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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 the New York City Public Design Commission (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 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.

The review process for Distinctive sidewalk and curb materials is as follows:

1. Adjacent property owner or jurisdictional organization submits proposal to DOT's Urban Design and Art Unit at udau@dot.nyc.gov. The submission usually comprises architectural drawings, site photographs, project descriptions, and other supporting materials as necessary, and must meet at least one of the following criteria:

- Encompasses an entire block
- Pertains to a streetscape project
- Features a design integral to an adjacent open plaza space, or
- Is compatible with the prevailing material on blocks adjacent to the site for which it is proposed

2. 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. If the proposal is acceptable, DOT submits it to PDC for an initial review

3. 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 the PDC's guidelines, visit their website at nyc.gov/designcommission

4. If PDC preliminarily approves the proposal, the applicant submits a Sidewalks, Curbs, and Roadways Application (SCARA) to DOT
5. DOT reviews the SCARA. Distinctive materials identified in this chapter will receive an expedited review
6. If the SCARA is approved, DOT and the applicant enter into a maintenance agreement
7. DOT submits proposal to PDC for Final Approval
8. If the proposal receives Final Approval from PDC, the applicant applies for the appropriate DOT construction permits and commences installation of the Distinctive sidewalk and/or curb materials

Historic

Historic materials are standard in historic districts designated by the New York City Landmarks Preservation Commission (LPC) and are subject to its requirements. Historic materials used outside of historic districts are considered Distinctive.

Pilot

Pilot materials exhibit environmentally sustainable properties and are being tested by DOT. It is anticipated that Pilot materials, if successful, will 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 Standard Details of Construction. 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, City Environmental Quality Review (CEQR), and appropriate reviews and approvals of oversight agencies. When materials are being selected, universal design resources such as the ADA Standards for Accessible Design should be consulted to ensure 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.

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 the Department of Buildings 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 nyc.gov/streetsdesignmanual. 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.

Sidewalks

Sidewalks are paths for pedestrians alongside a road (see Glossary). The primary function of a sidewalk is to provide pedestrian movement and access to buildings, parks, and other destinations. Sidewalks also function as sites for loading and unloading vehicles, as public meeting and gathering spaces, as places for outdoor dining, and as venues for commerce or expression. Increasingly frequently, sidewalks can also serve as opportunities to beautify streets with vegetation.

See SIDEWALK (2.2.1) 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; all sidewalk materials may be used 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 PLAZAS (2.1.4) as well.

Unpigmented Concrete

Usage: Standard

Benefits

Provides durable sidewalk surface with high friction coefficient

Widely available and cost-effective

Provides solid footing for flush-mounted furniture anchors

Considerations

Difficult to patch in sections where utility cuts or defects occur

Application

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

Adjacent property owners are generally responsible for maintaining this material

Design

Flag size: 5 feet by 5 feet

Joint: "tooled joint" or simulated saw-cut joint-scoring patterns

Typically requires 6-inch gravel base

May require metal reinforcement bars as specified by DOT

Specification source: DOT Standard Specifications Section 2.02, 2.15, 2.22, 3.05, 4.13, item numbers 4.13 AAS (4-inch sidewalk) and 4.13 BAS (7-inch sidewalk)

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

Sustainability Opportunity: Supplementary cementitious materials (SCM)

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



Typical concrete sidewalk: West Street at 16th Street, Manhattan



Concrete ribbon sidewalk: Rockaway Beach Boulevard, Queens

Pigmented Concrete: Dark

Usage: Standard*

Same mixture as UNPIGMENTED CONCRETE (3.1.1), but with an added pigment for use in high-density commercial districts. This is one of three kinds of pigmented concrete—see also PIGMENTED CONCRETE: BLUESTONE (3.1.2b) and PIGMENTED CONCRETE: GRANITE (3.1.2c).

* Standard only for 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

Benefits

See benefits of UNPIGMENTED CONCRETE (3.1.1)

Dark pigmentation visually enhances sidewalk and emphasizes urban character in areas with greatest commercial and retail density

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

Considerations

See considerations for UNPIGMENTED CONCRETE (3.1.1)

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

Adjacent property owners are generally responsible for maintaining this material

Design

See design guidance for UNPIGMENTED CONCRETE (3.1.1)

Specification source: DOT Standard Specifications Section 4.13, item numbers 4.13 CABS (4-inch sidewalk) and 4.13 CBBS (7-inch sidewalk)

Sustainability Opportunity: Supplementary cementitious materials (SCM)



Typical dark pigmented concrete sidewalk with simulated saw-cut joint scoring: Broadway at Exchange Place, Manhattan

Pigmented Concrete: Bluestone

Usage: Historic

Benefits

See benefits of UNPIGMENTED CONCRETE (3.1.1)

Reinforces historic character

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

Considerations

See considerations for UNPIGMENTED CONCRETE (3.1.1)

All sidewalk repair or replacement in historic districts requires written approval from LPC

Application

Appropriate, pending LPC review, in historic districts as replacement of bluestone that is beyond repair, per LPC guidelines

Appropriate, pending PDC review, in historic, non-landmarked neighborhoods as replacement of bluestone that is beyond repair, per PDC guidelines

Adjacent property owners are generally responsible for maintaining this material

Same mixture as UNPIGMENTED CONCRETE (3.1.1), but with an added pigment to simulate bluestone flags in historic districts, as per LPC guidelines, or in historic, non-landmarked neighborhoods, as per PDC guidelines. This is one of three kinds of pigmented concrete—see also PIGMENTED CONCRETE: DARK (3.1.2a) and PIGMENTED CONCRETE: GRANITE (3.1.2c).



Bluestone pavers in the foreground and concrete pigmented to simulate the historic pavers in the background: Hudson Street at Christopher Street, Manhattan

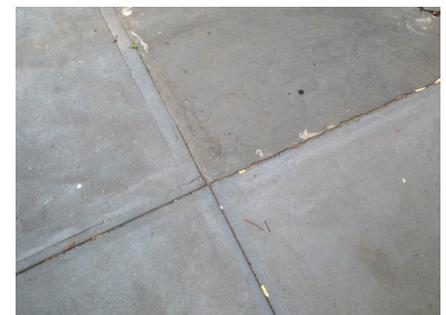
Design

See design guidance for UNPIGMENTED CONCRETE (3.1.1)

Flag size and pigmentation to match existing bluestone flags per LPC or PDC guidelines

Specification source: DOT Standard Specifications Section 4.13, item numbers 4.13 ABS (4-inch sidewalk) and 4.13 BBS (7-inch sidewalk)

Sustainability Opportunity: Supplementary cementitious materials (SCM)



Concrete pigmented to simulate bluestone adjacent to a bluestone flag: Pacific Street, Brooklyn

Pigmented Concrete: Granite

Usage: Historic

Same mixture as UNPIGMENTED CONCRETE (3.1.1), but with an added pigment to simulate granite slabs in historic districts, per LPC guidelines, or in historic, non-landmarked neighborhoods, per PDC guidelines. This is one of three kinds of pigmented concrete—see also PIGMENTED CONCRETE: DARK (3.1.2a) and PIGMENTED CONCRETE: BLUESTONE (3.1.2b).

Benefits

See benefits of UNPIGMENTED CONCRETE (3.1.1)

Reinforces historic character

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

Considerations

See considerations for UNPIGMENTED CONCRETE (3.1.1)

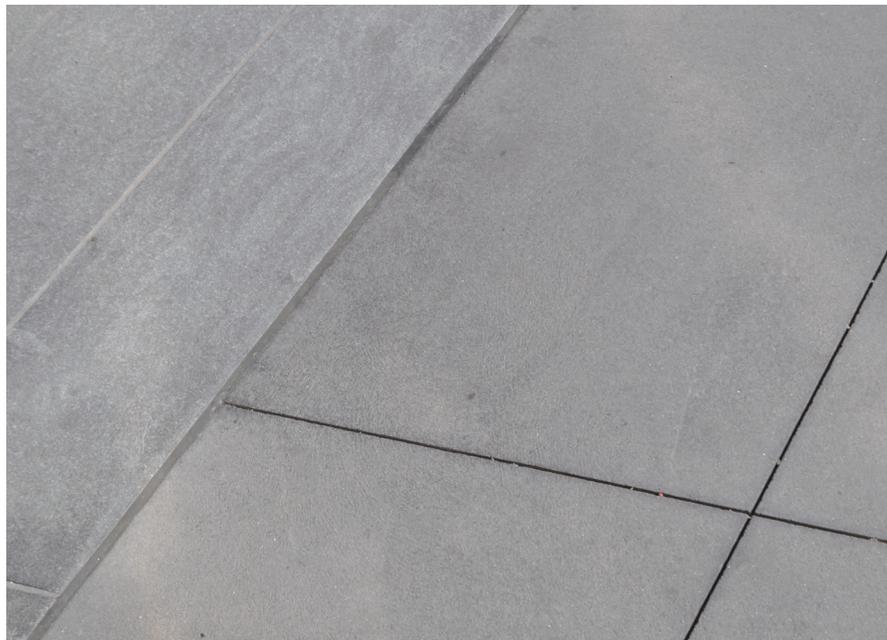
All sidewalk repair or replacement in historic districts requires written approval from LPC

Application

Appropriate, pending LPC review, in historic districts as replacement of granite that is beyond repair, per LPC guidelines

Appropriate, pending PDC review, in historic, non-landmarked neighborhoods as replacement of granite that is beyond repair, per PDC guidelines

Adjacent property owners are generally responsible for maintaining this material



Concrete pigmented to match adjacent granite: Greenwich Street at Barclay Street, Manhattan

Design

See design guidance for UNPIGMENTED CONCRETE (3.1.1)

Flag size and pigmentation to match existing granite slabs per LPC or PDC guidelines

Specification source: DOT Standard Specifications Section 4.13, item numbers 4.13 ABS (4-inch sidewalk) and 4.13 BBS (7-inch sidewalk)

Sustainability Opportunity: Supplementary cementitious materials (SCM)

Pigmented Concrete with Exposed Light-Colored Aggregate

Usage: Distinctive

Benefits

See benefits of PIGMENTED CONCRETE: DARK (3.1.2a)

Exposed aggregate creates a texture and more natural appearance

Exposed aggregate camouflages dirt and gum in high-traffic areas

Considerations

See considerations for PIGMENTED CONCRETE: DARK (3.1.2a)

Application

This material is recommended for commercial areas with high foot traffic

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

Use of this material generally requires a maintenance agreement

Same mixture as PIGMENTED CONCRETE: DARK (3.1.2a) for commercial districts, but with addition of exposed light-colored pebble-sized aggregate. Joints are scored to simulate saw-cutting.



Tinted concrete sidewalk with light-colored exposed aggregate (note: this example does not include the required "simulated saw-cut joint" scoring pattern); East 42nd Street at Grand Central Terminal, Manhattan

Design

See design guidance for PIGMENTED CONCRETE: DARK (3.1.2a)

Aggregate: pebble-sized, light in color

Aggregate specification source:
DOT Standard Specifications
Section 4.13 E, item numbers 4.13
EAGG
(4-inch sidewalk), 4.13 EBGG
(7-inch sidewalk)

Sustainability Opportunity:
Supplementary cementitious
materials (SCM)

Pigmented Concrete with Silicon Carbide Treatment

Usage: Distinctive

Benefits

See benefits of PIGMENTED CONCRETE: DARK (3.1.2a)

Sparkle adds distinction and visual enhancement to pigmented concrete

Increases slip resistance of surface

Considerations

See considerations for PIGMENTED CONCRETE: DARK (3.1.2a)

Application

This material is appropriate for sidewalks in commercial districts

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

Use of this material generally requires a maintenance agreement

Design

See design guidance for PIGMENTED CONCRETE: DARK (3.1.2a)

Silicon carbide specification source: DOT Standard Specifications Section 4.13, item numbers 4.13 CSABS (4-inch sidewalk) and 4.13 CSBBS (7-inch sidewalk)

Sustainability Opportunity: Supplementary cementitious materials (SCM)

Same mixture as PIGMENTED CONCRETE: DARK (3.1.2a) for commercial districts, but treated with silicon carbide to add sparkle.



Pigmented concrete sidewalk with silicon carbide treatment, shown with non-standard flag size: Hanover Square at Pearl Street, Manhattan



Close-up of concrete with silicon carbide treatment: Hanover Square at Pearl Street, Manhattan

Sand-Colored Concrete with Exposed Aggregate

Usage: Distinctive

Benefits

See benefits of PIGMENTED CONCRETE WITH EXPOSED LIGHT-COLORED AGGREGATE (3.1.2d)

Sand color reinforces natural character of open spaces

Considerations

See considerations for PIGMENTED CONCRETE WITH EXPOSED LIGHT-COLORED AGGREGATE (3.1.2d)

Application

This material is appropriate for sidewalks adjacent to waterfronts, parks, and other open spaces

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

Use of this material generally requires a maintenance agreement

Sand-colored concrete with multi-colored pebble-sized exposed aggregate. This material is appropriate for sidewalks adjacent to parks.



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

Design

See design guidance for PIGMENTED CONCRETE WITH EXPOSED LIGHT-COLORED AGGREGATE (3.1.2d)

Pigmenting: sand-colored

Aggregate: pebble-sized, mixed-color river rock

Specification source: DOT Standard Specifications Section 4.13, item number 4.13 ESA (4-inch sidewalk) and 4.13 ESB (7-inch sidewalk)

Sustainability Opportunity: Supplementary cementitious materials (SCM)

Concrete with Exposed Glass Aggregate

Usage: Distinctive

Benefits

Decorative glass adds distinction and visual enhancement to concrete

Increases slip resistance of surface

Precast pavers are relatively easy to reset or replace for utility access and other purposes

Considerations

See considerations of UNPIGMENTED CONCRETE (3.1.1)

Alkaline reaction can degrade structural integrity of the concrete

Unit pavers can become loose over time and will require regular maintenance

DOT requires testing of this material

Application

Cast-in-place should not be used where frequent utility cuts are likely

Use of this material generally requires a maintenance agreement

Concrete into which select surface aggregates (such as colored glass or decorative pebbles) are embedded. Either cast in place or installed in the form of precast unit pavers. This treatment is for use exclusively in the furnishing zone.

Design

See design guidance for of UNPIGMENTED CONCRETE (3.1.1)

Slip resistance: minimum 0.60 coefficient of friction wet

Unlimited color and aggregate mix options available

Cast in Place:

- Joint: simulated saw-cut joint scoring
- When poured, may require metal reinforcement bars as specified by DOT

Pavers:

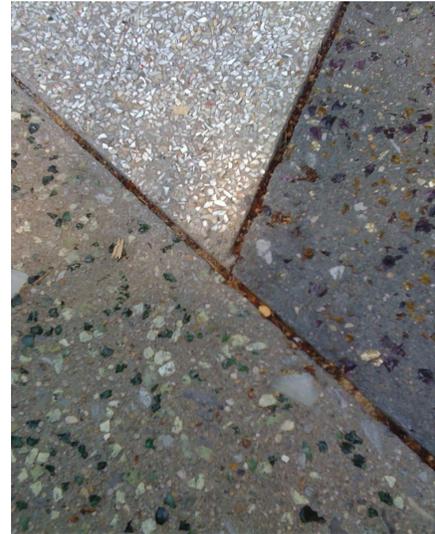
- Pavers should be sand-set for easier installation and greater permeability wherever impermeable installation generates stormwater runoff
- Pavers can be mortar set for stronger structural properties
- Paver size: 8 inches by 8 inches

Specification source: DOT Standard Specifications Section 4.13 EG, item numbers 4.13 EGA (4-inch sidewalk), 4.13 EGB (7-inch sidewalk), and 6.47 EGA8 (pavers)

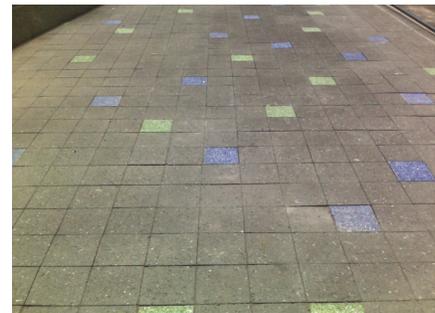
Sustainability Opportunity: Supplementary cementitious materials (SCM)

Sustainability Opportunity: High-SRI coloring

Sustainability Opportunity: Recycled glass or reclaimed aggregates



Poured, cast-in-place concrete with exposed glass aggregate: Manhattan Bridge Plaza, Brooklyn



Concrete pavers with exposed blue and green glass aggregate (shown interspersed with black asphalt pavers): Hudson River Park, Manhattan

Concrete with London Paver Scoring

Usage: Distinctive

Benefits

See benefits of UNPIGMENTED CONCRETE (3.1.1)

Reinforces civic character of an area

Less expensive than unit pavers

Considerations

Difficult to patch in sections where utility cuts or defects occur

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

Use of this material generally requires a maintenance agreement

Design

Flag size: 18 inches by 36 inches

Requires concrete base

Specification source: DOT Standard Specifications Section 6.06 LP, item number 6.06 LP

Sustainability Opportunity: Supplementary cementitious materials (SCM)

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



Concrete with London paver scoring: Brooklyn Bridge pedestrian access ramp, Manhattan



Concrete with London paver scoring: Washington, DC

Hexagonal Asphalt Paver

Usage: Distinctive

Benefits

Commonly used paver for New York City public spaces conveys park-like character

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

Hexagonal pavers are relatively easy to reset or replace, especially for utility access

Asphalt pavers can be recycled

Considerations

Unit pavers can become loose over time and will require regular maintenance

May contribute to heat-island effect

Application

Hexagonal asphalt pavers are appropriate for sidewalks adjacent to parks or plazas

Use of this material generally requires a maintenance agreement—hexagonal asphalt pavers installed by DPR are an exception

Asphalt pre-cast into hexagonally shaped paver.



Hexagonal asphalt paver sidewalk: Columbus Avenue at West 66th Street, Manhattan

Design

Paver size: 8 inches between parallel sides

Can be sand-set for easier installation or mortar-set for stronger structural properties

Specification source: DOT Standard Highway Specifications Section 3.04 and 6.60, item number 6.60 B

Sustainability Opportunity: High recycled asphalt (RAP) content

Bluestone Flag

Usage: Historic

Benefits

Reinforces historic character

Adds distinction and visual enhancement to sidewalk

Stone conveys connection to natural environment

Considerations

Vulnerable to breakage

Due to the possibility of pavers cracking or becoming uneven, application requires attentive maintenance

All sidewalk repair or replacement in historic districts requires written approval from LPC

Higher up-front cost than concrete

Application

This material is standard in historic districts or other areas with existing bluestone pavers where historic fabric remains intact, per the LPC guidelines

In historic districts, adjacent property owners are generally responsible for maintaining this material

Use of this material outside historic districts generally requires a maintenance agreement

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



Bluestone flag sidewalk: Perry Street at Bleecker Street, Manhattan

Design

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

Finish: Natural cleft, with variation in smoothness not exceeding 1/8 inch

Joints: Hand-tight

Specification sources: LPC guidelines, DOT Standard Specifications Section 6.07, item number 6.07 AB

Sustainability Opportunity: Salvaged bluestone

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.

Benefits

Reinforces historic character

Adds distinction and visual enhancement to sidewalk

Stone conveys connection to natural environment

Considerations

Not intended to support heavy vehicles when spanning underground vaults

Difficult to repair or patch in sections

All sidewalk repair or replacement in historic districts requires written approval from LPC

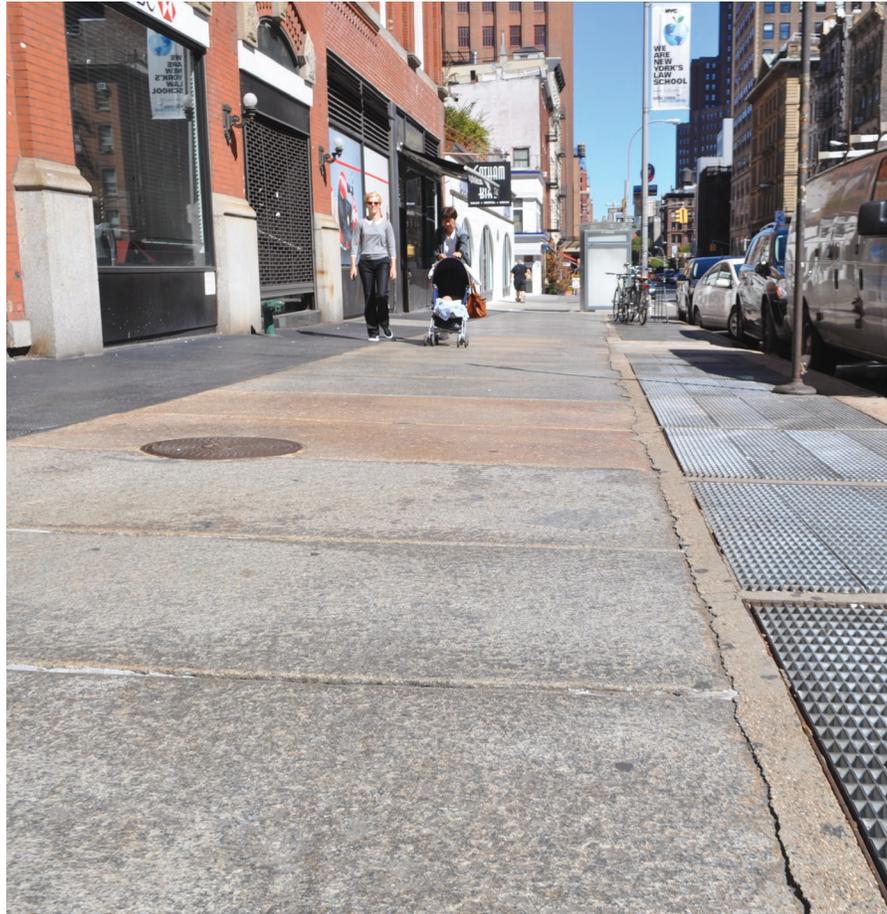
Higher up-front cost than concrete

Application

This material is standard in historic districts or other areas with existing granite pavers where historic fabric remains intact, per the LPC guidelines

In historic districts, adjacent property owners are generally responsible for maintaining this material

Use of this material outside historic districts generally requires a maintenance agreement



Granite slab sidewalk: West Broadway at Reade Street, Manhattan

Design

Granite: to match size and color of existing flags, 3-inch minimum thickness

Slip resistance: minimum 0.60 coefficient of friction wet

Specification sources: LPC guidelines, DOT Standard Specifications Section 6.04, item numbers 6.06 NG, 6.06 NGSM (mortar setting bed and joints), and 6.06 NGSS (sand setting bed and joints)

Sustainability Opportunity: Salvaged granite slabs

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 exclusively in the furnishing zone.

Benefits

Visually delineates separation of street uses

Stones convey connection to natural environment

Cobblestones are relatively easy to remove and reset, especially for utility access

Reinforces historic character, where applicable

Considerations

Stones can become loose over time and will require regular maintenance

Can be slippery when wet

Uneven surface can hinder the mobility of pedestrians and people with disabilities

Application

Furnishing zone and around tree beds

Use of this material generally requires a maintenance agreement. Granite blocks installed by DPR around tree beds are an exception



Granite blocks are for use in furnishing zones only: Little West Street, Battery Park City, Manhattan

Design

Should be sand-set for easier installation and greater permeability wherever impermeable installation generates stormwater runoff

Can be mortar-set for stronger structural properties

The area within 18 inches of the curb should be kept free of obstructions

Specification source: DOT Standard Specifications Section 2.06, 6.06

Sustainability Opportunity:
Salvaged cobbles

Sustainability Opportunity: Permeable installation

Precast Square Paver

Usage: Distinctive

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

Benefits

This material is widely available and cost-effective

Relatively easy to reset or replace, especially for utility access

Asphalt pavers can be recycled

Considerations

Unit pavers can become loose over time and will require regular maintenance

Application

Furnishing zone

Use of this material generally requires a maintenance agreement

Design

Paver size: 8 inches by 8 inches

Should be sand-set for easier installation and greater permeability wherever impermeable installation generates stormwater runoff

Can be mortar set for stronger structural properties

The area within 18 inches of the curb should be kept free of obstructions



Square asphalt pavers in a furnishing zone: Willoughby Street at Duffield Street, Brooklyn

Specification source: DOT Standard Specifications Section 6.06, item numbers 6.6 B (asphalt), 6.06 CSA (concrete with sand joints), 6.06 CSB (concrete with grouted joints), and 6.06 CSC (concrete with sand and grouted joints)

Sustainability Opportunity: High recycled asphalt (RAP) content

Sustainability Opportunity: High-SRI coloring

Permeable Interlocking Concrete Paver (PICP)

Usage: Distinctive*

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

Not recommended for use 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

Requires regular maintenance

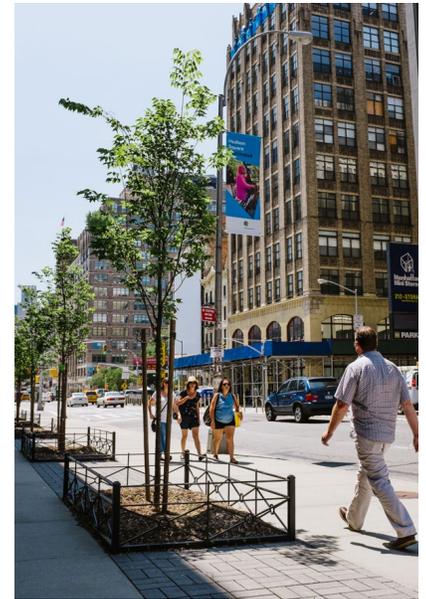
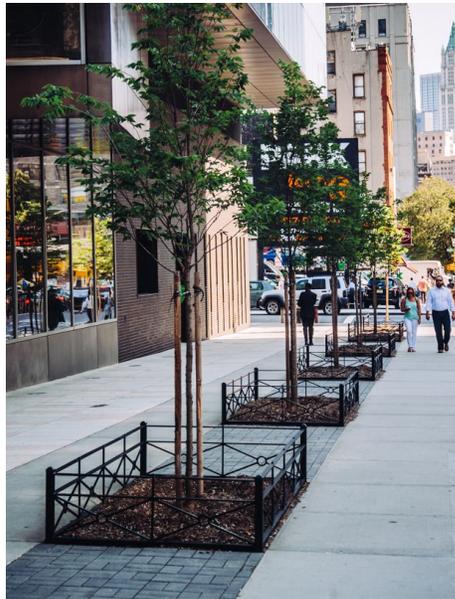
Vegetative growth in joints will occur if there is no regular maintenance

May require vacuuming of surface to restore permeability when joints become clogged

Sand should not be applied to surface

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 partner.



PICPs above a connected tree bed in Hudson Square, Manhattan (Credit: Hudson Square Business Improvement District)

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 "stormwater hotspots" — sites where there is potential for soil and groundwater contamination

Use of this material generally requires a maintenance agreement

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 incorporating recycled materials

Porous Concrete

Usage: Pilot



Porous concrete lets water permeate down to the subsurface soil

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

See benefits of UNPIGMENTED CONCRETE (3.1.1)

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 UNPIGMENTED CONCRETE (3.1.1)

Pervious concrete has reduced strength compared to conventional concrete applications

Not appropriate for use 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

Requires routine vacuuming of surface to restore permeability

Sand should not be applied to surface

Contractors should be certified to install porous concrete

Slump and air content tests are not applicable to pervious concrete

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 used to pave an entire sidewalk or just hardscape between CONNECTED TREE BEDS (6.1.1b)

Avoid "stormwater hotspots"—sites where there is potential for soil and groundwater contamination

Not recommended for implementation over significant underground utility corridors

Use of this material generally requires a maintenance agreement

Design

See design guidance for UNPIGMENTED CONCRETE (3.1.1)

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

Rubber Paver

Usage: Pilot

Benefits

Easy to install and replace

Pavers can be shaped to avoid trees or other objects

Thinner than traditional sidewalk, allowing more room for roots to grow

Permeability of the joints allows stormwater to filter through to tree roots

Permeability helps to reduce the formation of the condensation commonly seen under traditional concrete flags which promotes the aggressive root growth that tends to cause fracturing and upheaval

Considerations

Generates some stormwater runoff

Unit pavers can become uneven over time and require regular maintenance

Application

Appropriate for piloting on sidewalks or plazas with low pedestrian traffic where tree roots may cause the fracturing and upheaval of sidewalk paving

Use of this material generally requires a maintenance agreement

Interlocking sidewalk pavers made of recycled rubber or a rubber/plastic mix.



Rubber sidewalk pavers (credit: Rubbersidewalks®)

Design

Recycled rubber must be free of high-risk chemicals or otherwise sealed to prevent contamination of soil

Paver size: 2 feet by 2.5 feet

Various colors available

Sustainability Opportunity: High-SRI coloring

Curbs

A curb is a step where the roadbed meets the sidewalk or other raised pathway (see Glossary). Curbs serve three functions: a visual and physical limit to the vehicular roadbed; a gutter to convey rainwater and detritus from the roadbed and sidewalks to the catch basins at the ends of the street; and aesthetically, curbs add a finished edge to sidewalks and roadbeds.

Unpigmented Concrete

Mixture comprising cement(s), aggregate(s), water, and other chemical admixtures, smoothed and then allowed to harden, forming a solid curb.

Usage: Standard



ABOVE: Typical untinted concrete curb with steel facing: West 114th Street and Morningside Avenue, Manhattan

LEFT: Typical concrete curb: Beach 73rd Street, Queens

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

Vulnerable to breakage or crumbling

Application

This material is standard for any street with UNPIGMENTED CONCRETE sidewalks (3.1.1)

DOT generally maintains this material

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

Pigmented Concrete

Usage: Standard

Benefits

See benefits of UNPIGMENTED CONCRETE (3.2.1)

Considerations

See considerations for UNPIGMENTED CONCRETE (3.2.1)

Application

See application guidance for PIGMENTED CONCRETE sidewalks (3.1.2a, 3.1.2b, and 3.1.2c)

DOT generally maintains this material

Design

See design guidance for UNPIGMENTED CONCRETE (3.2.1)

See design guidance and specification information for PIGMENTED CONCRETE sidewalks (3.1.2a, 3.1.2b, and 3.1.2c)

Sustainability Opportunity:
Supplementary cementitious materials (SCM)

Same mixture as UNPIGMENTED CONCRETE (3.2.1), but with a pigmented admixture to match the sidewalk. There are three types of pigmented concrete: PIGMENTED CONCRETE: DARK (3.1.2a), BLUESTONE (3.1.2b), and GRANITE (3.1.2c).



Typical pigmented concrete curb with steel facing: Beaver Street at Hanover Street, Manhattan

Integral Concrete Curb and Gutter

Usage: Distinctive

Benefits

Easier to install and maintain than cast-in-place alternatives

Can be removed and replaced as needed

Considerations

See considerations for UNPIGMENTED CONCRETE (3.2.1)

Use of this material may require a maintenance agreement

Application

Appropriate for residential areas with low volumes of heavy vehicles

Flood-prone areas

Design

Specification source: DOT Standard Specifications Section 4.08, item number 4.08 CG

Sustainability Opportunity: Supplementary cementitious materials (SCM)

Sustainability Opportunity: Porous concrete where possible

Concrete curb and gutter precast as single pieces and installed in sections.



Precast concrete curb and gutter sections laid end-to-end. Photo shows extension in background: Miami Beach, FL (Note: for illustrative purposes only)

Granite

Usage: Distinctive

Benefits

Reinforces historic character (if applicable)

Adds distinction and visual enhancement to sidewalk

Stone conveys connection to natural environment

Extremely durable and low-maintenance, resists cracking and discoloration

Can be removed and replaced as needed

Considerations

Difficult to patch and must therefore be replaced by section if severely damaged

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

DOT generally maintains this material

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.



Split-finish granite curb shown with concrete sidewalk: Houston Street at LaGuardia Place, Manhattan



Saw-finish granite curb shown with historic bluestone sidewalk: Madison Avenue at East 51st Street, Manhattan

Design

Size: 5 inches to 8 inches wide on top, 3 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

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

Sustainability Opportunity: Salvaged granite curb

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 (3.4) 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.



Granite pavers in a crosswalk. This treatment is appropriate for historic districts: Water Street, Brooklyn

Benefits

Visually enhances crosswalk

Creates accessible, smooth crossing surface

Considerations

Due to the possibility of pavers cracking or becoming uneven, and asphalt shoving at the borders, application requires attentive maintenance

Significantly higher cost than a standard asphalt crosswalk

Application

Crosswalks on historic streets or where distinction is desired and there are low volumes of heavy vehicle traffic

Should not be used where frequent utility cuts are likely

Use of this material generally requires a maintenance agreement

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

Specification source: DOT Standard Specifications Section 6.04

Sustainability Opportunity: Salvaged pavers

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

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, 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 in all neighborhoods unless otherwise specified

Preferred road surface for cycling

DOT generally maintains this material

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



Typical asphalt roadway: Delancey Street at Forsyth Street, Manhattan

Design

Minimum 3-inch-thick wearing course, typically

Roadway should be crowned to drain stormwater from the road surface

Typically requires concrete base

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

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

Sustainability Opportunity: High recycled asphalt (RAP) content

Sustainability Opportunity: High-SRI asphalt

Sustainability Opportunity: Porous asphalt in parking lanes

Porous Asphalt

Usage: Pilot

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

Benefits

See benefits of ASPHALTIC CONCRETE (3.4.1)

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 ASPHALTIC CONCRETE (3.4.1)

Not recommended for use 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 chemicals into the soil

Requires vacuuming of surface to restore permeability when clogged

Sand should not be applied to surface



Voids in between stones allow water to pass through (Note: for demonstration purposes, this example shows a clear resin, not asphalt, to bind the aggregate particles)



Conventional asphalt causes rainwater to pool while porous asphalt allows it to permeate the ground below

Application

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

Avoid “stormwater hotspots”— sites where there is high potential for soil and groundwater contamination

Not recommended for implementation over significant underground utility corridors

Use of this material generally requires a maintenance agreement

Design

Minimum 3-inch-thick wearing course, typically

Roadway should be crowned to drain stormwater from the road surface

Aggregate should be no smaller than 600 μm , or the No. 30 sieve

Asphaltic cement should be 5.75–6.75% bituminous asphalt content by weight

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

Concrete

Usage: Standard

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

Considerations

Difficult to replace or patch in sections where utility cuts or defects occur

Noisier than asphalt

Application

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

Mixture comprising cement(s), aggregate(s), water, and other chemical admixtures, poured over metal reinforcement bars, smoothed, and then allowed to harden, forming a solid road surface.



Typical concrete roadbed: 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

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

Sustainability Opportunity:
Supplementary cementitious materials (SCM)



Typical concrete bus pad: Manhattan Avenue at 114th Street, Manhattan

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.



Typical cobblestone roadway: Jay Street at Hudson Street, Manhattan



Detail of a design to provide rideable cycling surface using a strip of smooth granite pavers among reused granite blocks

Benefits

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

Considerations

- Stones can become loose over time and require intensive, regular maintenance
- 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
- See GRANITE PAVER CROSSING (3.3.1)
- Can be slippery when wet

Application

- Should be used wherever there is existing cobblestone in areas where the historic fabric remains intact
- Use of this material is subject to LPC review when used in historic districts with existing cobblestones
- 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 the Commissioner 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 generally 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. DOT and DDC are finalizing a new specification for achieving rideability
- Specification source: DOT Standard Highway Specifications Section 2.06, 6.04
- Sustainability Opportunity: Salvaged cobbles
- Sustainability Opportunity: Permeable installation