

SECTION 07 55 65

INTENSIVE GREEN ROOF

(ZinCo "Perennial Garden" with Floradrain FD 40-E - intensive)

PART 1 GENERAL

1.1 SUMMARY

- A. This sample specification serves as a guideline to the specifier. It shall be adapted to each project by either choosing from several suggestions or by adjusting the text to project specific and site conditions, such as type of roof construction, roof slope, insulation, water proofing, local climate, design goals, and other.
- B. This specification is prepared in accordance with the CSI format and shall be included as separate section under DIVISION 7 – Thermal and moisture protection.

1.2 SECTION INCLUDES

- A. Intensive green roof system including the following:
 - 1. Plug plants according to project specific plant list.
 - 2. Growing media.
 - 3. Filter layer.
 - 4. Inspection chambers.
 - 5. Drainage layer.
 - 6. Protection layer / separation layer.
 - 7. Root barrier.
 - 8. Related products.

1.3 RELATED SECTIONS

- A. Division 07 Section "Waterproofing" for waterproofing systems under vegetated roof system.
- B. Division 07 Section "Roofing" for roofing systems under vegetated roof system.
- C. Section 07 Section "Sheet Metal Flashing and Trim" for coordination with flashing.

1.4 DEFINITIONS

- A. Green roof: Multi-layered exterior system of growing media and plant materials for installation over membrane roofing and waterproofing systems.
- B. Intensive green roof: Well maintained garden on utilized flat roof. Intensive green roofs are heavy in weight with deep growing media levels. The plant selection includes perennials, shrubs and / or lawn. Other landscape options like pavement, pergolas and ponds also may be included. Maintenance varies depending on plant choice and design.
- C. System build-up "Perennial Garden" with Floradrain FD 40-E - intensive: A perennial garden system can be lighter in weight than a regular intensive green roof, and is generally designed to have plants with periodic maintenance requirements and allows for a wide range of design options with medium amount of maintenance.

INTENSIVE GREEN ROOF SYSTEM 07 55 65-1

1.5 SUBMITTALS

- A. Submit in accordance with Division 01 Section "Submittal Procedures".
- B. Product data: Submit manufacturer's current published data including component materials, dimensions, standard details, and installation instructions.
- C. Shop drawings: Include the following:
 - 1. Details of green roofing system, plantings, and paving.
 - 2. Relationship to substrate, perimeter, and penetrating items.
 - 3. Location of roof drains and slopes.
 - 4. Average weight of green roof system.
- D. Range samples: Full size sample of each planting selection in trays minimum 1 x 1 feet by full thickness.
- E. Closeout submittals: Maintenance instructions and warranties.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer qualifications: Minimum ten years' experience producing green roof systems of the size with the production facilities capable of meeting the project schedule.
 - 2. Installer qualifications: Minimum 2 years' experience with green roof systems and acceptable to the manufacturer, with adequate equipment and skilled workers.
- B. Pre-installation meeting: Convene on project site min. one week before beginning work to:
 - 1. Verify project requirements and site logistics.
 - 2. Coordinate between trades.
 - 3. Assess integrity of the roofing system and building structure.
 - 4. Review manufacturer's installation instructions and warranty requirements.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Coordinate delivery schedule to minimize on-site storage. Verify roofing installation system is tested and accepted prior to delivery. Do not overload roof.
- B. Store materials in a dry area, out of direct sunlight, protected from freezing, staining, contamination, or damage.
- C. Water plants and expose plant materials to daylight. Unpack trays for even daylight distribution.

1.8 WARRANTY

- A. Manufacturer's warranty: Provide manufacturer's 5-year limited warranty against deficiencies in materials or fabrication.
- B. Installer's warranty: Provide installer's 2-year growing warranty which provides periodic inspections and maintenance service to ensure vegetation is properly installed, is becoming established, and is of sufficient density over the roof area.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Basis-of-Design: "Perennial Garden" with Floradrain FD 40-E - intensive Intensive Green Roof System by
ZinCo USA, Inc.
401 VFW Drive
Rockland, MA 02370
Telephone: 866-766-3155
Website: www.zinco-usa.com.

2.2 COMPONENTS

(Note to specifier: select applying components for standard roof / inverted roof.)

- A. Vegetation layer:
Plug plans: perennials, grasses and small shrubs. Species, sizes, and qualities according to project specific plant list. Delivery and appropriate installation in growing media, incl. suitable watering regime after installation.
- B. Growing media:
Engineered growing media purpose made for intensive green roofs.
Zincoblend I, typical for intensive roofs. Average depth according to the requirements of selected species and according to drawings, approx. 8 in. (approx. 200 mm). Delivery and installation on the filter layer.
- C. Filter layer:
ZinCo Filter Sheet SF made of non-rotting thermally strengthened polypropylene. UV-stabilized, chemically and biologically neutral. Color: black. Thickness: approx. 0.04 in. (approx. 1.14 mm). Weight approx. 0.02 lbs./sq. ft. (approx. 109 g/m²). Water flow rate according to ASTM D4491: approx. 160 gpm/sq. ft. (approx. 6519 l/min/m²). Apparent opening size according to ASTM D4751: approx. 70 US Sieve (approx. 0.212 mm). Delivery and installation on the drainage layer.
- D. Inspection chambers:
(Note to specifier: please select according to project requirements.)
1. ZinCo Inspection Chamber KS 10, made of plastic-coated aluminum with lateral slots for water passage. Detachable cover made of galvanized, plastic-coated steel with two finger-holes. Color: old silver-antique. Height: approx. 3.9 in. (approx. 100 mm) (H). Outer dimension of the Chamber (at transportation): approx. 11.8 x 11.8 in. (approx. 300 x 300 mm) (O). Dimension including flange (extended, including chamber): approx. 11.8 x 20.9 in. (approx. 300 x 530 mm) (F). Aperture dimension: approx. 9.4 x 9.4 in. (approx. 240 x 240 mm) (A). Slot width: approx. 0.1 in. (approx. 3 mm). Weight: approx. 6.2 lbs. (approx. 2.8 kg). Delivery and installation on the drainage elements above the roof outlets to ensure accessibility of the outlets at any time.
 2. ZinCo Extension Piece KSA 8. *(Optional item for deeper growing media level)*. Height approx. 3.1 in (approx. 80 mm). For elevation of KS 10 in segments of approx. 3.1 in. (approx. 80 mm).
- E. Drainage layer:
ZinCo Floradrain FD 40-E. Drainage and water retention element made of thermoformed recycled polyolefin, with water retaining troughs and openings for ventilation and evaporation as well as a multidirectional drainage channel system on the underside. Color: dark grey. Height: approx. 1.6 in. (approx. 40 mm). Weight: approx. 0.4 lbs/sq. ft. (approx. 1.9 kg/m²). Biologically neutral. Max. compressive strength (at 10% compression, without filling): approx. 24.7 psi (approx. 170 kN/m²). Water retention capacity: approx. 0.12 gal/sq. ft. (approx. 5 l/m²). Delivery and installation on the protection layer / separation layer.

- F. Protection layer / separation layer:
(Note to specifier: select applying components for standard roof / inverted roof.)
1. For standard roof:
ZinCo Protection Mat SSM 45. Water and nutrient retention as well as a protection layer. Non-rotting, UV stabilized fiber mat made of polypropylene, with fleece backing. Color: black. Thickness approx. 0.15 in. (approx. 3.8 mm). Weight approx. 0.11 lbs/sq. ft. (approx. 543 g/m²). Compatible with bitumen and polystyrene; biologically neutral. Delivery and installation on top of the root barrier or root resistant waterproofing.
 2. For inverted roof:
ZinCo Separation Membrane TGV 21 made of thermally bound, water repellent polypropylene. Non-rotting. Color: black. Thickness approx. 0.02 in. (approx. 0.55 mm); Weight approx. 0.02 lbs/sq. ft. (approx. 80 g/m²). Compatible with bitumen and polystyrene, resistant to acids and alkalizes, biologically and chemically neutral, air and vapor permeable. Vapor opening size $s_d \leq 0.03$ ft. ($s_d \leq 0.01$ m). Delivery and installation on top of the thermal insulation.
- G. Root barrier:
(Note to specifier: please select, if non root resistant waterproofing is used.)
1. ZinCo Root Barrier WSF 40. Seamless tarp of high-pressure polyethylene (PE-LD). UV-stabilized. Color: black. Thickness approx. 0.01 in. (approx. 0.34 mm). Weight: approx. 0.06 lbs/sq. ft. (approx. 320 g/m²). Compatible with bitumen and polystyrene; no chemical softeners; resistant to humic acids; partially resistant to oil and petrol. Delivery and installation on top of the waterproofing.
 2. In case of woody plants ZinCo Root Barrier WSB 100-PO. Root proof, hot air weldable sheet made of flexible polyolefin (FPO), with polyester weft inserted reinforcement. Resistant to bitumen and for short periods of time to oil. Superb weather proofness (UV- and IR-Radiation). Thickness: approx. 0.04 in. (approx. 1.1 mm). Weight: approx. 0.23 lbs./sq. ft. (approx. 1.1 kg/m²). Hot air weldable, excellent cold flexibility. Root resistance tested according to FLL-Test method of 2002. Delivery and installation on top of the waterproofing.
- H. Related products
(Note to specifier: please select, if required)
1. Provide gravel for non-vegetated areas, including roof edges, flashing, and roof penetrations: smooth, washed, clean, well rounded gravel.
 2. Provide aluminum or stainless steel L-shaped profile between gravel and growing media.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of conditions:
1. Confirm work by others is installed per the project requirements. Do not cover work by others prior to inspection or acceptance.
 2. Inspect seams, penetrations and details. Identify defects in writing to the architect.
- B. Do not proceed until unacceptable conditions are corrected.

3.2 INSTALLATION

(Note to specifier: select applying components for standard roof / inverted roof.)

- A. General:
Install green roof system in strict accordance with manufacturer's instructions and in proper relationship with adjacent materials and the following.

1. Root barrier:
(Note to specifier: please select, if required. Please select applying components.)
 - a. Install the Root Barrier WSF 40 above the non root resistant waterproofing with an overlap of min. 5.0 ft. The root barrier shall be taken above the growing media along edges and at roof penetrations. Cut the root barrier in situ at roof penetrations. Consider an allowance for overlap and wastage of approx. 20–30 %.
 - b. In case of woody plants install the Root Barrier WSB 100-PO above the non root resistant waterproofing, the seams are to be hot air welded, root proof and waterproof with an overlap of min. 2.0 in. The root barrier shall be taken above the growing media along edges and at roof penetrations. Cut the root barrier in situ at roof penetrations. Consider an allowance for overlap and wastage of approx. 3–5 %.
2. Protection layer / separation layer:
 - a. For standard roof:
Install the Protection Mat SSM 45 above a waterproofing or root barrier with an overlap of approx. 4.0 in (approx. 100 mm). The protection mat shall be taken above the growing media along edges and at roof penetrations. Cut the protection mat in situ at roof penetrations. Consider an allowance for overlap and wastage of approx. 10–15 %.
 - b. For inverted roof:
Install the Separation Membrane TGV 21 above the thermal insulation with an overlap of approx. 4.0 in (approx. 100 mm). Cut the slip sheet in situ at roof penetrations. Consider an allowance for overlap and wastage of approx. 10–15 %.
3. Drainage layer:
Install the drainage element Floradrain FD 40-E on the Protection Mat SSM 45 or Separation Membrane TGV 21. The drainage elements are installed butt jointed, in vegetated areas with the evaporation holes facing up. Cut the drainage element in situ at roof penetrations. Consider an allowance for wastage of approx. 3 %.
4. Inspection chambers:
Cut holes into all layers of the build-up in the size of the drain. Then install the Inspection Chamber KS 10, and if needed Extension Pieces KSA 8, on top of the drainage layer above the drain. Install the Filter Sheet SF by rolling it over the inspection chamber and cutting it, ensuring that all slots of the inspection chamber remain uncovered, but the flanges remain covered. Surround with a gravel strip.
5. Filter layer:
Install the Filter Sheet SF with an overlap of approx. 8 in. (approx. 200 mm) above the drainage element. The filter sheet shall be taken above the growing media along edges and at roof penetrations. Cut the filter sheet in situ at roof penetrations. Consider an allowance for overlap and wastage of approx. 15–25 %.
6. Growing media:
Install the growing media Zincoblend I for the “Perennial Garden” Green Roof System on the Filter Sheet SF. Install the growing media equally in the necessary depth. Check the depth in several places to ensure continuous thickness. A tolerance of approx. 0.5 in. (approx. 13 mm) is acceptable. Consider a settlement factor of 1.2.

7. Vegetation layer:
Plug Plants: Apply plug plants at recommended application rate and according to the project specific plant list and drawings. Water and fertilize as required by the specific plant lists and local climate.
8. Related products:
(Note to specifier: please select, if required.)
 - a. Install gravel in non-vegetated areas, including roof edges, flashing, and roof penetrations: smooth, washed, clean, well rounded gravel.
 - b. Install aluminum or stainless steel L-shaped profile between gravel and growing media.

3.3 CLEANING

- A. Remove all debris from the project site in accordance with the owner's construction waste management requirements.

3.4 PROTECTION

- A. Protect green roof planting and components from dirt and damage caused by subsequent construction activities.

3.5 MAINTENANCE

- A. Initial irrigation: Immediately after installation, ensure the plants have sufficient water to root successfully. Subsequent irrigation regime depends on weather, location, and project specific plant material.
- B. Initial fertilization: After seeding or planting an initial fertilization with a slow release fertilizer is recommended.
- C. Monitor the first two growing seasons carefully. Replace dead plants to ensure full-vegetation coverage and prevent weed growth. Remove coarse or unwanted plants and tree seedlings.
- D. General maintenance: includes but is not limited to the removal of unwanted plants and the seedlings of trees, keeping the vegetation zone free from unwanted plants, visual inspection and cleaning of the outlets, and fertilization of the vegetation with a slow release fertilizer, replacing plant material that dies, plant specific irrigation.

END OF SECTION