
Materials



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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.

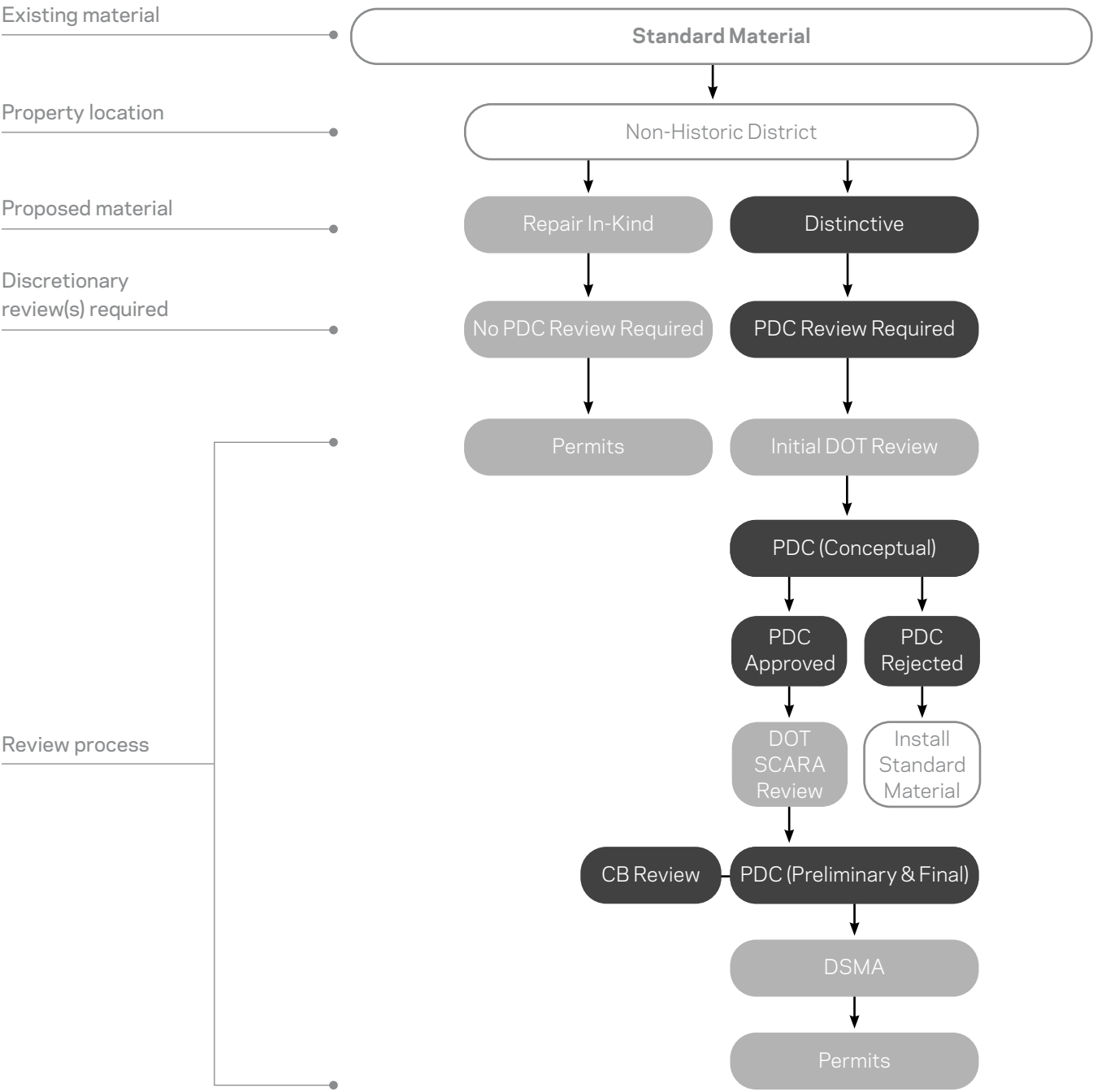
Sidewalk Permits

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/streetworksmannual. 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.

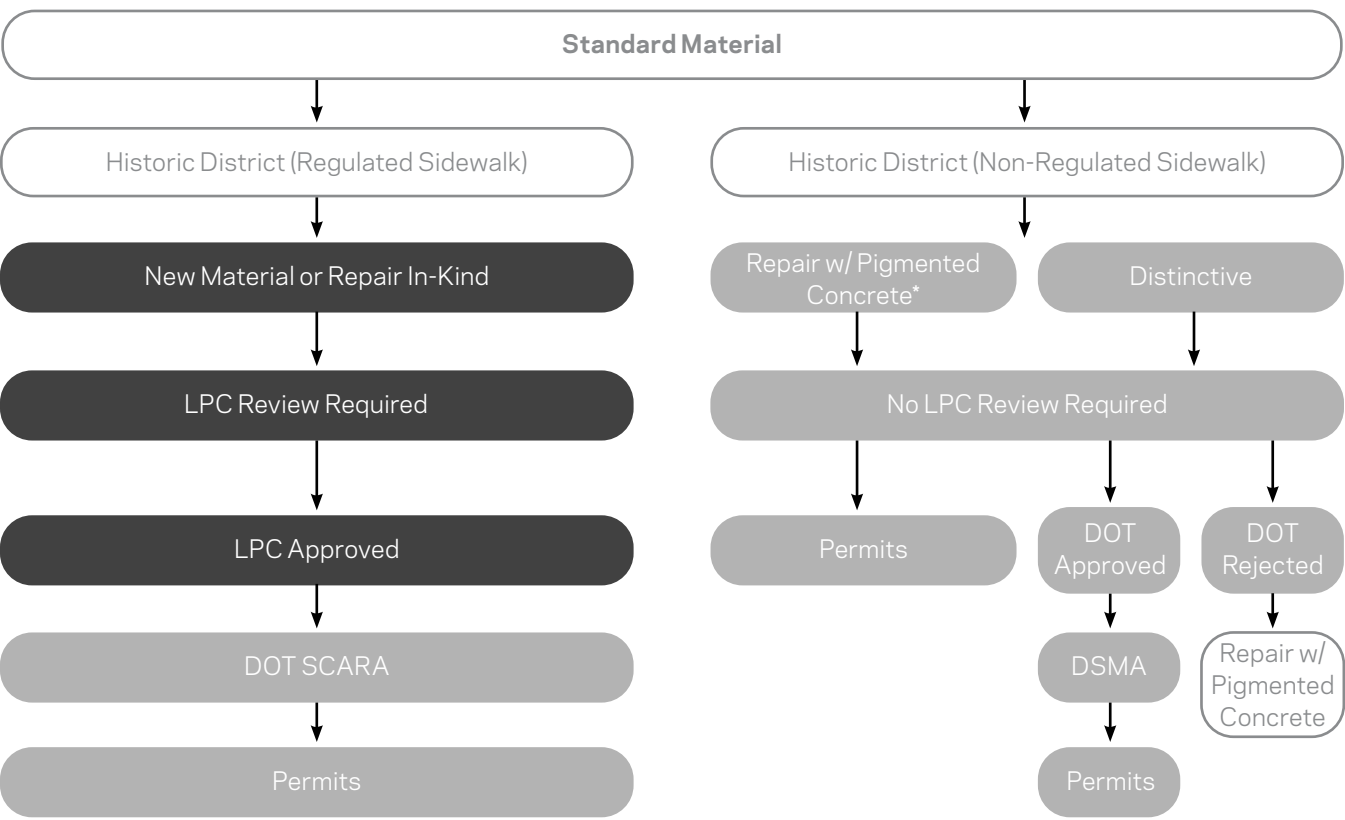
Sidewalk Review Process Diagram:
Standard Sidewalk and Curb Materials



Legend

DOT Process

PDC/LPC Process



Acronyms
DSMA: Distinctive Sidewalk Maintenance Agreement
LPC: Landmarks Preservation Commission
PDC: Public Design Commission
CB: Community Board
SCARA: Sidewalk, Curb, & Roadway Application (www.nyc.gov/html/dot/downloads/pdf/instfilingplan.pdf)

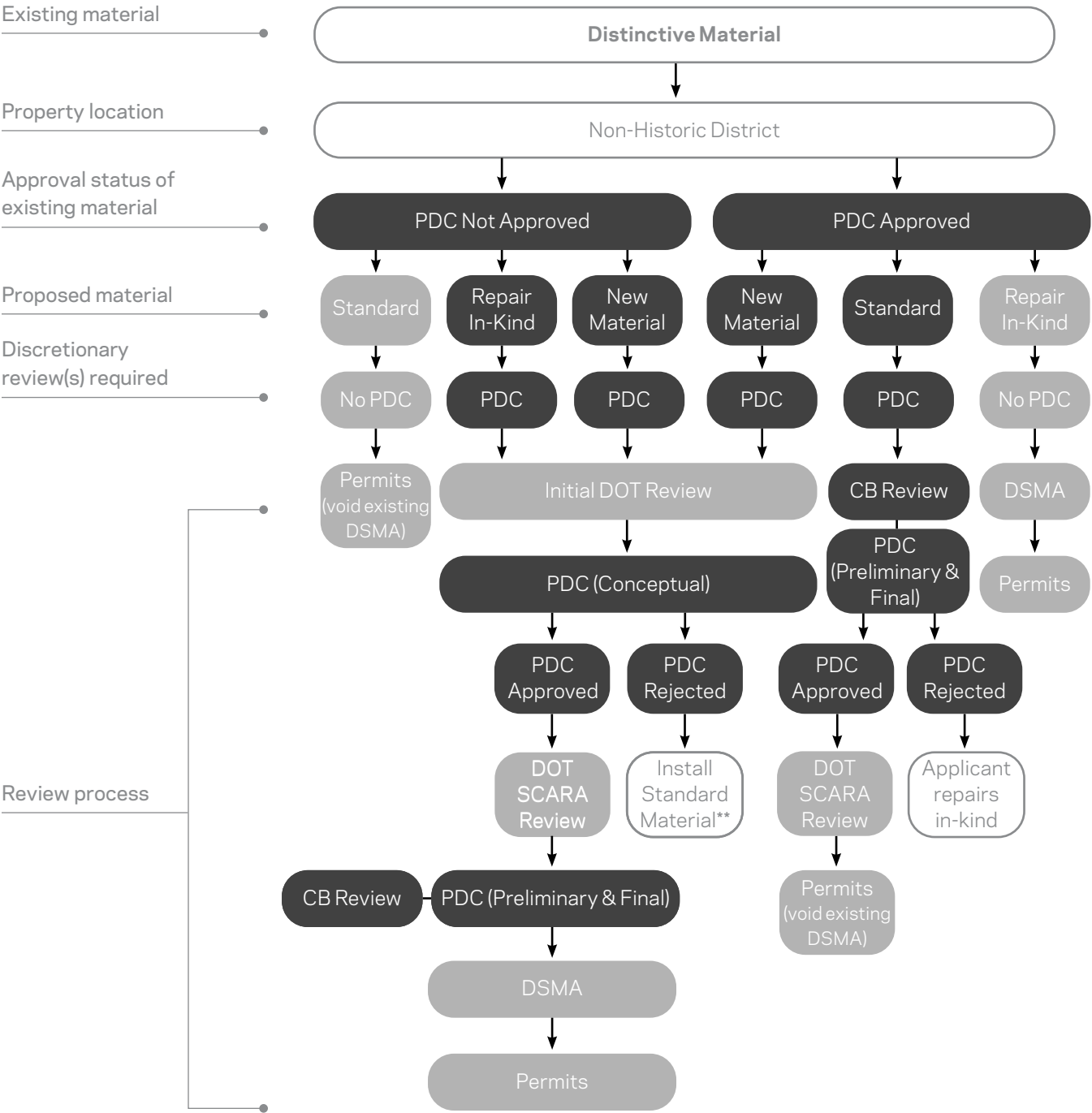
Note: Standard Material refers to MATERIALS: UNPIGMENTED CONCRETE and MATERIALS: PIGMENTED CONCRETE.

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.*

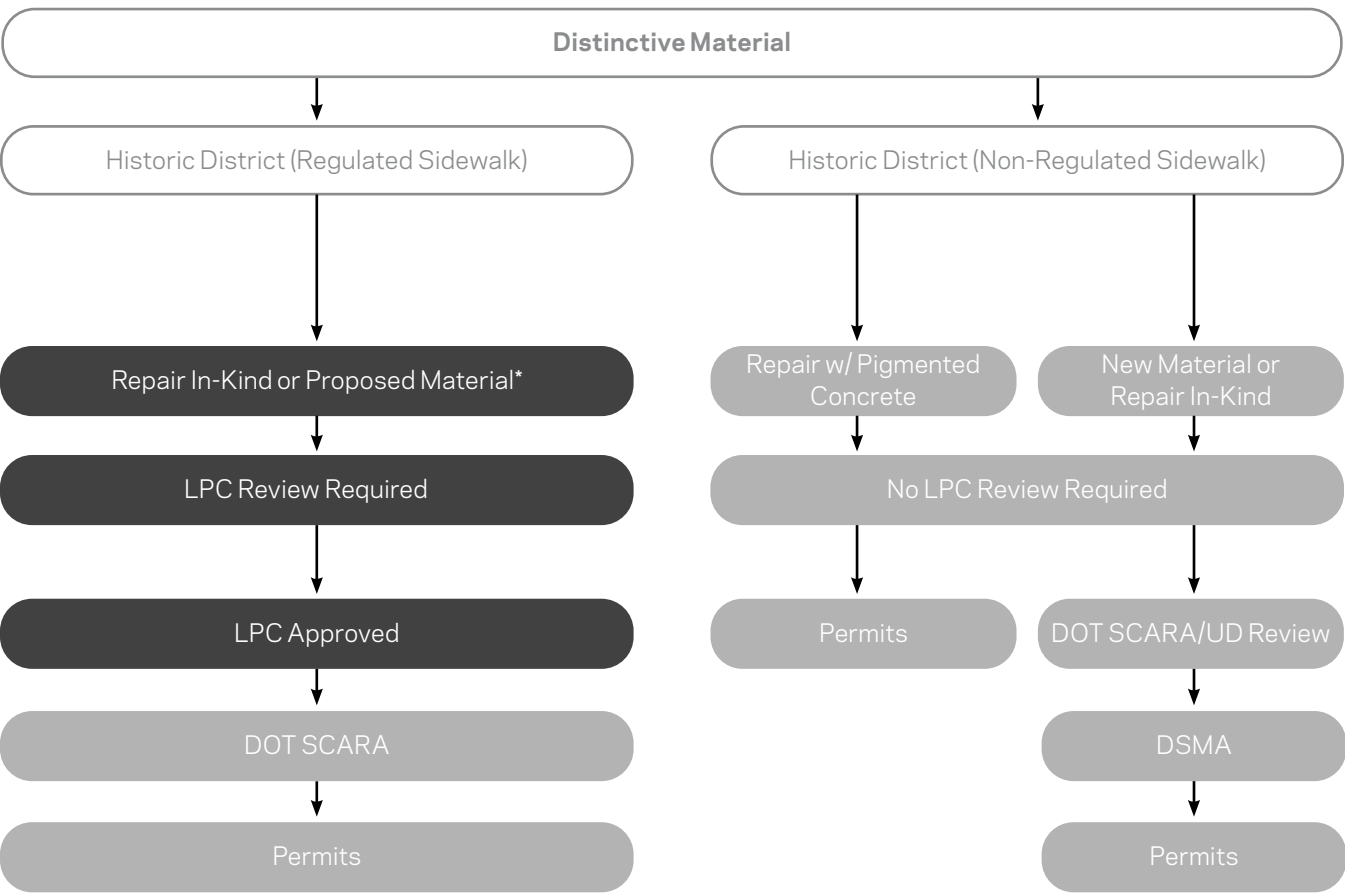
Sidewalk Review Process Diagram:
Distinctive Sidewalk and Curb Materials



Legend

DOT Process

PDC/LPC Process



Acronyms
DSMA: Distinctive Sidewalk Maintenance Agreement
LPC: Landmarks Preservation Commission
PDC: Public Design Commission
CB: Community Board
SCARA: Sidewalk, Curb, & Roadway Application (www.nyc.gov/html/dot/downloads/pdf/instfilingplan.pdf)
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.

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.

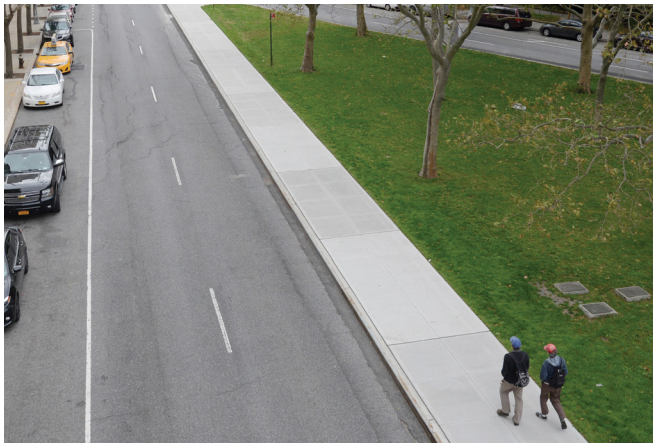
Unpigmented Concrete

Usage: Standard

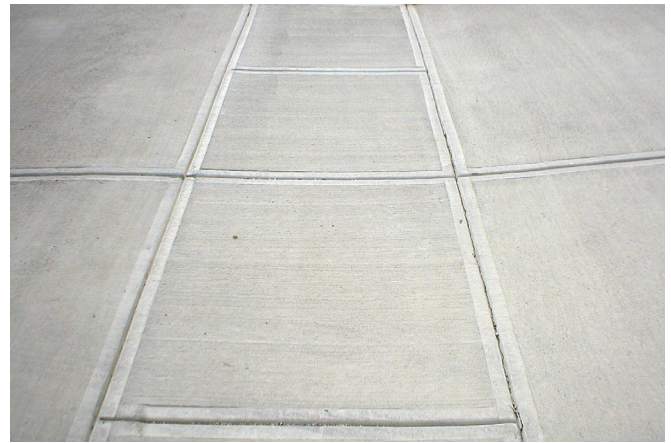
Mixture comprised of cement(s), aggregate(s), water, and other chemical admixtures, smoothed and then allowed to harden, forming a solid sidewalk surface.

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

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



Riverside Drive, Manhattan



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

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

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



State Street, Manhattan



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

Application

Standard in commercial districts C4-4 through C4-7, C5 and C6, as defined in the Zoning Resolution of the City of New York, per Section 2-09(f)(4) of Title 34 of the Rules of the City of New York

Silicon carbide:

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

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).

Specification source: DOT Standard Specifications
Section 4.13



Concrete pigmented to simulate granite: 9th Avenue, Manhattan



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

Appropriate, pending PDC review, in historic, non-landmarked neighborhoods as a replacement for granite or bluestone that is beyond repair

Design

See design guidance for MATERIALS: UNPIGMENTED CONCRETE

Flag size and pigmentation 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.

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



Sand-colored concrete sidewalk with exposed aggregate: Prospect Park West, Brooklyn



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

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

Considerations

See considerations for MATERIALS: UNPIGMENTED CONCRETE

Design

See design guidance for MATERIALS: UNPIGMENTED CONCRETE

Sustainability opportunity: Supplementary cementitious materials (SCM)

Sustainability opportunity: Recycled concrete aggregate (RCA)

Application

Pigmented concrete with exposed light-colored aggregate:

May be used in commercial areas with high foot traffic

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

Sand-colored concrete with exposed aggregate:

Appropriate for sidewalks adjacent to waterfronts, parks, and other open spaces

Concrete with London Paver Scoring

Usage: Distinctive

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

Specification source: DOT Standard Specifications
Special Section 6.06 LP



Brooklyn Bridge pedestrian access ramp, Manhattan



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

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

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



Richard Tucker Park, Broadway and Columbus Avenue, Manhattan



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

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.

Specification source: LPC guidelines, DOT Standard Specifications Section 6.07



Bleecker Street, Manhattan



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

- 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

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



Hudson Street, Manhattan



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



Gansevoort Plaza, Gansevoort Street and 9th Avenue, Manhattan (Credit: DDC)



Granite blocks in the furnishing zone

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

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



Willoughby Street, Brooklyn



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

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.

Specification source: Special Section GI-2.03



Varick Street, Manhattan



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

Design

ASTM No. 8, 89, or 9 stone is recommend 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



Seth Low Houses, Brooklyn



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.

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
- For pigmented concrete curbs, see MATERIALS: PIGMENTED CONCRETE (DARK) and MATERIALS: PIGMENTED CONCRETE (HISTORIC MATERIALS) for design guidance and specification information on pigmented concrete sidewalks

- 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



87th Street, Queens

- 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

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



Gansevoort Street, Manhattan.

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

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.

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



Front Street, Brooklyn



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

Roadways

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.

Asphaltic 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



69th Street, Queens

- Typically requires concrete base
- Sustainability opportunity: High recycled asphalt (RAP) content
- Sustainability opportunity: Warm-mix asphalt
- Sustainability opportunity: High-SRI asphalt
- Sustainability opportunity: Porous asphalt in parking lanes

Maintenance

- Easier to repair than other roadway materials

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.

No specification source



Craig Road N, Governors Island



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

- Porosity of pavement can convey harmful materials into the soil
- Sand and certain chemical de-icers should not be applied to surface

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

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



Porous asphalt in parking lot at the Bronx Zoo: Bronx

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.

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

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



West Side Highway, Manhattan

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

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.

No specification source



Rego Park, Queens



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

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

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

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

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.

Specification source: DOT Standard Highway Specifications Section 2.06, 6.04



Greene Street, Manhattan



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
- See MATERIALS: GRANITE PAVER

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