Materials
# Materials

3.0 Introduction 112  
Sidewalk Review Process Diagrams 114

## 3.1 Sidewalks 118
3.1.1 Unpigmented Concrete 119  
3.1.2a Pigmented Concrete (Dark) 120  
3.1.2b Pigmented Concrete (Historic Materials) 121  
3.1.3 Concrete with Exposed Aggregate 122  
3.1.4 Concrete with London Paver Scoring 123  
3.1.5 Hexagonal Asphalt Paver 124  
3.1.6 Bluestone Flag 125  
3.1.7 Granite Slab 126  
3.1.8 Granite Block 127  
3.1.9 Precast Square Paver 128  
3.1.10 Permeable Interlocking Concrete Paver (PICP) 129  
3.1.11 Pervious Concrete 131

## 3.2 Curbs 133
3.2.1 Cast-in-Place Concrete 134  
3.2.2 Granite 135

## 3.3 Crosswalks 136
3.3.1 Granite Paver 137

## 3.4 Roadways 138
3.4.1 Asphalitic Concrete 139  
3.4.2 Porous Asphalt 140  
3.4.3 Concrete 142  
3.4.4 Pervious Concrete 143  
3.4.5 Granite Block 145
Introduction

About this Chapter
This chapter identifies materials for sidewalks, curbs, and roadways that are either approved citywide standards or alternatives for specified locations.

Applicability and Exceptions
All projects that significantly impact public and private streets should follow these guidelines. DOT approval will be based on site-specific conditions and cost-effective engineering standards and judgment based on the policies outlined in the Introduction to this Manual, with the safety of all street users being of paramount importance.

Usage Categories
Materials are divided into four usage categories: Standard, Distinctive, Historic, and Pilot.

Standard
Standard materials are required for use in all contexts outside of historic districts, unless DOT and PDC approve a Distinctive treatment. Projects utilizing the Standard materials in the identified contexts will generally only require a permit from DOT.

DOT is responsible for the maintenance of roadways and crosswalks. As such, materials not listed here as Standard are rarely installed in these contexts.

Distinctive
Any material not deemed Standard by DOT will be considered Distinctive and requires review and approval by DOT and PDC. Distinctive materials identified in this chapter are visually appealing and are proven to be durable, and DOT encourages their use in certain circumstances.

All Distinctive sidewalk and curb materials require a maintenance agreement between DOT and the entity proposing the materials (typically the adjacent property owner(s) or a jurisdictional organization). Per the Rules of the City of New York Section 2-09(f)(4)(xvi), all approved Distinctive materials must be replaced in kind; however, any changes to existing Distinctive materials must be approved by DOT and PDC prior to their implementation.

Proposals for Distinctive material must meet one of the following criteria:
- Encompass an entire block,
- Pertain to a streetscape project,
- Feature a design integral to an adjacent open plaza space, or
- Are compatible with the prevailing material on blocks adjacent to the site for which it is proposed

DOT reviews the proposal for consistency with this Manual and for compliance with the criteria listed above. If the proposal does not satisfy these requirements, DOT may require design revisions or reject the proposal.

PDC reviews the proposal for its aesthetic impact on the streetscape and conformance with the criteria listed above. PDC strongly discourages proposals for piecemeal treatments. For more information on PDC’s guidelines, visit their website at www.nyc.gov/designcommission. See Sidewalk Review Process Diagram.

Historic
Historic materials are Standard in historic districts designated by LPC and are subject to its requirements. Historic materials used outside of historic districts are considered Distinctive.

LPC adopted new rules, effective January 22, 2019, governing the replacement of sidewalks in historic districts; for more information visit www1.nyc.gov/site/lpc/applications/new-adopted-rules.page. Pursuant to the Rules of the City of New York, Title 63, Section 2-19, LPC has created a list of historic districts where paving was a significant feature and where sufficient historic or tinted paving remains to convey this historic condition (“Historic District: Regulated Sidewalk Material”). LPC will update the list as new districts are designated. Sidewalk work in these areas require approval from LPC prior to the start of construction; historic materials are considered Standard and will require less review. Sidewalk work in all other designated historic districts (“Historic District: Non-Regulated Sidewalk Material”) no longer require LPC approval; DOT generally requires tinted concrete with saw cut joints be used. Historic materials used outside of historic districts are considered Distinctive and therefore require PDC approval. See Sidewalk Review Process Diagram.
Pilot
Pilot materials exhibit environmentally sustainable properties and are being tested by DOT. It is anticipated that Pilot materials, if successful, may be classified in future editions of this Manual either as Standard or Distinctive.

Specification Sources
The recommendations in this chapter supplement rather than replace existing engineering standards. Readers are directed to the sources noted below, those listed in APPENDIX B, and any other applicable resources.

Detailed information on the specifications for Standard materials is contained in the DOT/DDC Standard Highway Specifications. Typical construction details are provided in the DOT/DDC Standard Details of Construction. Sections and Items labeled as “Special” in this chapter are not part of the Standard Highway Specifications, but may be obtained by contacting specs@ddc.nyc.gov. Information regarding standard procedures and approval requirements is provided in the Instructions for Filing Plans and Guidelines for the Design of Sidewalks, Curbs, Roadways, and Other Infrastructure Components.

The design guidance described here does not supersede any existing federal, state, or local laws, rules, or regulations. All projects remain subject to relevant statutes, such as the Zoning Resolution of the City of New York, CEQR, and appropriate reviews and approvals of oversight agencies. When materials are being selected, inclusive design resources such as the 2010 ADA Standards for Accessible Design should be consulted to achieve a maximum degree of accessibility.

Material selection and design for projects in flood-vulnerable areas may involve additional considerations as resiliency best practices continue to develop. Consult the latest version of MOR’s Climate Resiliency Design Guidelines.

Sidewalk and curb materials not included in this chapter may be proposed, but are generally discouraged and require full engineering and design review by DOT, LPC, or PDC, as well as approvals from other governmental entities. Such materials, if approved, require a maintenance agreement.

Sidewalk Permits
Installation of sidewalks associated with new building construction is coordinated by DOB through the Builder’s Pavement Plan. For more information on sidewalk permits, reviews, and approvals, see DOT’s Street Works Manual. For the Instructions for Filing Plans and Guidelines for the Design of Sidewalks, Curbs, Roadways, and Other Infrastructure Components, visit www.nyc.gov/streetworksmanual. See Section 2-09 of Title 34 of the Rules of the City of New York for requirements related to sidewalk, curb, and roadway work.

Maintenance Agreements
Each treatment in this chapter has a statement indicating whether or not the material requires a maintenance agreement before being installed. This agreement typically requires that the adjacent property owner, installing entity, or some other entity will generally be responsible for maintaining that material and providing appropriate insurance and indemnification.
3.0 Introduction

MATERIALS

Sidewalk Review Process Diagram:
Standard Sidewalk and Curb Materials

Existing material

Property location

Proposed material

Discretionary review(s) required

Review process

Legend

DOT Process
PDC/LPC Process

Acronyms

DSMA: Distinctive Sidewalk Maintenance Agreement
LPC: Landmarks Preservation Commission
PDC: Public Design Commission
CB: Community Board

Note: Standard Material refers to MATERIALS: UNPIGMENTED CONCRETE and MATERIALS: PIGMENTED CONCRETE.

Note: Adjacent property owner or jurisdictional organization submits proposals for Distinctive materials to DOT for an initial review. The submission usually comprises architectural drawings, site photographs, project descriptions, and other supporting materials as necessary.

Note: For permits, applicant's contractor must submit for appropriate construction permits from DOT prior to starting any work.

* In Historic District (Non-Regulated Sidewalk), pigmented concrete is considered Standard. See MATERIALS: PIGMENTED CONCRETE.
3.0 Introduction

MATERIALS

Acronyms
DSMA: Distinctive Sidewalk Maintenance Agreement
LPC: Landmarks Preservation Commission
PDC: Public Design Commission
CB: Community Board
UD: Urban Design Unit

Note: Standard Material refers to MATERIALS: UNPIGMENTED CONCRETE and MATERIALS: PIGMENTED CONCRETE.

Note: Adjacent property owner or jurisdictional organization submits proposals for Distinctive materials to DOT for an initial review. The submission usually comprises architectural drawings, site photographs, project descriptions, and other supporting materials as necessary.

Note: For permits, applicant’s contractor must submit for appropriate construction permits from DOT prior to starting any work.

* Pursuant to LPC Rules, certain treatments may be approved at a Staff level. See Landmarks Preservation Commission, Title 63, Section 2-19 SIDEWALKS of the Rules of the City of New York.

** If PDC rejects replacing an approved Distinctive sidewalk with a new Distinctive sidewalk, the applicant must repair the approved Distinctive sidewalk in-kind.

Legend
DOT Process
PDC/LPC Process

Sidewalk Review Process Diagram:
Distinctive Sidewalk and Curb Materials

Existing material
Property location
Approval status of existing material
Proposed material
Discretionary review(s) required

Review process

Distinctive Material
Non-Historic District

PDC Not Approved

PDC Approved

Standard
Repair In-Kind
New Material
New Material
Standard
Repair In-Kind

PDC (Conceptual)

PDC (Preliminary & Final)

CB Review
PDC Review

Permits (void existing DSMA)

PDC Not Approved

PDC Approved

Initial DOT Review

DOT SCARA Review

LPC Approved

Permits

PDC Approved

Permits

PDC Rejected

Permits

PDC Rejected

Permits

PDC Rejected

Permits

LPC Approved

Permits

LPC Review Required

Permits

Repair In-Kind or Proposed Material*

Repair w/ Pigmented Concrete

New Material or Repair In-Kind

Permits

Permits

Permits

Permits

Permits

Permits

Permits

Permits

Permits

Permits
Sidewalks

Sidewalks are paths for pedestrians alongside a road (see GLOSSARY). The primary function of a sidewalk is to provide for pedestrian movement and access to buildings, parks, and other destinations. Sidewalks also function as sites for loading and unloading vehicles, as places for outdoor dining and commerce, and as public meeting and gathering spaces. Sidewalks also serve as opportunities to locate other street improvements, such as stormwater management, plantings, and street furniture.

See **FULL SIDEWALK** in the **GEOMETRY** chapter for more information about sidewalks.

The furnishing zone is the area of the sidewalk usually immediately adjacent to the curb where street trees, signs, above-ground utilities, and street furniture are typically located (see GLOSSARY). Furnishing zones provide a physical buffer and a visual transition between the vehicles in the roadway and the pedestrians on the sidewalk, while also affording a clear area for organizing the various elements of street furniture that might otherwise appear cluttered. This area is generally 5 feet wide, or as wide as the tree pits along the blockface.

Furnishing zones are most appropriate on streets with at least moderate levels of both pedestrian and vehicle traffic—usually commercial shopping streets. Furnishing zones are best used when applied to entire blocks or a series of blocks comprising a corridor, rather than to sidewalks in front of individual small properties which would create a “patchwork” effect. Some materials in this chapter are exclusively for use in furnishing zones.

Issues with pavement heaving due to tree root growth in limited soil volume are common and expensive to repair. Where feasible, use of suspended pavement systems should be considered. Suspended pavement systems can be used with all of the sidewalk materials featured in this section.

All materials listed in this section may be used in permanent pedestrian plazas as well. See **GEOMETRY: PEDESTRIAN PLAZA**.
Unpigmented Concrete

Usage: Standard

Mixture comprised of cement(s), aggregate(s), water, and other chemical admixtures, smoothed and then allowed to harden, forming a solid sidewalk surface.

Benefits

- Provides durable sidewalk surface with high friction coefficient
- Widely available and cost-effective
- Provides solid footing for flush-mounted furniture anchors

Considerations

- Sidewalk heaving may occur next to street trees if suspended pavement systems are not used

Application

- Appropriate for sidewalks on all non-commercial and non-historic streets and select commercial streets unless otherwise specified

Specification source: DOT Standard Specifications
Section 2.02, 2.15, 2.22, 3.05

Detail source: DOT Standard Details of Construction drawing # H-1045

Design

- Flag size: 5 feet by 5 feet
- Joint: “tooled joint” or saw-cut joint-scoring patterns
- Typically requires 6-inch gravel base
- Sustainability opportunity: Supplementary cementitious materials (SCM)
- Sustainability opportunity: Recycled concrete aggregate (RCA)

Maintenance

- Adjacent property owners are generally responsible for maintaining this material
- Difficult to patch in sections where utility cuts or defects occur
- Patching may result in different coloration
3.1.2a Pigmented Concrete (Dark)

Usage: Standard*

Same mixture as unpigmented concrete, but with an added pigment for use in high-density commercial districts. Pigmented concrete can be treated with silicon carbide to add sparkle, making it a Distinctive material. See MATERIALS: UNPIGMENTED CONCRETE. This is one of two kinds of pigmented concrete — see also MATERIALS: PIGMENTED CONCRETE (HISTORIC MATERIALS).

* Inclusion of silicon carbide in the aggregate makes this a Distinctive material.

* See below for details of where Standard usage applies.

Specification source: DOT Standard Specifications Section 4.13

Silicon carbide specification source: DOT Standard Specifications Section 4.13

Benefits

See benefits of MATERIALS: UNPIGMENTED CONCRETE

Dark pigmenting visually enhances sidewalk and emphasizes urban character in areas with denser commercial and retail density

Saw-cut joints provide cleaner look, simulating individually hewn blocks of stone

Silicon carbide:
Sparkle adds distinction and visual enhancement to pigmented concrete, especially at night

Considerations

See considerations of MATERIALS: UNPIGMENTED CONCRETE

Design

See design guidance for MATERIALS: UNPIGMENTED CONCRETE

Sustainability opportunity: Supplementary cementitious materials (SCM)

Sustainability opportunity: Recycled concrete aggregate (RCA)

Maintenance

See maintenance for MATERIALS: UNPIGMENTED CONCRETE

Adjacent property owners are generally responsible for maintaining this material
Pigmented Concrete (Historic Materials)

Usage: Historic

Same mixture as unpigmented concrete, but with an added pigment to simulate granite slabs or bluestone flags in historic districts, as per LPC guidelines, or in historic, non-landmarked neighborhoods, as per PDC guidelines. See MATERIALS: UNPIGMENTED CONCRETE. This is one of two kinds of pigmented concrete — see also MATERIALS: PIGMENTED CONCRETE (DARK).

Benefits

See benefits of MATERIALS: UNPIGMENTED CONCRETE

Reinforces historic character

Saw-cut joints provide cleaner look, simulating individually hewn blocks of stone, and add to the historic character of this treatment

Less costly than bluestone flags or granite slabs

Considerations

See considerations of MATERIALS: UNPIGMENTED CONCRETE

Different in appearance from new granite or bluestone

Application

Appropriate, pending LPC review, in historic districts where LPC sidewalk regulations remain in force as a replacement for granite or bluestone that is beyond repair

Design

See design guidance for MATERIALS: UNPIGMENTED CONCRETE

Flag size and pigmenting to match existing granite slabs or bluestone flags per LPC or PDC guidelines

Sustainability opportunity: Supplementary cementitious materials (SCM)

Sustainability opportunity: Recycled concrete aggregate (RCA)

Maintenance

See maintenance for MATERIALS: UNPIGMENTED CONCRETE

Adjacent property owners are generally responsible for maintaining this material

All sidewalk repair or replacement in historic districts requires written approval from LPC
Concrete with Exposed Aggregate

Usage: Distinctive

Exposed aggregate, such as pebble-sized stone, can be added to unpigmented or pigmented concrete mixtures to create texture and increase the distinctive quality. Aggregates can vary in size and color to achieve different effects.

Benefits

See benefits of MATERIALS: UNPIGMENTED CONCRETE
Exposed aggregate creates a textured and more natural appearance
Exposed aggregate camouflages dirt and gum in high-traffic areas

Considerations

See considerations for MATERIALS: UNPIGMENTED CONCRETE

Application

Pigmented concrete with exposed light-colored aggregate:
May be used in commercial areas with high foot traffic

Sand-colored concrete with exposed aggregate:
Appropriate for sidewalks adjacent to water fronts, parks, and other open spaces

Aggregate specification source: DOT Standard Specifications
Pigmented concrete with exposed light-colored aggregate: Special Section 4.13 E
DOT sand-colored concrete with exposed aggregate: Special Section 4.13 E

Because this is a Distinctive sidewalk treatment, it is best used when applied to entire blocks, rather than to the sidewalks of individual small properties which would create a “patchwork” effect

Requires PDC approval

Design

See design guidance for MATERIALS: UNPIGMENTED CONCRETE
Sustainability opportunity: Supplementary cementitious materials (SCM)
Sustainability opportunity: Recycled concrete aggregate (RCA)

Maintenance

See maintenance for MATERIALS: UNPIGMENTED CONCRETE
Adjacent property owners are generally responsible for maintaining this material
Use of these materials generally requires a maintenance agreement
Concrete with London Paver Scoring

Usage: Distinctive

Cast-in-place concrete scored to look like London Pavers.

**Benefits**

See benefits of MATERIALS: UNPIGMENTED CONCRETE

Reinforces civic character of an area

Less expensive than unit pavers

**Considerations**

See considerations of MATERIALS: UNPIGMENTED CONCRETE

**Application**

For sidewalks fronting on government buildings and other civic structures such as bridges and memorials

Because this is a Distinctive sidewalk treatment, it is best used when applied to entire blocks, rather than to the sidewalks of individual small properties which would create a “patchwork” effect

Requires PDC approval

**Specification source:** DOT Standard Specifications Special Section 6.06 LP

**Design**

Flag size: 18 inches by 36 inches; joints must be saw cut to ¼ depth of pavement

Requires concrete base

Sustainability opportunity: Supplementary cementitious materials (SCM)

Sustainability opportunity: Recycled concrete aggregate (RCA)

**Maintenance**

See maintenance for MATERIALS: UNPIGMENTED CONCRETE

Adjacent property owners are generally responsible for maintaining this material

Use of this material generally requires a maintenance agreement
3.1.5 Hexagonal Asphalt Paver

Hexagonal Asphalt Paver

Usage: Distinctive

Asphalt precast into hexagonally shaped paver. This material is primarily used on sidewalks adjacent to parks, and conveys park-like character.

Specification source: DOT Standard Highway Specifications Section 3.04 and 6.60

Benefits

- Interlocking hexagonal shape fits tightly together and resists shifting and buckling
- This material is widely available and cost-effective
- Dark color hides dirt and stains
- Asphalt pavers can be recycled

Considerations

- Dark color may contribute to heat-island effect
- Loose pavers can hinder the mobility of pedestrians, people with disabilities, and cyclists

Application

- Hexagonal asphalt pavers are appropriate for sidewalks adjacent to parks
- Requires PDC approval

Design

- Paver size: 8 inches between parallel sides
- Can be sand-set for easier installation or mortar-set for stronger structural properties
- Sustainability opportunity: High recycled asphalt (RAP) content

Maintenance

- Adjacent property owners are generally responsible for maintaining this material
- Use of this material generally requires a maintenance agreement, except when installed by Parks
- Unit pavers can become loose over time and will require regular maintenance
- Hexagonal pavers are relatively easy to reset or replace, especially for utility access

Richard Tucker Park, Broadway and Columbus Avenue, Manhattan
Bluestone Flag

Usage: Historic

Historic stone unit paver with subtle variations in color, grain, and surface. The preservation and in-kind replacement of bluestone flags are typically required in new construction projects within historic districts; the installation of new bluestone flags is typically recommended in locations adjacent to existing bluestone.

Benefits

- Reinforces historic character
- Adds distinction and visual enhancement to sidewalk
- Stone conveys connection to natural environment

Considerations

- Vulnerable to breakage
- Substantially higher cost than concrete

Application

This material is Standard in historic districts where LPC sidewalk regulations remain in force or other areas with existing bluestone pavers where historic fabric remains intact, per LPC guidelines.

Design

- Bluestone: minimum 2.25-inch thick New York State bluestone to match size and color of existing flags
- Finish: Thermal

Specification source: LPC guidelines, DOT Standard Specifications Section 6.07

Joints: Hand-tight

Sustainability opportunity: Salvaged bluestone

Maintenance

- In historic districts, adjacent property owners are generally responsible for maintaining this material
- Use of this material outside historic districts requires a maintenance agreement
- Due to the possibility of bluestone pavers cracking or becoming uneven, application requires attentive maintenance
- Wherever possible, existing material should be salvaged and reused
- Bluestone-tinted concrete can be used to fill gaps when recycling existing bluestone flags
- All sidewalk repair or replacement in historic districts requires written approval from LPC
- Repairs and maintenance are more complex and require more highly-skilled labor

Bleecker Street, Manhattan
Granite Slab

Usage: Historic

Historic stone paver, with varieties of color, texture, and veining. Can be cut to extremely large sizes to span underground vaults. The preservation and in-kind replacement of granite slabs are normally required in new construction projects within historic districts; the installation of new granite slabs is typically recommended in locations adjacent to existing granite.

Specification source: LPC guidelines, DOT Standard Specifications Section 6.04

Benefits

- Reinforces historic character
- Adds distinction and visual enhancement to sidewalk

Considerations

- Not intended to support heavy vehicles when spanning underground vaults
- Higher up-front cost than concrete

Application

This material is Standard in historic districts where LPC sidewalk regulations remain in force or other areas with existing granite pavers where historic fabric remains intact, per LPC guidelines

Design

- Granite: to match size and color of existing flags, 3-inch minimum thickness
- Slip resistance: minimum 0.60 coefficient of friction wet

Maintenance

- In historic districts, adjacent property owners are generally responsible for maintaining this material
- Use of this material outside historic districts requires a maintenance agreement
- Difficult to repair or patch in sections
- All sidewalk repair or replacement in historic districts requires written approval from LPC
Granite Block

Usage: Distinctive

Historic smooth-finish granite block unit pavers often referred to as “cobblestones,” commonly used throughout New York City in the nineteenth century. This treatment is for use in the furnishing zone and may also be used in plazas within landmarked districts.

Specification source: DOT Standard Specifications
Section 2.06, 6.06

Benefits
Visually delineates separation of street uses
Reinforces historic character, where applicable

Considerations
Can be slippery when wet
Uneven surface can hinder the mobility of pedestrians, people with disabilities, and cyclists

Application
Furnishing zone and around tree beds. See LANDSCAPE: CONNECTED TREE BED

Design
Can be sand-set for easier installation and greater permeability wherever impermeable installation generates stormwater runoff
Can be mortar-set for stronger structural properties. In Parks-maintained spaces, mortar is required

Requires PDC approval
Finish: Natural, aged, or tumbled is typical and produces a rough surface texture that is commonly seen throughout the city
Finish: Thermal or flamed produces a smooth surface texture that is typically ADA-compliant; consider using in pedestrian zones and around benches
Sustainability opportunity: Salvaged blocks
Sustainability opportunity: Permeable installation

Maintenance
Adjacent property owners are generally responsible for maintaining this material
Use of this material requires a maintenance agreement, except when installed by Parks around tree beds
When set in sand, stones can become loose over time and will require regular maintenance, including weeding
Relatively easy to reset or replace, especially for utility access
3.1.9 Precast Square Paver

Precast Square Paver

Usage: Distinctive

Precast, square asphalt or concrete pavers. This treatment is for use exclusively in the furnishing zone.

Specification source: DOT Standard Specifications Section 6.06

Benefits

This material is widely available and cost-effective
Asphalt pavers can be recycled

Considerations

Loose pavers can hinder the mobility of pedestrians, people with disabilities, and cyclists

Application

Furnishing zone and around tree beds. See LANDSCAPE: CONNECTED TREE BED

Design

Paver size: 8 inches by 8 inches
Consider permeable versions with joints that allow water to infiltrate; ensure a proper sub-base and appropriate soil selection

Can be mortar-set for stronger structural properties
The area within 18 inches of the curb should be kept free of obstructions
Requires PDC approval
Sustainability opportunity: High recycled asphalt (RAP) content
Sustainability opportunity: High-SRI coloring

Maintenance

Adjacent property owners are generally responsible for maintaining this material
Use of this material requires a maintenance agreement
Unit pavers can become loose over time and will require regular maintenance
Relatively easy to reset or replace, especially for utility access

Willoughby Street, Brooklyn
Permeable Interlocking Concrete Paver (PICP)

Usage: Distinctive*

Permeable Interlocking Concrete Pavers (PICPs) have voids at the joints to allow water to pass through into an open-graded reservoir below.

*PICPs have been approved as Standard for use on sidewalks at school locations in lieu of a planting strip. (See: Adopted Zoning Text Amendment 26-421, adopted April 30, 2012.) In addition, PDC has approved this treatment for use in the furnishing zone of city sidewalks. In all cases, PICPs are considered a Distinctive material, and require a maintenance agreement.

Benefits

- Reduces impermeable surface, thereby increasing water infiltration
- Reduces peak sewer discharge during storm events
- Reduces likelihood of ponding and slick or icy conditions
- Helps reduce urban heat island effect

Considerations

- Extra care must be taken where there is water-sensitive subsurface infrastructure
- Only certain soil types are appropriate as sub-bases for infiltration
- Porosity of the pavers can convey harmful chemicals into the soil

Vegetative growth in joints will occur if there is no regular maintenance

Sand should not be applied to surface

Application

- Most effective on slopes less than 5%
- Must have adequate sub-surface conditions to detain stormwater and level bottom to allow for uniform infiltration
- Can be proposed for use in parking lane, gutter strip, sidewalk, or plaza area
- Avoid sites where there is potential for soil and groundwater contamination

Specification source: Special Section GI-2.03
### 3.1.10 Permeable Interlocking Concrete Paver (PICP)

#### Design

- ASTM No. 8, 89, or 9 stone is recommended to fill paver joints. Requires open-graded stone infiltration bed.
- Bottom of infiltration bed should be at least 2 feet above high water table and 2 feet above bedrock.
- Sustainability opportunity: Coat pavers with photocatalytic treatment or high-SRI surface.
- Sustainability opportunity: Manufacture pavers using color additives to increase the SRI or incorporate recycled materials.

#### Maintenance

- Use of this material requires a maintenance agreement.
- Regular maintenance is required, including vacuuming of surface to restore permeability when joints become clogged.
- Unit pavers can become loose over time.
- Relatively easy to reset or replace.
Pervious Concrete

Usage: Pilot

Concrete mixture using admixtures to allow a smaller amount of cementitious paste to coat the aggregate, and using little or no sand or fine aggregate, leaving substantial void content. This allows water to pass through to an open-graded reservoir underneath.

Specification source: Special Section GI-2.04

Benefits

- See benefits of MATERIALS: UNPIGMENTED CONCRETE
- Reduces impermeable surface, thereby increasing water infiltration
- Reduces peak sewer discharge during storm events
- Reduces likelihood of ponding and slick or icy conditions
- Helps reduce urban heat island effect

Considerations

- See considerations for MATERIALS: UNPIGMENTED CONCRETE
- Extra care must be taken where there is water-sensitive sub-surface infrastructure
- Only certain soil types are appropriate as sub-bases for infiltration
- Porosity of the concrete can convey harmful chemicals into the soil
- Sand and certain chemical de-icers should not be applied to surface
- Contractors should be certified to install cast-in-place pervious concrete, which requires specially-trained concrete finishers
- Slump, air content, and strength tests are not applicable to pervious concrete
### Application

Pervious concrete is a pilot material that the city is testing at select locations.

Use of this material beyond the city-led pilots will require a maintenance agreement.

Most effective on slopes less than 5%.

Must have adequate sub-surface conditions to detain stormwater and level bottom to allow for uniform infiltration.

Can be used to pave an entire sidewalk or just hardscape between connected tree beds. See LANDSCAPE: CONNECTED TREE BED.

Avoid sites where there is potential for soil and groundwater contamination.

Not recommended for implementation over significant underground utility corridors.

### Design

See design guidance for MATERIALS: UNPIGMENTED CONCRETE.

Typically an 8- to 24-inch open graded stone infiltration bed is recommended.

Generally 4 – 8 inches thick.

Pervious concrete should maintain a 15 – 25% void content ratio.

Bottom of infiltration bed should be at least 2 feet above high water table and 2 feet above bedrock.

### Maintenance

Use of this material requires a maintenance agreement.

Requires routine vacuuming of surface using a regenerative air sweeper to restore permeability.
Curbs

A curb is a step where the roadbed meets the sidewalk or other raised pathway (see GLOSSARY). Curbs serve three functions: a gutter to convey rainwater and detritus from the roadbed and sidewalks to the catch basins at the ends of the street; a visual and physical limit to the vehicular roadbed; and a finished edge to sidewalks and roadbeds.
3.2.1 Cast-in-Place Concrete

**Cast-in-Place Concrete**

**Usage: Standard**

This is the standard method for installing concrete curbs. The mixture is comprised of cement(s), aggregate(s), water, and other possible chemical admixtures, such as air entrainer and pigment. When the mixture is finished, it is allowed to harden, forming a solid curb. Concrete curbs can be pigmented to match the adjacent sidewalk (See MATERIALS: PIGMENTED CONCRETE (DARK) and MATERIALS: PIGMENTED CONCRETE (HISTORIC MATERIALS)).

**Benefits**

- This material is widely available and cost-effective
- Can easily be cast on site to fit curved sidewalk profiles
- Cast-in-place curbs are more resistant to displacement than stone alternatives

**Considerations**

- Concrete curbs without steel facing are more vulnerable to breakage or crumbling
- Steel faced drop curbs per Standard Detail H-1015 should not be used where bike lanes cross curbs

**Application**

This material is Standard for any street with unpigmented concrete sidewalks. See MATERIALS: UNPIGMENTED CONCRETE

**Design**

- Size: 6 inches wide on top, 8 inches wide on bottom, 18 inches deep; 7-inch reveal above roadway
- Expansion joints of curb should line up with expansion joints of sidewalk
- Steel facing should be used on streets where repeated mounting by heavy vehicles may cause damage
- May require metal reinforcement bars as specified by DOT

**Concrete curb specification source**: DOT Standard Specifications Section 4.08, 3.05

**Steel-faced curb specification source**: DOT Standard Specifications Section 2.13, 3.05, 4.09

**Concrete curb detail source**: DOT Standard Details drawing # H-1044

**Steel-faced curb detail source**: DOT Standard Details drawing # H-1010

**Sustainability opportunity**: Supplementary cementitious materials (SCM)

**Sustainability opportunity**: Salvaged or recycled steel facing

**Maintenance**

See maintenance for MATERIALS: UNPIGMENTED CONCRETE

DOT generally maintains this material
### 3.2.2 Granite

**Usage:** Distinctive

Granite cut to long sections and laid as curbing. Saw-finishing, achieved by cutting the granite with a stone saw and polishing out saw marks, provides a smooth, clean look. Split finishing, typically achieved by hand-chiseling, exposes the natural cleft of the stone, giving a rough-hewn texture.

**Specification source:** DOT Standard Specifications
Section 2.12, 4.07

**Saw-finish curb detail source:** DOT Standard Detail
Drawing # H-1056

**Split-finish curb detail source:** DOT Standard Detail
Drawing # H-1056A

---

**Benefits**

- Adds distinction and visual enhancement to sidewalk
- Reinforces historic character (if applicable)
- Extremely durable
- Can be removed and replaced as needed

**Considerations**

- Much higher material cost than concrete

**Application**

This material is appropriate for all streets, especially commercial districts, including use in combination with concrete sidewalk.

Granite curb is usually required in historic districts, adjacent to individual landmarks, or in areas with existing granite curb where the historic fabric remains intact.

**Design**

- Size: 5 inches to 8 inches wide on top, 4 inches of minimum width on bottom, 16 inches deep
- Must have lip with batter and rounded edge
- Slip resistance at top of curb: minimum 0.60 coefficient of friction when wet
- Sustainability opportunity: Salvaged granite curb

**Maintenance**

- DOT generally maintains this material
- Low-maintenance, resists cracking and discoloration
- Difficult to patch and must therefore be replaced by section if severely damaged

*Gansevoort Street, Manhattan.*
Crosswalks

Crosswalks are areas of roadbed that are delineated to indicate where pedestrians are expected to cross (see GLOSSARY). In certain instances, crosswalks may have patterns or be constructed from materials that further increase their visibility or add character to a neighborhood. This section is intended to include only surface materials approved for creating distinctive crosswalks. It does not include guidance on using standard thermoplastic markings to designate crosswalks for traffic control purposes. For this information, please refer to the most recent version of the federal Manual on Uniform Traffic Control Devices (MUTCD).

In addition to the materials listed in this section, all materials listed in the ROADWAYS section may also be used in crosswalks, according to the application guidance provided.
### 3.3.1 Granite Paver

#### Granite Paver

**Usage: Historic**

Stone unit pavers are known for durability and associated with high-quality traditional streets.

**Specification source:** DOT Standard Specifications

Sections 2.06 and 6.04

---

#### Benefits

- Visually enhances crosswalk
- Creates accessible, smooth crossing surface

#### Considerations

- Significantly higher cost than a standard asphalt crosswalk

#### Application

- Crosswalks on historic streets or where a Distinctive material is desired and there are low volumes of heavy-vehicle traffic
- Should not be used where frequent utility cuts are likely

#### Design

- Crosswalks generally should comply with MUTCD standards

- Paver size: minimum 4 inches for shortest dimension, maximum 30 inches for longest dimension, minimum 5-inch thickness for vehicular roadbed

Pavers that have a ratio of length to width greater than 2:1 should only be used when set in poured concrete because of the likelihood of breakage under heavy-vehicle traffic

Granite must have a textured surface that provides sufficient slip resistance to meet a minimum 0.60 coefficient of friction when wet

Sustainability opportunity: Salvaged pavers

#### Maintenance

- DOT maintains this treatment in historic districts
- Use of this material outside of historic districts requires a maintenance agreement
- Due to the possibility of pavers cracking or becoming uneven, and asphalt shoving at the borders, application requires attentive maintenance

---

*Front Street, Brooklyn*
Roadways represent the paved central portion of the street that allows access to and movement through an area (see GLOSSARY). Most roadways are primarily designed for motor vehicle use.
# Asphalitic Concrete

**Usage:** Standard

Commonly known as asphalt, this material is a mixture of asphalt bitumen and stone aggregate, usually laid on a concrete base and compacted by a roller to form a smooth and solid road surface.

**Specification source:** DOT Standard Specifications
Section 2.05, 3.01, 4.01, 4.02

**Detail source:** DOT Standard Details drawing H-1034 and related

### Benefits

- Provides smooth and durable road surface with high friction coefficient
- Material is widely available and cost-effective
- Impervious quality channels water to the curb on crowned roadways
- Dark color hides dirt and stains and creates background for high-contrast markings
- Easy to maintain and patch
- Can be pigmented or imprinted for varied purposes
- Asphalt can be recycled

### Considerations

- Prone to rutting and shoving under high volumes of heavy vehicles
- Contributes to heat-island effect
- Sends runoff to catch basins, thereby contributing to combined-sewer overflows (CSOs) during large rainstorms

### Application

- Standard for roadbeds of all city streets unless otherwise specified
- Preferred road surface for cycling
- DOT generally maintains this material

### Design

- Minimum 3-inch-thick wearing course, typically
- Roadway should be crowned to drain stormwater from the road surface

### Sustainability opportunities

- High recycled asphalt (RAP) content
- Warm-mix asphalt
- High-SRI asphalt
- Porous asphalt in parking lanes

### Maintenance

- Easier to repair than other roadway materials
3.4.2 Porous Asphalt

**Porous Asphalt**

**Usage:** Pilot

Asphaltic concrete with open-graded aggregate, in which the amount of fine particles is kept to a minimum, and in which the binder content is lower, allowing water to pass through into an open-graded reservoir.

**Benefits**

- See benefits of MATERIALS: ASPHALTIC CONCRETE
- Reduces impermeable surface, thereby increasing water infiltration
- Exhibits structural properties similar to conventional asphalt
- Reduces peak sewer discharge during storm events
- Reduces likelihood of ponding and slick or icy road conditions
- Helps reduce urban heat island effect

**Considerations**

- See considerations for MATERIALS: ASPHALTIC CONCRETE
- Extra care must be taken where there is water-sensitive sub-surface infrastructure
- Only certain soil types are appropriate as sub-bases for infiltration

**Application**

- Porous asphalt is a pilot material that the city is testing at select locations
- Use of this material beyond the city-led pilots will require a maintenance agreement
- Can be proposed for use in parking lanes, parking lots, and recreational paths
- Most effective on slopes less than 5%
- Must have adequate sub-surface conditions to detain stormwater and level bottom to allow for stormwater infiltration
- Avoid sites where there is high potential for soil and groundwater contamination

*Craig Road N, Governors Island*
Not recommended for implementation over significant underground utility corridors

**Design**

Minimum 3-inch-thick wearing course, typically

Roadway should be crowned to drain stormwater from the road surface

Aggregate gradation should be engineered to provide open gradation and an adequate stone matrix

Bitumen content should be lower than in standard asphaltic concrete, as necessary for the provided gradation. See MATERIALS: ASPHALTIC CONCRETE

Do not seal coat

Typically, a 12 – 30-inch open graded stone infiltration bed is recommended.

Bottom of infiltration bed should be at least 2 feet above high water table and 2 feet above bedrock

Consider use in gutter area near pedestrian ramps to reduce ponding

**Maintenance**

Requires vacuuming of surface with regenerative air sweepers to maintain permeability and prevent clogging

Difficult and more expensive to replace or patch in sections where utility cuts or defects occur
3.4.3 Concrete

Concrete

Usage: Standard
Mixture comprising cement(s), aggregate(s), and water, which may include other chemical admixtures that hardens to form a solid road surface. The mixture may be poured over metal reinforcement bars.

Benefits
- Provides durable road surface with high friction coefficient
- This material is widely available and cost-effective
- Resists rutting and shoving that can occur with asphalt
- Compared to asphalt, reduces impact of vehicle travel vibrations on sub-surface features and neighboring structures
- Higher SRI than asphalt, which helps reduce urban heat island effect

Considerations
- Difficult and more expensive to replace or patch in sections where utility cuts or defects occur
- Noisier than asphalt

Application
- May be considered for use in shared streets. See GEOMETRY: SHARED STREET
- Appropriate for roads with high motor vehicle volumes and/or gross weight
- Should be used wherever engineering criteria dictates, such as bridges, vaulted roadways, or bus pads
- Should not be used where frequent utility cuts are likely
- Will be evaluated case-by-case based on engineer review of roadway structure
- DOT generally maintains this material

Specification source: DOT Standard Specifications Section 3.05, 4.05
Detail source: DOT Standard Details drawing H-1050
Detail source (bus pad): DOT Standard Details drawings H-1005, H-1005 A

Design
- Must have joints to allow for expansion no more than 20 feet apart
- May require metal reinforcement bars as specified by DOT
- Sustainability opportunity: Supplementary cementitious materials (SCM)

Maintenance
- Patching may result in different coloration

West Side Highway, Manhattan
Pervious Concrete

**Usage:** Pilot

Concrete mixture using minimal cementitious paste to coat the aggregate, and using little or no sand or fine aggregate, leaving substantial void content. This allows water to pass through to an open-graded reservoir underneath.

**Benefits**

- Reduces impermeable surface, thereby increasing water infiltration
- Reduces peak sewer discharge during storm events
- Reduces likelihood of ponding and slick or icy conditions
- Helps reduce urban heat island effect

**Considerations**

- Extra care must be taken where there is water-sensitive sub-surface infrastructure
- Only certain soil types are appropriate as sub-bases for infiltration
- Porosity of the concrete can convey harmful chemicals into the soil
- Sand and certain chemical de-icers should not be applied to surface

**Contractors should be certified to install cast-in-place pervious concrete**

**Slump and air content tests are not applicable to pervious concrete**

**Lower strength material than standard concrete**

**Application**

- Pervious concrete is a pilot material that the city is testing at select locations
- Use of this material beyond the city-led pilots will require a maintenance agreement
- Most effective on slopes less than 5%
- Must have adequate sub-surface conditions to detain stormwater and level bottom to allow for uniform infiltration
- Avoid sites with frequent heavy vehicle traffic
3.4.4 Pervious Concrete

Avoid sites where there is potential for soil and groundwater contamination

Not recommended for implementation over significant underground utility corridors

Design

See design guidance for MATERIALS: UNPIGMENTED CONCRETE

Typically an 8- to 24-inch open graded stone infiltration bed is recommended

Generally 4 - 8 inches thick

Pervious concrete should maintain a 15 – 25% void content ratio

Bottom of infiltration bed should be at least 2 feet above high water table and 2 feet above bedrock

Maintenance

Requires routine vacuuming of surface using a regenerative air sweeper to restore permeability, which typically requires a maintenance partner

Rego Park, Queens
Granite Block

Usage: Historic

Historic smooth-finish granite block unit pavers often referred to as “cobblestones,” commonly used throughout New York City in the nineteenth century.

**Benefits**
- Reinforces historic character
- Calms vehicle traffic
- Can visually delineate separation of street uses or modal priorities
- Granite blocks are relatively easy to remove and reset, especially for utility access

**Considerations**
- May generate significant noise from vehicle tires
- Uneven surface can hinder pedestrians, cyclists, and people with disabilities; attention must be given to navigation by people with disabilities at crosswalks, and by cyclists
- Can be slippery when wet

**Specification source:** DOT Standard Highway Specifications Section 2.06, 6.04

**Application**
- Should be used wherever there is existing granite block in historic districts where the historic fabric remains intact
- Use of this material is subject to LPC review when used in historic districts with existing granite blocks
- May be used to provide visual delineation to separate bike lanes from vehicle lanes or vehicle lanes from pedestrian areas
- Can be used to designate areas of the roadbed not intended for regular vehicle travel, such as pedestrian streets or textured gutters, aprons, or medians
- DOT generally maintains this material in historic districts, but any third party that excavates it must restore it in kind or as directed by DOT pursuant to Rules of the City of New York, Title 34, Section 2-11(e)(12)(vii)
- Use of this material outside of historic districts requires a maintenance agreement
### Design

Can be sand-set for easier installation and maintenance and for greater permeability, or mortar-set for stronger structural properties.

May require concrete base.

Provision must be made for a smooth cycling surface, regardless of whether or not the roadway is part of a designated bike route. Design treatments include medium-to large-sized thermal-finished granite.

Finish: Natural, aged, or tumbled is typical and produces a rough surface texture that is commonly seen throughout the city.

Finish: Thermal or flamed produces a smooth surface texture that is typically ADA-compliant; consider using where there is a pedestrian path of travel.

Sustainability opportunity: Salvaged blocks.

Sustainability opportunity: Permeable installation.

### Maintenance

Stones can become loose over time and require intensive, regular maintenance.

---

*SIM Crew replaces granite blocks: Bruckner Boulevard, Bronx*