Installation Guidelines

Black Locust End Grain Flow Pavers

Revised Edition

Material Overview

- Each paver sheet consists of 9 Black Locust wood blocks mounted on a 12” × 12” metal mesh backing
- Each block is 3.5” × 3.5” × 2.3” high — exposing the natural end grain to the surface
- Gap spacing is ½” between blocks to allow water to flow through and be ADA compliant
- Each paver weighs approximately 7 pounds

Why Black Locust? Black Locust (*Robinia pseudoacacia*) is one of the hardest and most naturally rot-resistant hardwoods in the United States. It requires no chemical preservatives and performs exceptionally well in ground-contact with wet permeable paving environments.

Black Locust End Grain Flow Paver (12” × 12”)

Suggested Site Preparation

- Obtain a geotechnical survey for the site to determine water flow, soil infiltration capacity, and the appropriate drainage plan
- Confirm groundwater depth is at least 2 ft (0.6 m) below the bottom of the planned paver structure
- Assess contributing area runoff — divert uncontrolled sediment-laden runoff away from the paver area during and after construction
- The site must enable water to pass *through* the pavers and *underneath* them into the subgrade
- Locate and mark underground utilities before any excavation

Ground Up Construction Guidelines

The following step-by-step guidelines incorporate best practices for permeable pavement subbase preparation adapted for **Black Locust End Grain Flow Pavers**. Layer thicknesses should be confirmed by your geotechnical survey.

Step 1: Excavation and Site Marking

- Mark the excavation boundary with paint and/or stakes
- Excavate to the total required depth based on the subbase, base, and bedding layer thicknesses determined from structural and hydrologic design (typically 6”–18” below finish grade)
- Remove all rocks, roots, and debris from the excavated area
- Use the excavation hole as a temporary sediment trap — clean it immediately before placing aggregate and divert all surface runoff away from the excavated area
- Ensure no groundwater seepage or standing water is present before proceeding

Step 2: Soil Subgrade Preparation

- Compact the native soil subgrade to a uniform density appropriate for the anticipated traffic or loads
- Field-test compaction with density measurements per project specifications
- For soft or low-strength soils (CBR < 2%), consider geogrids or geocells to reinforce the subbase
- Slope the subgrade surface to match the intended drainage direction (typically 1–2%), ensuring water flows away from structures

NOTE: *For subgrade slopes exceeding 3%, install berms or intermittent check structures within the aggregate base to slow lateral water migration.*

Step 3: Geosynthetic Separation Layer (Recommended)

- Line the sides of the excavation with separation geotextile prior to placing any aggregate — this prevents surrounding soil fines from migrating into and clogging the subbase over time
- Lay separation geotextile horizontally over the compacted subgrade surface before placing the subbase reservoir layer
- Geotextile must conform to subsurface drainage applications (e.g., AASHTO M-288); select material evaluated for clogging potential
- Ensure geotextile has no tears or wrinkles; pull taut and secure during installation

NOTE: *Geotextile is a key long-term performance element for permeable pavements. It extends the life of the subbase and reduces maintenance frequency significantly.*

Step 4: Open-Graded Subbase Reservoir Layer

- Place 2”–8” of open-graded crushed stone subbase per the geotechnical survey. For pedestrian or light residential applications a single combined base layer may suffice; increase thickness for heavier loads or poor-draining soils
- Recommended stone size: ASTM No. 2, 3, or 4 (approx. 3” down to 2” / 75–50 mm) — larger voids store more water and drain rapidly
- Spread stone with a front-end loader rather than dumping directly to prevent aggregate segregation
- Store aggregate on a hard surface or geotextile to keep it sediment-free prior to placement
    - This layer is the primary stormwater reservoir — water held here infiltrates into the subgrade over a design period of 48–72 hours
    - For clay-heavy or low-permeability soils, increase depth and/or add a perforated underdrain pipe

Step 5: Open-Graded Base Layer

- Place a 4” (100 mm) layer of ASTM No. 57 crushed stone (approx. 1” down to ½” / 25–13 mm) on top of the subbase
- This layer provides a structural transition between the coarser subbase and the fine bedding aggregate above, while continuing to store water in the void spaces between stones
- Use durable, clean, crushed stone with LA Abrasion < 40 and less than 2% passing the No. 200 sieve (0.075 mm) to maximise structural capacity and porosity
- Compact the base layer to a uniform surface; verify elevation and slope conform to design drawings

Step 6: Edge Restraints / Border

- Install edge restraints before placing the bedding or pavers to frame the installation and prevent lateral spreading
- Use a **Black Locust wood border** — either buried flush with the paver surface or left exposed for a visible frame, depending on the desired appearance
- Black Locust is naturally rot-resistant and requires no chemical treatment, making it ideal for ground contact in a permeable system

NOTE: *For large vehicular areas, a more robust edge restraint such as a compacted gravel berm or buried timber may be required to handle lateral loads.*

Step 7: Bedding / Leveling Layer

- Place a 1.5”–2” (38–50 mm) layer of ASTM No. 8 open-graded drainage aggregate (fine crushed stone or clean angular grit) on top of the base layer
- Screed the bedding layer to a flat, even surface, maintaining the intended drainage slope
- Do **not** compact the bedding layer before placing pavers — it must remain loose to allow fine-grading adjustments during paver installation

NOTE: *Avoid silica sand as a bedding material. Use angular, open-graded No. 8 aggregate to maintain drainage performance under the pavers.*

Step 8: Placing the Black Locust End Grain Flow Pavers

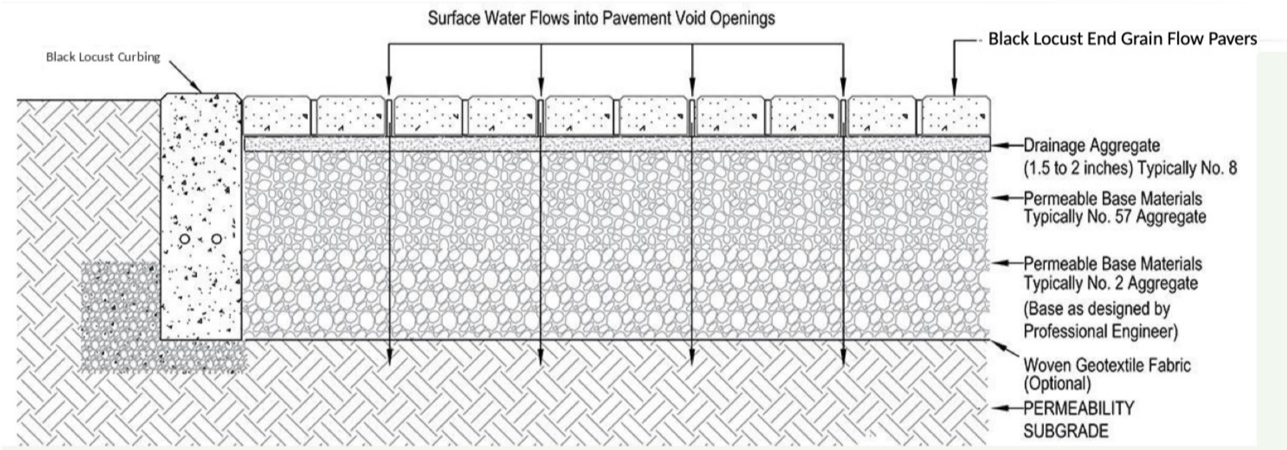
- Place pavers onto the screeded bedding layer, maintaining the ½” gap between blocks
- Work from a fixed edge restraint outward to maintain consistent joint alignment
- For large areas wider than 10 x 10 feet, include a 1” expansion gap in the layout in each direction for every 4–5 feet to accommodate wood expansion and contraction with seasonal moisture changes
- Surface tolerance: finished paver surface should not deviate more than ±3/8” (10 mm) under a 10 ft (3 m) straightedge
- Tamp or lightly compact pavers once laid to seat them evenly into the bedding layer
  - No cut paver subjected to foot or vehicle traffic should be less than one-third of a full paver

Step 9: Joint Filler Material

- Fill gaps between the wood blocks with a permeable, flexible filler material after all pavers are placed and seated
- Choose a filler that allows the wood to freely expand and contract — if packed too tightly or if a rigid filler is used, it can buckle the pavers during moisture-driven swelling
- Suitable options include dirt, sand, polymeric jointing sand rated for permeable systems, crushed cork, fine decomposed granite (from non-sulfidic sources), crushed limestone screenings, or a living moss/gravel blend

- **AVOID: Acid-Producing (Sulfidic) Rocks as Filler Material**

Certain crushed rocks — particularly those containing iron sulfide minerals such as pyrite (FeSs) or marcasite — are classified as acid-producing or sulfidic rocks. When exposed to oxygen and water, the sulfur undergoes oxidation and produces **sulfuric acid (HsSOs).** In a permeable paver system where water continuously passes through the joints, this reaction occurs persistently. The resulting acidic environment causes **rapid chemical degradation and accelerated rot in the black locust wood pavers**, significantly shortening their service life. Common rock types to avoid include: crusher run containing pyrite schist, certain granites with high sulfide content, shale-derived aggregates, and any aggregate that effervesces or produces an odor when wet. Always request a **geochemical analysis or acid-base accounting (ABA) test** from your aggregate supplier to confirm the material is non-acid-forming before use.



Cross-section showing permeable subbase layer system. Note: edge restraint should be Black Locust wood border or concrete curbing); paving units are Black Locust End Grain Flow Pavers.

Figure 1: Installation Cross-Section Detail

Additional Design Reminders

- Level the ground surface taking into account the intended water flow and drainage direction before any layers are placed
- Perforated underdrains may be installed within the subbase or base layer for sites with low-infiltration soils or where drainage must be directed to a specific outlet — consult your geotechnical engineer
- For subgrade slopes exceeding 3%, consider a partial infiltration design with an outlet pipe and temporary storage to prevent sub-surface erosion
- After installation, test surface infiltration — water should drain freely through the joints and not pond on the surface

Construction Layer Summary

Layer (top to bottom)	Material	Thickness
Black Locust End Grain Paver	Black Locust wood on metal mesh backing	2.3” (58 mm) high
Bedding / Leveling	ASTM No. 8 open-graded aggregate	1.5”–2” (38–50 mm)
Open-graded Base	ASTM No. 57 crushed stone	4” (100 mm) typical
Open-graded Subbase Reservoir	ASTM No. 2, 3, or 4 crushed stone	2”–8”+ per geotech survey
Separation Geotextile	AASHTO M-288 subsurface drainage grade	As specified (wrap sides too)
Compacted Subgrade	Native soil, compacted	Per geotech recommendation

Subbase construction guidance adapted from: FHWA TechBrief – Permeable Interlocking Concrete Pavement (FHWA-HIF-15-007, January 2015)