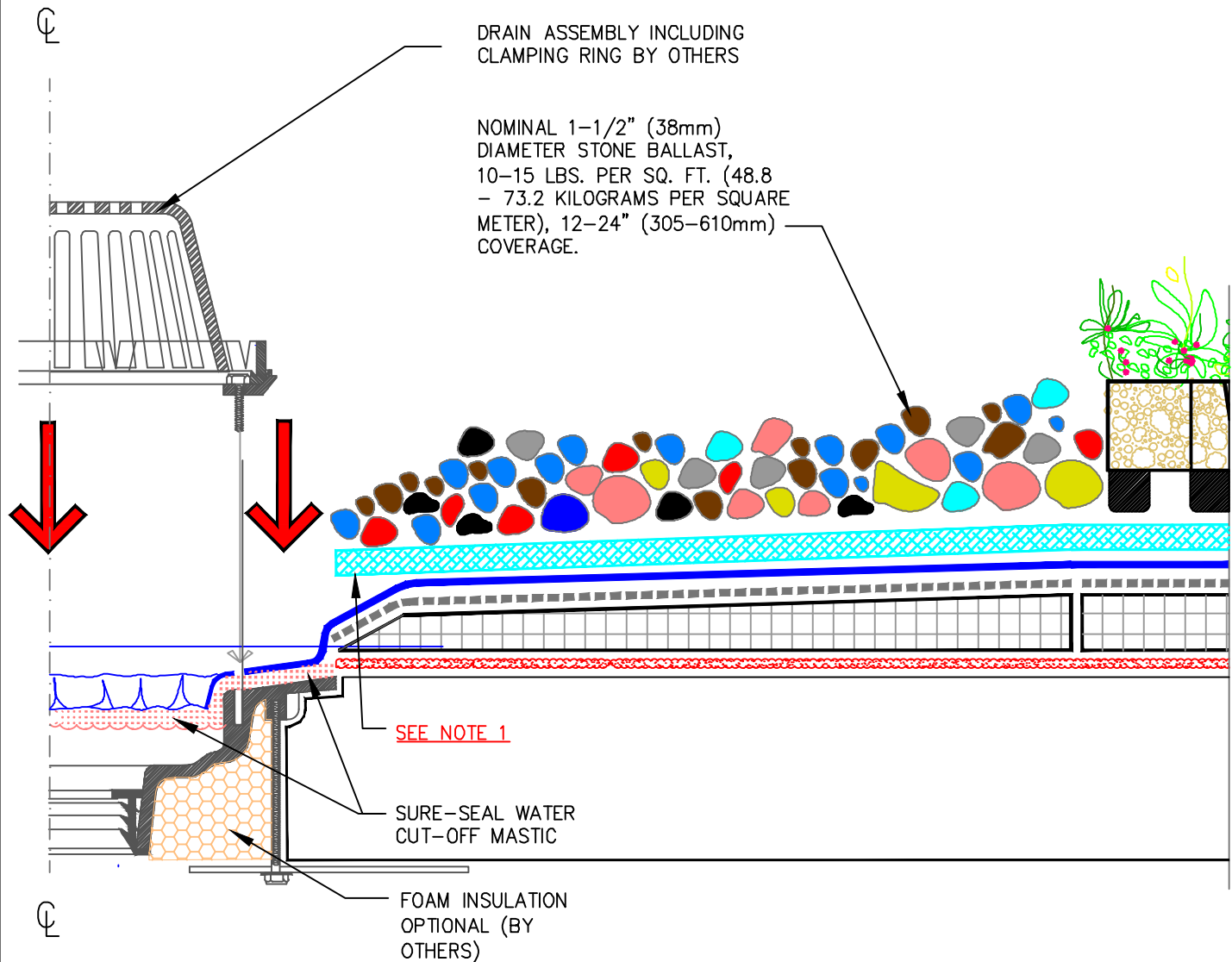
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NOTE 1:  
 NOMINAL 1-1/2" (38mm) DIAMETER STONE BALLAST, 10-15  
 LBS PER SQUARE FOOT (48.8-73.2 KILOGRAMS PER SUARE  
 METER).

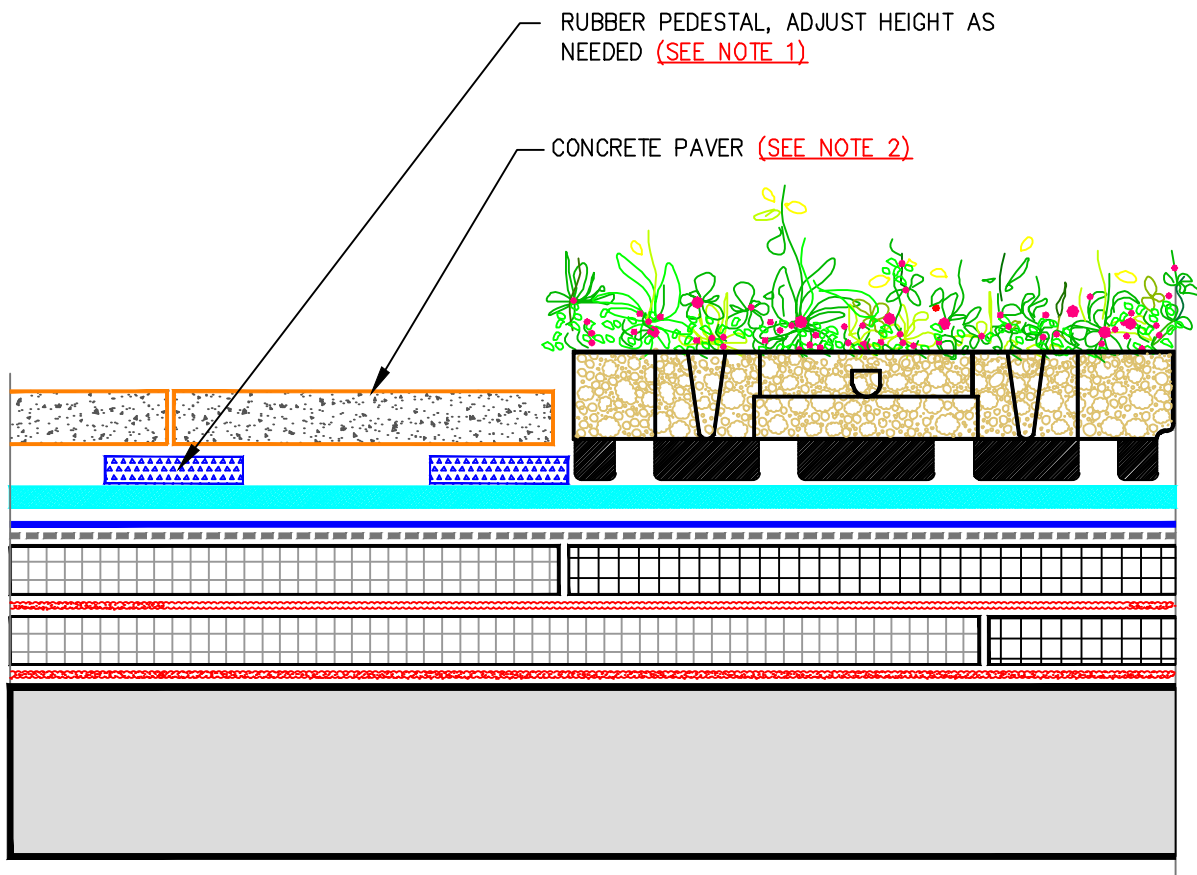


NOTE 1:  
 NOMINAL 1-1/2" (38mm) DIAMETER STONE BALLAST, 10-15  
 LBS PER SQUARE FOOT (48.8-73.2 KILOGRAMS PER SUARE  
 METER).



NOTES:

1. STOP CCW 300HV PROTECTION FABRIC MAT AT BASE OF DRAIN.
2. ALL BOLTS OR CLAMPS MUST BE IN PLACE TO PROVIDE CONSTANT COMPRESSION ON WATER CUT-OFF MASTIC.
3. CUT THE MEMBRANE SO IT EXTENDS A MIN. OF 1/2" (13mm) FROM THE ATTACHMENT POINTS OF THE DRAIN CLAMPING RING.
4. HOLE IN MEMBRANE MUST EXCEED THE SIZE OF DRAIN PIPE.
5. ROOF DRAIN SIZE AND NUMBER OF DRAINS SHALL BE IN ACCORDANCE WITH APPLICABLE LOCAL CODES.
6. REMOVE ALL LEAD AND OTHER FLASHING, WHERE EXISTING DRAINS ARE FLASHED.



NOTES:

1. ALTERNATE: EXPANDED OR EXTRUDED POLYSTYRENE BOARDS WITH MINIMUM DENSITY OF 1.25 POUNDS PER CUBIC FOOT (20 KILOGRAMS PER CUBIC METER).
2. ALTERNATE: STONE BALLAST, 10–15 POUNDS PER SQUARE FOOT (48.8 – 73.2 KILOGRAMS PER SQUARE METER)