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TABLE OF CONTENTS

THE CITY RECORD

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PUBLIC HEARINGS AND MEETINGS

See Also: Procurement; Agency Rules

BOROUGH PRESIDENT - BROOKLYN

■ PUBLIC HEARINGS

NOTICE IS HEREBY GIVEN THAT, pursuant to Section 201 of the New York City Charter, the Brooklyn Borough President, will hold a remote ULURP public hearing on the following matters, commencing, at **6:00 P.M. on Wednesday, December 15, 2021**.

The hearing will be conducted via the Webex video conferencing system.

Members of the public may join and testify using the following information:

Event Address:
https://nycbp.webex.com/nycbp/onstage/g.php?MTID=ea1b9e01a880a6cdc041efa0db447825d

Event Number: 2340 907 9349

Event Password: Ulurp

Those wishing to call in without video may do so using the following information:

Audio Conference: +1-408-418-9388

Access Code: 2340 907 9349

1) Sutter Avenue Rezoning (210031 ZMK, N 210032 ZRK)
Applications submitted by Almonte Lincoln LLC, pursuant to Sections 197-c and 201 of the New York City Charter, for the following land use actions: a zoning map amendment to change the north block front of Sutter Avenue between Autumn and Lincoln avenues from an R5 district to R6A/C2-4, and a zoning text amendment to establish a Mandatory Inclusionary Housing (MIH) area coterminous with the project area. The requested actions would facilitate a five-story, 31,564 square-foot (sq. ft.) building with 28 apartments and 7,436 sq. ft. of commercial space on the northwest corner of Lincoln and Sutter avenues in Brooklyn Community District 5 (CD 5). Approximately eight units, at 1377 Sutter Avenue would be permanently affordable to households earning 80 percent of Area Median Income (AMI), pursuant to MIH Option 2. The development's cellar would contain 10 accessory parking spaces.

This hearing will be recorded for public transparency and made available on Borough President Adams' YouTube channel, One Brooklyn.

Note: For further information on accessibility or to make a request for accommodations, such as sign language interpretation services, please contact Nathan Sherfinski via email, at nathan.sherfinski@brooklynbp.nyc.gov or via phone, at (718) 802-3857, at least five (5) business days in advance, to ensure availability.

Accessibility questions: Nathan Sherfinski, (718) 802-3857, nathan.sherfinski@brooklynbp.nyc.gov, by: Wednesday, December 8, 2021, 6:00 P.M.

d7-15

CITY PLANNING COMMISSION

■ PUBLIC HEARINGS

In support of the City's efforts to contain the spread of COVID-19, the City Planning Commission will hold a remote public hearing, via the teleconferencing application Zoom, at 10:00 A.M. Eastern Daylight Time, on Wednesday, December 15, 2021, regarding the calendar items listed below.

The meeting will be live streamed through Department of City Planning's (DCP's) website and accessible from the following webpage, which contains specific instructions on how to observe and participate, as well as materials relating to the meeting: https://www1.nyc.gov/site/nycengage/events/city-planning-commission-public-meeting/290350/1.

Members of the public should observe the meeting through DCP's website.

Testimony can be provided verbally by joining the meeting using either Zoom or by calling the following number and entering the information listed below:

877 853 5247 US Toll-free
888 788 0099 US Toll-free

253 215 8782 US Toll Number

213 338 8477 US Toll Number

Meeting ID: **618 237 7396**
[Press # to skip the Participation ID]
Password: 1

To provide verbal testimony via Zoom, please follow the instructions available through the above webpage (link above).

Written comments will also be accepted until 11:59 P.M., one week before the date of vote. Please use the CPC Comments form that is accessible through the above webpage.

Please inform the Department of City Planning if you need a reasonable accommodation, such as a sign language interpreter, in order to participate in the meeting. The submission of testimony, verbal or written, in a language other than English, will be accepted, and real time interpretation services will be provided based on available resources. Requests for a reasonable accommodation or foreign language assistance during the meeting, should be emailed, to *[AccessibilityInfo@planning.nyc.gov],* or made by calling, *[212-720-3508].* Requests must be submitted at least five business days before the meeting.

BOROUGH OF MANHATTAN
Nos. 1 & 2
CASTLE III 107-111 EAST 123RD STREET
No. 1

CD 11 **C 220059 ZSM**
IN THE MATTER OF an application submitted by the Department of Housing Preservation and Development, pursuant to Sections 197-c and 201 of the New York City Charter for the grant of a special permit, pursuant to Section 74-903 of the Zoning Resolution to modify the requirements of Section 24-111 (Maximum floor area ratio for certain community facility uses) to permit the allowable community facility floor area ratio of Section 24-11 (Maximum Floor Area Ration and Percentage of Lot Coverage) to apply to a non-profit institution with sleeping accommodations, in connection with a proposed 15-story building on property, located at 107-111 East 123rd Street (Block 1772, Lots 4, 7 and 8), in an R7-2 District.

Plans for this proposal are on file with the City Planning Commission and may be seen, at 120 Broadway, 31st Floor, New York, NY 10271-0001.

No. 2

CD 11 **C 220060 HAM**
IN THE MATTER OF an application submitted by the Department of Housing Preservation and Development (HPD)

1. pursuant to Article 16 of the General Municipal Law of New York State for:
   a. the designation of property, located at 107-111 East 123rd Street (Block 1772, Lots 4, 7 and 8) as an Urban Development Action Area; and
   b. an Urban Development Action Area Project for such area; and
2. pursuant to Section 197-c of the New York City Charter for the disposition of such property to a developer to be selected by HPD;

to facilitate the development of a 15-story building containing approximately 81 supportive and affordable housing units, Borough of Manhattan, Community District 11.

BOROUGH OF QUEENS
No. 3
99-07 ASTORIA BOULEVARD COMMERCIAL OVERLAY

CD 3 **C 210189 ZMQ**
IN THE MATTER OF an application submitted by 99-20 Realty Corp., pursuant to Sections 197-c and 201 of the New York City Charter for the amendment of the Zoning Map, Section No. 9c, establishing within the existing R3-2 District a C2-3 District bounded by 27th Avenue, 100th Street Astoria Boulevard, and 99th Street, as shown on a diagram (for illustrative purposes only), dated August 30, 2021, and subject to the conditions of CEQR Declaration E-640.

Nos. 4 & 5
97-04 SUTPHIN BOULEVARD REZONING
No. 4

CD 12 **C 210213 ZMQ**
IN THE MATTER OF an application submitted by BG Sutphin LLC, pursuant to Sections 197-c and 201 of the New York City Charter for an amendment of the Zoning Map, Section No. 14d, by changing from a C4-5X District to a C6-3 District property bounded by 97th Avenue, 146th Street, a line 100 feet southeasterly of 97th Avenue and Waltham Street, as shown on a diagram (for illustrative purposes only), dated August 30, 2021, and subject to the conditions of CEQR Declaration E-639.

No. 5

CD 12 **N 210214 ZRQ**
IN THE MATTER OF an application submitted by BG Sutphin LLC, pursuant to Section 201 of the New York City Charter, for an amendment of the Zoning Resolution of the City of New York, modifying Article XI, Chapter 5 (Special Downtown Jamaica District) and related Sections, and modifying APPENDIX F for the purpose of establishing a Mandatory Inclusionary Housing area.

Matter underlined is new, to be added;
Matter ~~struck out~~ is to be deleted;
Matter within # # is defined in Section 12-10;
* * * indicates where unchanged text appears in the Zoning Resolution

ARTICLE XI
SPECIAL PURPOSE DISTRICTS

CHAPTER 5
SPECIAL DOWNTOWN JAMAICA DISTRICT

* * *

115-20
SPECIAL BULK REGULATIONS

115-21
Floor Area Ratio, Open Space and Lot Coverage

* * *

(b) Maximum #floor area ratio# for #zoning lots# containing #residential uses#

The maximum #floor area ratio# for any #zoning lot# containing a #residential use# shall not exceed the #floor area ratio# set forth in Section 115-211 (Special regulations for Inclusionary Housing designated areas ~~regulations~~) or Section 115-212 (Special regulations for Mandatory Inclusionary Housing areas), as applicable, for the ~~applicable~~ district.

* * *

115-211
Special ~~Inclusionary Housing~~ regulations for Inclusionary Housing designated areas

(a) Applicability

Locations in R7A, R7X, C4-4A, C4-5X, C6-2, C6-3 and C6-4 Districts designated on APPENDIX F of this Resolution within the #Special Downtown Jamaica District# shall be #Inclusionary Housing designated areas#,, pursuant to Section 12-10 (DEFINITIONS), for the purpose of making the Inclusionary Housing Program regulations of Section 23-90 (INCLUSIONARY HOUSING), inclusive, applicable as modified, within the Special District.

* * *

115-212
Special regulations for Mandatory Inclusionary Housing areas

(a) Applicability

For the purposes of applying the Inclusionary Housing Program provisions set forth in Sections 23-154 and 23-90, inclusive,

#Mandatory Inclusionary Housing areas# within the **#Special Downtown Jamaica District#** are shown on the maps in APPENDIX F of this Resolution.

(b) Height and setback

The height and setback regulations of Sections 23-952 (Height and setback for Mandatory Inclusionary Housing areas) and 23-664 (Modified height and setback regulations for certain Inclusionary Housing buildings or affordable independent residences for seniors) shall be modified by the special height and setback regulations of Section 115-23, inclusive.

* * *

115-50
SPECIAL OFF-STREET PARKING AND OFF-STREET LOADING REGULATIONS

115-51
Parking and Loading Regulations

Within the #Special Downtown Jamaica District#, the underlying off-street parking and loading regulations shall be modified, as follows:

(a) #Commercial# and #manufacturing uses

#In C4, C6 and M1 Districts, the off-street parking and loading regulations of a C4-4 District shall apply, except as modified in this Section.

* * *

(4) Modification of Waiver of Parking Requirements

* * *

(iii) The provisions of Sections 36-342 (Reduced requirements in other C1 or C2 Districts or in C4, C5 or C6 Districts) and 36-344 (Waiver of requirements in other C1 or C2 Districts or in C4, C5 or C6 Districts) shall not apply in the #Special Downtown Jamaica District#.

(b) #Residential uses#

* * *

(2) The required #accessory# off-street parking space regulations of the underlying districts in the #Special Downtown Jamaica District# shall be modified as follows: The regulations set forth for an R6A District in Section 25-20 shall apply. The regulations set forth for an R6 District in Sections 25-50 (RESTRICTIONS ON LOCATION OF ACCESSORY OFF-STREET PARKING SPACES), inclusive, and 25-60 (ADDITIONAL REGULATIONS FOR PERMITTED OR REQUIRED ACCESSORY OFF-STREET PARKING SPACES), inclusive, shall apply except as modified in paragraphs (b)(3) and (b)(4) of this Section.

(3) In all #Residence Districts#, the provisions of Section 25-26 (Waiver of Requirements for Small Number of Spaces) are modified, as follows:

(i) The provisions of Section 25-26 shall only apply to #zoning lots# existing both on September 10, 2007, and on the date of application for a building permit.

(ii) For all #developments# or #enlargements# containing #residences#, the maximum number of #accessory# off-street parking spaces for which requirements are waived shall be five spaces.

* * *

(c) #MIH sites#

For #residential uses# on #MIH sites#, the provisions of paragraphs (a)(4), (b)(2) and (b)(3) of this Section shall not apply. In lieu thereof, the underlying off-street parking provisions shall apply.

* * *

APPENDIX F
Inclusionary Housing Designated Areas and Mandatory Inclusionary Housing Areas

* * *

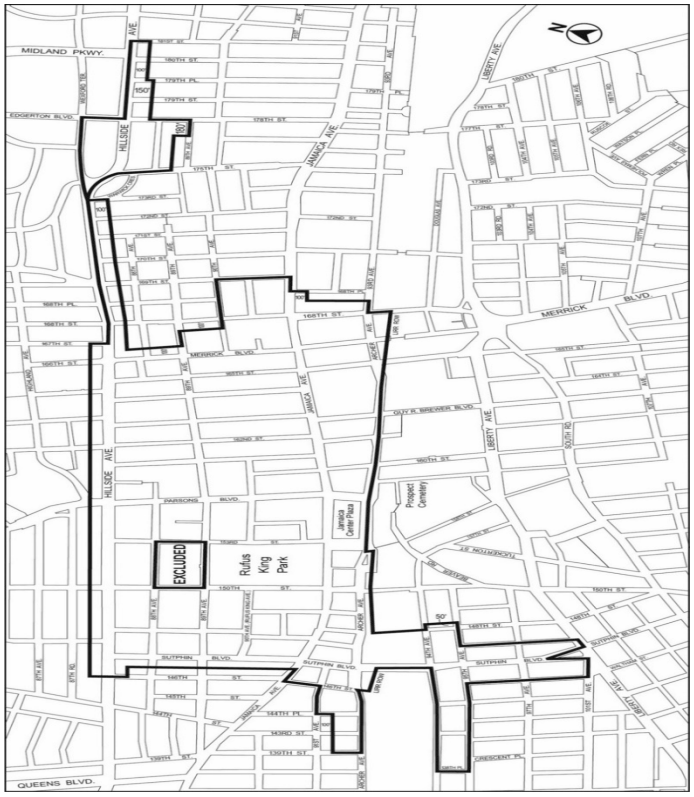
Queens

* * *

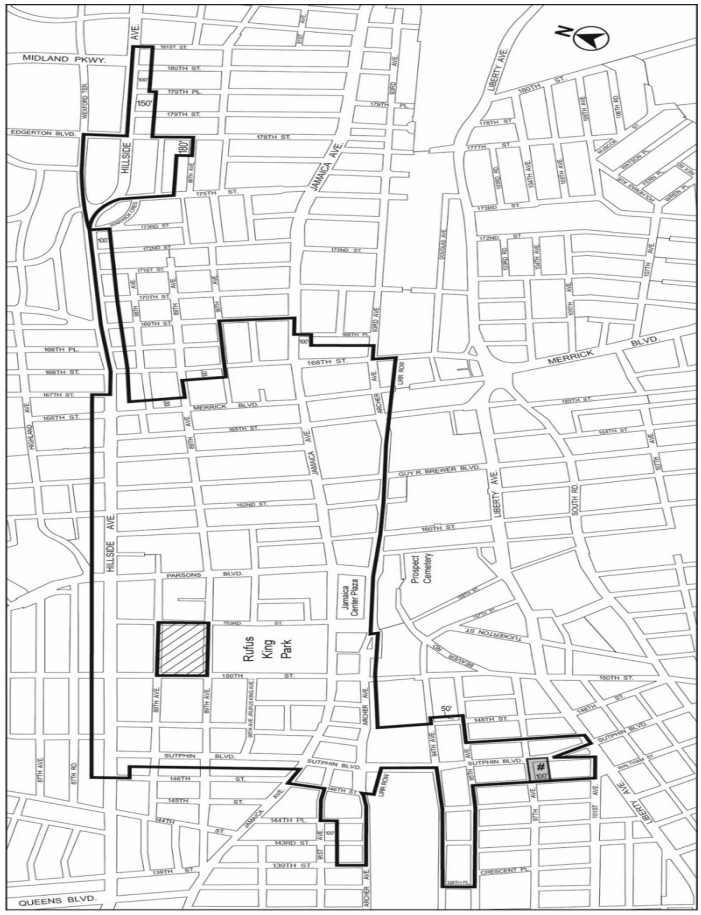
Queens Community Districts 8 and 12

Map 1 – [date of adoption]

[EXISTING MAP]



[Proposed Map]



Portion of Community Districts 8 and 12, Queens

* * *

BOROUGH OF THE BRONX
No. 6
EAST 178th STREET DEMAPPING

CD 6 **C 150355 MMX**

IN THE MATTER OF an application submitted by 420 Morris Park Avenue LLC, pursuant to Sections 197-c and 199 of the New York City Charter and Section 5-430 et seq. of the New York City Administrative Code for an amendment to the City Map involving:

1) the elimination, discontinuance and closing of East 178th Street east of Morris Park Avenue;

2) the adjustment of grades and block dimensions necessitated thereby;

including authorization for any acquisition or disposition of real property related thereto, in accordance with Map No. 13136, dated June 11, 2018, and signed by the Borough President.

YVETTE V. GRUEL, Calendar Officer
City Planning Commission
120 Broadway, 31st Floor, New York, NY 10271
Telephone (212) 720-3370

Accessibility questions: (212) 720-3508, AccessibilityInfo@planning.nyc.gov, by: Friday, December 10, 2021, 5:00 P.M.

d1-15

CIVIC ENGAGEMENT COMMISSION

■ MEETING

Pursuant to Section 104 of the Public Officers Law, notice is hereby given of an open meeting of the Commissioners of the Civic Engagement Commission. Join the meeting to learn about programs and upcoming initiatives.

The information for the meeting is as follows:

Date: **Tuesday, December 14th, 2021**
Time: **1:30 P.M.**

To join the meeting, enter the Webex URL:

https://civicengagement.webex.com/civicengagement/j.php?MTID=m66e56d83df7ebf86b87cff3d8ec3550f

If prompted to provide a password or number, please enter the following:
Meeting Password: **1214**
Meeting Number: **2631 198 0191**

To join via phone dial-in:

When joining the meeting, you can join via device audio, or dial-in, via phone. To dial-in via phone, please use the following local dial-in phone number and participant code:

Phone: **646-992-2010**
Access Code: **2631 198 0191**
If you have low bandwidth or inconsistent internet connection, use the dial-in option for the meeting. This will reduce the possibility of dropped audio and glitching.

Reasonable Accommodations

You must contact the Commission if you need a reasonable accommodation for a disability. To request a sign language interpreter, please contact the Commission, no later than **10:00 A.M., Friday, December 10th, 2021,** by calling or texting (646) 769-6026, or by emailing, info@civicengagement.nyc.gov. Closed Captioning is available.

The Commission will provide 30 minutes at the end of its meeting for public comment related to the mission and activities of the Commission. Please note, that public comment is limited to three minutes. This time is intended for comment and is not designated for questions and answers. To allow for comment in an orderly fashion, please sign up in advance, by emailing your name and affiliation, to **info@civicengagement.nyc.gov,** by **5:00 P.M., Monday, December 13th, 2021**. Participants who will be dialing-in via phone, are strongly encouraged to register in advance.

Further instructions on how to participate during the Webex meeting:

Please note that participants will be muted upon entry to the meeting.

Using the Chat panel

Click the Chat icon on the main meeting screen to open the Chat panel and chat directly with the meeting host. You may communicate your intention to offer public comment through the chat. The meeting host will then enable the audio to allow for public comment.

During the meeting, participants can place an icon beside their name to communicate with the host without disrupting the flow of the meeting. For example, click the Raise Hand icon beside your name to alert the meeting host that you would like to offer comment.

For participants who will be dialing-in via phone *during the meeting* and do not have access to a computer monitor, please text your name and affiliation, to (646) 763-2189, to offer public comment. The meeting host will then enable the audio and call on the dial-in participant by name to offer public comment in the order the text request was received.

Participants who do not have access to text or short message services (SMS), are strongly encouraged to register for public comment in advance, by calling (646) 763-2189, or by emailing the Commission, at **info@civicengagement.nyc.gov,** by 5:00 P.M., Monday, December 13, 2021.

Accessibility questions: furroz@civicengagement.nyc.gov, (646) 769-6026, by: Friday, December 10, 2021, 10:00 A.M.

d6-13

BOARD OF EDUCATION RETIREMENT SYSTEM

■ MEETING

The Board of Education Retirement System Board of Trustees Meeting, will be held on Thursday, December 16, 2021, from 4:00 P.M. - 6:00 P.M., via Webex. If you would like to attend this meeting, please contact BERS Executive Director, Sanford Rich, at Srich4@bers.nyc.gov.

d8-16

EMPLOYEES' RETIREMENT SYSTEM

■ MEETING

Please be advised, that the next Common Investment Meeting of the Board of Trustees of the New York City Employees' Retirement System, is Wednesday, December 15, 2021, at 9:00 A.M.

Due to the Covid-19 pandemic and for everyone's safety the NYCERS Regular Board of Trustees no longer meet in person and instead the meeting is held over Zoom. However, you can still view only the public session online, at https://comptroller.nyc.gov/services/financialmatters/pension/common-investment-meeting/

d8-14

EQUAL EMPLOYMENT PRACTICES COMMISSION

■ MEETING

When and where is the Commission Meeting? The Equal Employment Practices Commission's 253rd Commission Meeting will take place at 10:30 A.M., on Thursday, December 16, 2021 in the Commission's Conference Room/Library, located at 253 Broadway, Suite 602, New York, NY 10007. The meeting will also be conducted by video conference via Webex and streamed live via YouTube using the details below:

Webex Details

Meeting number (event number): 2348 425 9827
Meeting password: dJ2NQiWDg94

- **Join by internet**
https://nyceepc.webex.com/nyceepc/onstage/g.php?MTID=ed3772456ed44489a978e1e4ac581599a

- **Join by phone**
(408) 418-9388 United States Toll

- **Join by video system or application**
Dial 23484259827@webex.com
You can also dial 173.243.2.68 and enter your meeting number.

YouTube Details

- **Live Stream video link**
https://youtu.be/dWm-Ji_v77s

How do I ask questions during the Commission meeting? Anyone can ask questions during the Commission meeting by:

- **Webex -** You can submit your questions directly through the chat panel of the WebEx once joined via the internet option above
- **Email** - You can email questions to mpinckney@eepc.nyc.gov

Is there a deadline to submit questions? Yes, you must submit all questions during the meeting session on December 16, 2021.

Can I review the recording of the Commission Meeting? Yes, you can review the recorded Commission meeting, which will be made available online by going to the Equal Employment Practices Commission's YouTube page https://www.youtube.com/channel/UCdgAeD4p-esdjymDTdGScfA/featured.

d9-16

HOUSING AUTHORITY

■ **MEETING**

Because of the ongoing COVID-19 health crisis and in relation to Chapter 417 of the Laws of 2021, the Audit & Finance Committee Meeting of the New York City Housing Authority, scheduled for **Tuesday, December 14, 2021, at 9:30 A.M.**, will be limited to viewing the livestream or listening, via phone, instead of attendance in person.

For public access, the meeting will be streamed live on NYCHA's Website, at https://www1.nyc.gov/site/nycha/about/audit-committee-meetings.page, or can be accessed,via Zoom, by calling 1 (877) 853-5247, and using Webinar ID: 848 9526 3356.

For those wishing to provide public comment, pre-registration is required, via email, to audit@nycha.nyc.gov, or by contacting, (212) 306-3441, no later than 2:00 P.M., on the day prior to the Audit Committee Meeting. When pre-registering, please provide your name, development or organization name, contact information, email address and item you wish to comment on. You will then be contacted with instructions for providing comment. Comments are limited to the items on the Agenda.

Speaking time will be limited to three minutes. Speakers will provide comment in the order in which the requests to comment are received. The public comment period will conclude upon all speakers being heard or at the expiration of 30 minutes allotted for public comment, whichever occurs first.

Copies of the Agenda will be available on NYCHA's Website, no earlier than 24 hours before the upcoming Audit & Finance Committee Meeting. Copies of the draft Minutes will also be available on NYCHA's Website, no earlier than 3:00 P.M., on Thursday, two weeks after the Audit & Finance Committee Meeting.

Any changes to the schedule will be posted here and on NYCHA's Website, at https://www1.nyc.gov/site/nycha/about/audit-committee-meetings.page, to the extent practicable, at a reasonable time before the meeting.

For additional information regarding the Audit & Finance Committee Meeting, please visit NYCHA's Website, contact by phone, at (212) 306-3441 or by email, at audit@nycha.nyc.gov.

Accessibility questions: Department of Internal Audit and Assessment by phone, at (212) 306-3441, or by email, at audit@nycha.nyc.gov, by: Tuesday, December 7, 2021, 5:00 P.M.

Large Print

n26-d13

Because of the on-going COVID-19 health crisis and in relation to Chapter 417 of the Laws of 2021, the Board Meeting of the New York City Housing Authority, scheduled for Wednesday, December 15, 2021, at 10:30 A.M., will be limited to viewing the live-stream or listening via phone instead of attendance in person.

For public access, the meeting will be streamed live on NYCHA's YouTube Channel, http://nyc.gov/nycha, and NYCHA's Website on.nyc.gov/boardmeetings, or can be accessed via Zoom by calling (646) 558-8656 using Webinar ID: 869 4239 5110 and Passcode: 4365618640.

For those wishing to provide public comment, pre-registration is required via email, to corporate.secretary@nycha.nyc.gov, or by contacting (212) 306-6088, no later than 5:00 P.M., on the day prior to the Board Meeting. When pre-registering, please provide your name, development, or organization name, contact information and item you wish to comment on. You will then be contacted with instructions for providing comment. Comments are limited to the items on the Calendar.

Speaking time will be limited to three (3) minutes. Speakers will provide comment in the order in which the requests to comment are received. The public comment period will conclude upon all speakers being heard or at the expiration of thirty (30) minutes allotted for public comment, whichever occurs first.

Copies of the Calendar are available on NYCHA's Website, at http://www1.nyc.gov/site/nycha/about/board-calendar.page, to the extent practicable, no earlier than 24 hours before the upcoming Board Meeting. Copies of the draft Minutes are available on NYCHA's Website, at http://www1.nyc.gov/site/nycha/about/board-calendar.page, no earlier than 3:00 P.M., on the Thursday following the Board Meeting.

Any changes to the schedule will be posted on NYCHA's Website, at http://www1.nyc.gov/site/nycha/about/board-calendar.page, and via social media, to the extent practicable, at a reasonable time before the meeting.

Any person requiring a reasonable accommodation in order to participate in the Board Meeting, should contact the Office of the Corporate Secretary by phone, at (212) 306-6088, or by email, at corporate.secretary@nycha.nyc.gov, no later than Wednesday, December 8, 2021, at 5:00 P.M.

For additional information regarding the Board Meeting, please contact the Office of the Corporate Secretary by phone, at (212) 306-6088, or by email, at corporate.secretary@nycha.nyc.gov.

n30-d15

OFFICE OF LABOR RELATIONS

■ **MEETING**

The New York City Deferred Compensation Board will hold its next Deferred Compensation Board Hardship meeting on Thursday, December 16, 2021, at 3:00 P.M. The meeting will be held remotely via conference call. Please visit the below link to access the audio recording of the Board meeting, or to access archived Board meeting audio/videos: https://www1.nyc.gov/site/olr/deferred/dcp-board-webcasts.page

d9-16

LANDMARKS PRESERVATION COMMISSION

■ **PUBLIC HEARINGS**

NOTICE IS HEREBY GIVEN that pursuant to the provisions of Title 25, Chapter 3 of the Administrative Code of the City of New York (Sections 25-303, 25-307, 25-308, 25-309, 25-313, 25-318, 25-320) on Tuesday, December 14, 2021, at 9:30 A.M., the Landmarks Preservation Commission (LPC or agency) will hold a public hearing by teleconference with respect to the properties list below, and then followed by a public meeting.

The final order and estimated times for each application will be posted on the Landmarks Preservation Commission website, the Friday before the hearing. Please note that the order and estimated times are subject to change. The teleconference will be by the Zoom app and will be live streamed on the LPC's YouTube channel, www.youtube.com/nyclpc. Members of the public should observe the meeting on the YouTube channel and may testify on particular matters by joining the meeting using either the Zoom app or by calling in from any phone. Specific instructions on how to observe and testify, including the meeting ID and password, and the call-in number, will be posted on the agency's website, under the "Hearings" tab, https://www1.nyc.gov/site/lpc/hearings/hearings.page, on the Monday before the public hearing. Any person requiring language assistance services or other reasonable accommodation in order to participate in the hearing or attend the meeting, should contact the LPC, by contacting Sasha Sealey, Community and Intergovernmental Affairs, at ssealey@lpc.nyc.gov, at least five (5) business days before the hearing or meeting. Please note: Due to the City's response to COVID-19, this public hearing and meeting is subject to change and/or cancellation.

266 Brooklyn Avenue - Crown Heights North Historic District II
LPC-22-01515 - Block 1256 - Lot 43 - **Zoning:** R6
CERTIFICATE OF APPROPRIATENESS
An altered Italian Renaissance Revival style two-family house, designed by Mann & MacNeille and built c. 1909. Application is to install a cornice and balconies, replace windows and modify openings, install rooftop elements, demolish a garden wall, and construct a garage with curb cut.

318 College Road - Fieldston Historic District
LPC-21-07195 - Block 5816 - Lot 1867 - **Zoning:** R1-2
CERTIFICATE OF APPROPRIATENESS

A house built after 1953. Application is to construct a new house on a portion of the tax lot that is to be subdivided.

109 West Broadway - Tribeca South Historic District
LPC-22-02973 - Block 146 - Lot 11 - **Zoning:** C6-2A
CERTIFICATE OF APPROPRIATENESS
An Italianate style store and loft building, built in 1860. Application is to replace storefront entrance infill.

Broad Street, between Wall Street and Exchange Place - Individual Landmark
LPC-22-03354 - Block - Lot - **Zoning:** C5-5
ADVISORY REPORT
A pattern of streets, the only remaining above-ground physical evidence of the Dutch Colonial presence in Manhattan. Application is to maintain a statue at its current location for three years.

355 West Broadway - SoHo-Cast Iron Historic District
LPC-22-03827 - Block 475 - Lot 9 - **Zoning:** M1-5A
CERTIFICATE OF APPROPRIATENESS
A loft building built c. 1880 and altered in 1958. Application is to modify the rear façades constructed in non-compliance with Certificate of Appropriateness 18-4002.

525-527 Broome Street - Sullivan-Thompson Historic District
LPC-22-02598 - Block 476 - Lot 7501 - **Zoning:** M1-5B
CERTIFICATE OF APPROPRIATENESS
An altered Romanesque Revival/Renaissance Revival style building, designed by George Keister and built in 1897. Application is to replace storefront infill and a skylight and install planters.

65 Bleecker Street - NoHo Historic District
LPC-22-04344 - Block 529 - Lot 72 - **Zoning:** M1-5B
CERTIFICATE OF APPROPRIATENESS
A Sullivanesque style office building, designed by Louis Sullivan and built in 1897-99. Application is to establish a Master Plan governing the future installation of painted wall signs.

22 Little West 12th Street - Gansevoort Market Historic District
LPC-22-03204 - Block 644 - Lot 43 - **Zoning:** M1-5
CERTIFICATE OF APPROPRIATENESS
A Neo-Georgian style stables building, designed by John M. Baker and built in 1908-09. Application is to renew a Master Plan governing the future installation of painted wall signs.

261-267 Canal Street - SoHo-Cast Iron Historic District Extension
LPC-22-04401 - Block 209 - Lot 28 - **Zoning:** M1-5B
CERTIFICATE OF APPROPRIATENESS
An Italianate style store and loft building, built in 1853-57. Application is to establish a Master Plan governing the future installation of painted wall signs.

3 Sheridan Square - Greenwich Village Historic District
LPC-21-03686 - Block 591 - Lot 26 - **Zoning:** C4-5
CERTIFICATE OF APPROPRIATENESS
An apartment building, designed by Charles C. Platt and built in 1958. Application is to establish a master plan governing the future replacement of windows.

45-47 2nd Avenue - East Village/Lower East Side Historic District
LPC-22-03566 - Block 458 - Lot 27 - **Zoning:** C6-2A
CERTIFICATE OF APPROPRIATENESS
A pair of Italianate style tenement buildings, designed by John O'Neil and built in 1867. Application is to construct a rooftop.

430 West 22nd Street - Chelsea Historic District
LPC-21-00561 - Block 719 - Lot 60 - **Zoning:** R7B
CERTIFICATE OF APPROPRIATENESS
A Greek Revival style building, built in 1843. Application is to construct a rear yard addition.

18 East 41st Street - Individual Landmark
LPC-21-10733 - Block 1275 - Lot 61 - **Zoning:** C5-2.5, MID
CERTIFICATE OF APPROPRIATENESS
A Neo-Gothic style office building, designed by George & Edward Blum and built in 19-12-1914. Application is to modify and replace cladding at piers, and replace entrance infill and a canopy.

393 West End Avenue - West End - Collegiate Historic District Extension
LPC-22-04139 - Block 1186 - Lot 83 - **Zoning:** R10A
CERTIFICATE OF APPROPRIATENESS
A Colonial Revival style apartment building, designed by Goldner & Goldner and built in 1927. Application is to install a marquee, modify masonry openings and install windows, and modify a rooftop addition.

173-175 Riverside Drive - Riverside - West End Historic District
LPC-22-03297 - Block 1250 - Lot 67 - **Zoning:** R10A; R8
CERTIFICATE OF APPROPRIATENESS
A Neo-Renaissance style apartment building, designed by J.E.R. Carpenter and built in 1925-26. Application is to reconstruct and modify the rooftop parapet and balustrade.

455 West 148th Street - Hamilton Heights/Sugar Hill Historic District
LPC-21-06960 - Block 2063 - Lot 110 - **Zoning:** R6A
CERTIFICATE OF APPROPRIATENESS
A Romanesque Revival style rowhouse, designed by John P. Leo and built in 1897. Application is to construct rooftop and rear yard additions.

d1-14

OFFICE OF THE MAYOR

■ **PUBLIC HEARINGS**

NOTICE IS HEREBY GIVEN that the Report and Advisory Board Review Commission, will hold a virtual public hearing on Friday, December 10, 2021 from 1:00 P.M. - 2:00 P.M. This hearing can be accessed, at: https://us06web.zoom.us/j/85003675949?pwd=alJFK25zM1hpdk1hMHJDRWpnTE9BUT09. During the coming months, the commission will be reviewing reports and advisory boards that are required by local law, and will be making recommendations as to which should be removed, improved, or otherwise streamlined to improve efficiency and transparency.

d7-10

TRANSPORTATION

■ **PUBLIC HEARINGS**

NOTICE IS HEREBY GIVEN, pursuant to law, that the following proposed revocable consents, have been scheduled for a public hearing by the New York City Department of Transportation. The hearing will be held remotely commencing on Thursday, December 16, 2021, at 2:00 P.M., via the WebEx platform and in person, on the following petitions for revocable consent.

WebEx:
Meeting Number (access code): 2631 809 2008
Meeting Password: Vikm3cEBS66

The hearing will be held in person at 55 Water Street, Bid Room, in the Borough of Manhattan. Masks are required to be worn to enter the building and during the hearing. If you or a representative are planning to attend in person, please complete the health screening available at, dotcovidvisitorscreening.info. If you do not have internet access, conduct a self-screening using the information below:

Please do not attend this meeting if:
- **You have experience any symptoms of COVID-19 within the past 10 days (a fever of 100.0 degrees Fahrenheit or greater, a new cough, new loss of taste or smell, or shortness of breath).**
- **You have tested positive for COVID-19 within the past 10 days.**
- **You have been in close contact (within 6 feet for at least 10 minutes over a 24-hour period) with anyone while they had COVID-19 within the past 10 days, and are required to quarantine under existing CDC guidance (you have not had COVID-19 within the past 3 months, and you are not fully vaccinated).**

#1 IN THE MATTER OF a proposed revocable consent authorizing 122 Washington Place LLC, to continue to maintain and use a stoop on the south sidewalk of Washington Place, east of Barrow Street, in the Borough of Manhattan. The proposed revocable consent is for a term of ten years from July 1, 2020 to June 30, 2030 and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 1734**

For the period from July 1, 2020 to June 30, 2030 - $25/per annum.

with the maintenance of a security deposit in the sum of $0.00 the insurance shall be in the amount of Two Million Dollars ($2,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Two Million Dollars ($2,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

#2 IN THE MATTER OF a proposed revocable consent authorizing 535 West End Avenue Condominium, to continue to maintain and use a snowmelt system in the west sidewalk of West End Avenue, south of West 86th Street, and in the south sidewalk of West 86th Street, west of West End Avenue, in the Borough of Manhattan. The proposed revocable consent is for a term of ten years from July 1, 2020 to June 30, 2030 and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 2120**

For the period July 1, 2021 to June 30, 2022 - $28,632
For the period July 1, 2022 to June 30, 2023 - $29,079
For the period July 1, 2023 to June 30, 2024 - $29,526
For the period July 1, 2024 to June 30, 2025 - $29,973
For the period July 1, 2025 to June 30, 2026 - $30,420
For the period July 1, 2026 to June 30, 2027 - $30,867
For the period July 1, 2027 to June 30, 2028 - $31,314
For the period July 1, 2028 to June 30, 2029 - $31,761
For the period July 1, 2019 to June 30, 2030 - $32,208

with the maintenance of a security deposit in the sum of $32,200 the insurance shall be in the amount of Two Million Dollars ($2,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Two Million Dollars ($2,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

#3 IN THE MATTER OF a proposed revocable consent authorizing New York Life Insurance Company, to continue to maintain and use a tunnel under and across East 27th Street, east of Madison Avenue, in the Borough of Manhattan. The proposed revocable consent is for a term of ten years from July I, 2021 to June 30, 2031 and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 224**

For the period July 1, 2021 to June 30, 2022 - $122,951
For the period July 1, 2022 to June 30, 2023 - $124,921
For the period July 1, 2023 to June 30, 2024 - $126,891
For the period July 1, 2024 to June 30, 2025 - $128,861
For the period July 1, 2025 to June 30, 2026 - $130,831
For the period July 1, 2026 to June 30, 2027 - $132,801
For the period July 1, 2027 to June 30, 2028 - $134,771
For the period July 1, 2028 to June 30, 2029 - $136,741
For the period July 1, 2029 to June 30, 2030 - $138,711
For the period July 1, 2030 to June 30, 2031 - $140,681

with the maintenance of a security deposit in the sum of $140,700 and the insurance shall be in the amount of Five Million Dollars ($5,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Five Million Dollars ($5,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

#4 IN THE MATTER OF a proposed revocable consent authorizing New York University, to continue to maintain and use two pipes under and across LaGuardia Place, north of West 3rd Street, in the Borough of Manhattan. The proposed revocable consent is for a term of ten years from July 1, 2021 to June 30, 2031 and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 1014**

For the period July 1, 2021 to June 30, 2022 - $ 5,123
For the period July 1, 2022 to June 30, 2023 - $ 5,206
For the period July 1, 2023 to June 30, 2024 - $ 5,289
For the period July 1, 2024 to June 30, 2025 - $ 5,372
For the period July 1, 2025 to June 30, 2026 - $ 5,455
For the period July 1, 2026 to June 30, 2027 - $ 5,538
For the period July 1, 2027 to June 30, 2028 - $ 5,621
For the period July 1, 2028 to June 30, 2029 - $ 5,704
For the period July 1, 2029 to June 30, 2030 - $ 5,787
For the period July 1, 2030 to June 30, 2031 - $ 5,870

with the maintenance of a security deposit in the sum of $5,900 and the insurance shall be in the amount of Two Million Dollars ($2,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Two Million Dollars ($2,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

#5 IN THE MATTER OF a proposed revocable consent authorizing New York University, to continue to maintain and use a conduit under, across and along Broadway, between Washington Place and Astor Place, in the Borough of Manhattan. The proposed revocable consent is for a term of ten years from July 1, 2021 to June 30, 2031 and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 1804**

For the period July 1, 2021 to June 30, 2022 - $8,204
For the period July 1, 2022 to June 30, 2023 - $8,336
For the period July 1, 2023 to June 30, 2024 - $8,468
For the period July 1, 2024 to June 30, 2025 - $8,600
For the period July 1, 2025 to June 30, 2026 - $8,732
For the period July 1, 2026 to June 30, 2027 - $8,864
For the period July 1, 2027 to June 30, 2028 - $8,996
For the period July 1, 2028 to June 30, 2029 - $9,128
For the period July 1, 2029 to June 30, 2030 - $9,260
For the period July 1, 2030 to June 30, 2031 - $9,392

with the maintenance of a security deposit in the sum of $9,400 and the insurance shall be in the amount of Two Million Dollars ($2,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Two Million Dollars ($2,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

#6 IN THE MATTER OF a proposed revocable consent authorizing NOAH SILVERMAN QUALIFIED PERSONAL RESIDENCE TRUST with Noah Silverman and Elizabeth Betsy Silverman as Trustees of the Noah Silverman Qualified personal Residence Trust; and ELIZABETH BETSY SILVERMAN QUALIFIED PERSONAL RESIDENCE TRUST, with Elizabeth Betsy Silverman and Noah Silverman as Trustees of the Elizabeth Betsy Silverman Qualified personal Residence Trust to continue to maintain and use an entrance detail on the north sidewalk of West 95th Street, east of Amsterdam Avenue, in the Borough of Manhattan. The proposed revocable consent is for a term of ten years from July 1, 2020 to June 30, 2030 and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 1743**

For the period from July 1, 2020 to June 30, 2030 - $25/per annum

with the maintenance of a security deposit in the sum of $1,500 and the insurance shall be in the amount of Two Million Dollars ($2,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Two Million Dollars ($2,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

#7 IN THE MATTER OF a proposed revocable consent authorizing Patricia Gillego Barakett, to continue to maintain and use a stoop, steps and an existing fenced-in area on the south sidewalk of Barrow Street, west of Seventh Avenue South, in the Borough of Manhattan. The proposed revocable consent is for a term of ten years from July 1, 2021 to June 30, 2031 and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 2155**

2. From the Approval Date to June 30, 2031- $25/per annum.

with the maintenance of a security deposit in the sum of $5,000 and the insurance shall be in the amount of Two Million Dollars ($2,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Two Million Dollars ($2,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

#8 IN THE MATTER OF a proposed revocable consent authorizing Phil Emily Real Estate, Inc., to construct, maintain and use an accessibility ramp on the south sidewalk of 55th Street, between 4th and 5th Avenues, in the Borough of Brooklyn. The proposed revocable consent is for a term of ten years from the Approval Date by the Mayor and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 2555**

From the date of the final approval of this consent by the Mayor (the Approval Date) to June 30, 2031 - $25/per annum.

with the maintenance of a security deposit in the sum of $5,000 and the insurance shall be in the amount of Two Million Dollars ($2,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Two Million Dollars ($2,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

#9 IN THE MATTER OF a proposed revocable consent authorizing St. Barnabas Hospital, to continue to maintain and use a bridge over and across Third Avenue, between East 182nd and East 183rd Streets, in the Borough of the Bronx. The proposed revocable consent is for a term of ten years from July 1, 2020 to June 30, 2030 and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 1751**

For the period July 1, 2020 to June 30, 2021 - $15,394/per annum
For the period July 1, 2021 to June 30, 2022 - $15,642
For the period July 1, 2022 to June 30, 2023 - $15,890
For the period July 1, 2023 to June 30, 2024 - $16,138
For the period July 1, 2024 to June 30, 2025 - $16,386
For the period July 1, 2025 to June 30, 2026 - $16,634
For the period July 1, 2026 to June 30, 2027 - $16,882
For the period July 1, 2027 to June 30, 2028 - $17,130
For the period July 1, 2028 to June 30, 2029 - $17,378
For the period July 1, 2029 to June 30, 2030 - $17,626

with the maintenance of a security deposit in the sum of $115,000 and the insurance shall be in the amount of Five Million Dollars ($5,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Five Million Dollars ($5,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

#10 IN THE MATTER OF a proposed revocable consent authorizing Stoddard Elliot Anthony Sennott, to continue to maintain and use a stoop, stairs and planted area on the north sidewalk of State Street, east of Smith Street, in the Borough of Brooklyn. The proposed revocable consent is for a term of ten years from July 1, 2015 to June 30, 2025 and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 1939**

For the period July 1, 2015 to June 30, 2016 - $1,154/per annum
For the period July 1, 2016 to June 30, 2017 - $1,184

For the period July 1, 2017 to June 30, 2018 - $1,214
For the period July 1, 2018 to June 30, 2019 - $1,244
For the period July 1, 2019 to June 30, 2020 - $1,274
For the period July 1, 2020 to June 30, 2021 - $1,304
For the period July 1, 2021 to June 30, 2022 - $1,334
For the period July 1, 2022 to June 30, 2023 - $1,364
For the period July 1, 2023 to June 30, 2024 - $1,394
For the period July 1, 2024 to June 30, 2025 - $1,424

with the maintenance of a security deposit in the sum of $3,700 and the insurance shall be in the amount of Two Million Dollars ($2,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Two Million Dollars ($2,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

#11 IN THE MATTER OF a proposed revocable consent authorizing 220 5th Realty LLC, to construct, maintain and use sidewalk recessed light fixtures, together with electrical conduit, in the north sidewalk of West 26th Street, west of 5th Avenue, and in the west sidewalk of 5th Avenue, north of West 26th Street, in the Borough of Manhattan. The proposed revocable consent is for a term of ten years from the Approval Date by the Mayor and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 2551**

From the Approval Date by the Mayor to June 30, 2022- $2,397/per annum
For the period July 1, 2022 to June 30, 2023 - $2,430
For the period July 1, 2023 to June 30, 2024 - $2,463
For the period July 1, 2024 to June 30, 2025 - $2,496
For the period July 1, 2025 to June 30, 2026 - $2,529
For the period July 1, 2026 to June 30, 2027 - $2,562
For the period July 1, 2027 to June 30, 2028 - $2,595
For the period July 1, 2028 to June 30, 2029 - $2,628
For the period July 1, 2029 to June 30, 2030 - $2,661
For the period July 1, 2030 to June 30, 2031 - $2,694
For the period July 1, 2031 to June 30, 2032 - $2,727

with the maintenance of a security deposit in the sum of $7,000 and the insurance shall be in the amount of Two Million Dollars ($2,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Two Million Dollars ($2,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

#12 IN THE MATTER OF a proposed revocable consent authorizing 545 Broadway Associates LLC, to continue to maintain and use an accessibility ramp on the south sidewalk of Boerum Street, east of Broadway, in the Borough of Brooklyn. The proposed revocable consent is for a term of ten years from July 1, 2019 to June 30, 2029 and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 1328**

For the period July 1, 2019 to June 30, 2029 - $25/per annum

with the maintenance of a security deposit in the sum of $1,500 and the insurance shall be in the amount of Two Million Dollars ($2,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Two Million Dollars ($2,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

#13 IN THE MATTER OF a proposed revocable consent authorizing Thomas Anthony Holdings LLC, to construct, maintain and use a stoop, fenced-in area and planters on the south sidewalk of West 22nd Street, between Seventh and Eighth Avenues, in the Borough of Manhattan. The proposed revocable consent is for a term of ten years from the Approval Date by the Mayor and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 2557**

From the Approval Date by the Mayor to June 30, 2022- $ 3,175/per annum
For the period July 1, 2022 to June 30, 2023 - $ 3,227
For the period July 1, 2023 to June 30, 2024 - $ 3,302
For the period July 1, 2024 to June 30, 2025 - $ 3,353
For the period July 1, 2025 to June 30, 2026 - $ 3,405
For the period July 1, 2026 to June 30, 2027 - $ 3,457
For the period July 1, 2027 to June 30, 2028 - $ 3,508
For the period July 1, 2028 to June 30, 2029 - $ 3,560
For the period July 1, 2029 to June 30, 2030 - $ 3,612
For the period July 1, 2030 to June 30, 2031 - $ 3,664
For the period July 1, 2031 to June 30, 2032 - $ 3,715

with the maintenance of a security deposit in the sum of $7,300 and the insurance shall be in the amount of Two Million Dollars ($2,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Two Million Dollars ($2,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

#14 IN THE MATTER OF a proposed revocable consent authorizing 980 Madison Owner LLC, to continue to maintain and use a sculptural group on the façade of the building above the west sidewalk of Madison Avenue, between East 76th and East 77th Streets, in the Borough of Manhattan. The proposed revocable consent is for a term of ten years from July 1, 2019 to June 30, 2029 and provides among other terms and conditions for compensation payable to the City according to the following schedule: **R.P. # 96**

For the period July 1, 2019 to June 30, 2020 - $4,536
For the period July 1, 2020 to June 30, 2021 - $4,605
For the period July 1, 2021 to June 30, 2022 - $4,674
For the period July 1, 2022 to June 30, 2023 - $4,743
For the period July 1, 2023 to June 30, 2024 - $4,812
For the period July 1, 2024 to June 30, 2025 - $4,881
For the period July 1, 2025 to June 30, 2026 - $4,950
For the period July 1, 2026 to June 30, 2027 - $5,019
For the period July 1, 2027 to June 30, 2028 - $5,088
For the period July 1, 2028 to June 30, 2029 - $5,157

with the maintenance of a security deposit in the sum of $5,200 and the insurance shall be in the amount of Two Million Dollars ($2,000,000) per occurrence for bodily injury and property damage, One Million Dollars ($1,000,000) for personal and advertising injury, Two Million Dollars ($2,000,000) aggregate, and Two Million Dollars ($2,000,000) products/completed operations.

n24-d16

COURT NOTICES

SUPREME COURT

RICHMOND COUNTY

■ **NOTICE**

RICHMOND COUNTY
I.A.S. PART 89
NOTICE OF ACQUISITION
INDEX NUMBER CY4506/2021
CONDEMNATION PROCEEDING

IN THE MATTER OF the Application of the CITY OF NEW YORK, Relative to Acquiring Title in Fee Simple Absolute to certain real property in Staten Island where not heretofore acquired for the same purpose, for

ROMA AVENUE AND HETT AVENUE

in the area generally, bounded by Milton Avenue, to the north, Navesink Place, to the west, Cedar Grove Avenue, to the South and New Dorp Lane, to the east, in the Borough of Staten Island, City and State of New York.

PLEASE TAKE NOTICE, that by the order of the Supreme Court of the State of New York, County of Richmond, IA Part 89 Hon. Wayne P. Saitta, J.S.C., duly entered in the office of the Clerk of the County of Richmond on June 1, 2021 ("Order"), the application of the City of New York to acquire certain real property, for the construction of roadways, installation of sanitary and storm sewers, water mains and appurtenances, in the Borough of Staten Island, City and State of New York, was granted and the City was thereby authorized to file an acquisition map with the Clerk of Richmond County. Said Map, showing the property acquired for the City, was filed with the Clerk of Richmond County. Title, to the real property vested in the City of New York on November 10, 2021 ("Vesting Date").

PLEASE TAKE FURTHER NOTICE, that the City has acquired the parcels of real property as described in the annexed Schedule A.

PLEASE TAKE FURTHER NOTICE, that, pursuant to said Order and to §§ 503 and 504 of the Eminent Domain Procedure Law ("EDPL") of the State of New York, each and every person interested in the real property acquired in the above-referenced proceeding and having any claim or demand on account of thereof shall have a period of three calendar years from the Vesting Date for this proceeding, to file a written claim with the Clerk of the Court of Richmond County, and to serve within the same timeframe a copy thereof on the Corporation Counsel of the City of New York, Tax and Bankruptcy Litigation Division, 100 Church Street, New York, NY 10007. Pursuant to EDPL § 504, the claim shall include:

(A) the name and post office address of the condemnee;

(B) reasonable identification by reference, to the acquisition map, or otherwise, of the property affected by the acquisition, and the condemnee's interest therein;

(C) a general statement of the nature and type of damages claimed, including a schedule of fixture items which comprise part or all of the damages claimed; and,

(D) if represented by an, attorney, the name, address and telephone number of the condemnee's, attorney.

Pursuant to EDPL § 503 (C), in the event a claim is made for fixtures or for any interest other than the fee in the real property acquired, a copy of the claim, together with the schedule of fixture items, if applicable, shall also be served upon the fee owner of the said real property.

PLEASE TAKE FURTHER NOTICE, that, pursuant to § 5-310 of the New York City Administrative Code, proof of title shall be submitted, to the Corporation Counsel of the City of New York, Tax and Bankruptcy Litigation Division, 100 Church Street, New York, NY.

Dated: New York, NY
November 17, 2021
GEORGIA M. PESTANA
Corporation Counsel of the City of New York
Attorneys for the Condemnor
100 Church Street
New York, NY 10007
Tel. (212) 356-4064
By: Stephanie M. Fitos
Assistant Corporation Counsel

UNLOTTED STREETBED PARCELS ADJACENT TO THE FOLLOWING BLOCKS AND LOTS:

SCHEDULE A

Unlotted Street Bed Adjacent to Block	Unlotted Street Bed Adjacent to Lot
4049	94
4049	193
4049	93
4049	92
4049	91
4049	90
4049	88
4049	85
4049	84
4049	83
4049	81
4049	80
4049	78
4049	76
4049	73
4049	72
4049	71
4049	69
4049	68
4049	67
4049	166
4049	66
4049	65
4049	62
4049	60
4049	58
4043	49
4043	47
4043	46
4043	45
4043	44
4043	43
4043	42
4043	41
4043	39
4043	37
4043	35
4043	33

SCHEDULE A

Unlotted Street Bed Adjacent to Block	Unlotted Street Bed Adjacent to Lot
4043	31
4043	29
4043	27
4043	26
4043	25
4043	23
4043	21
4043	19
4043	15
4043	13
4043	12
4043	10
4043	6
4043	3
4043	1
4043	115
4045	24
4045	21
4045	19
4045	17
4045	13
4045	9
4045	6
4045	1
4046	31
4046	30
4046	29
4046	28
4046	27
4046	26
4046	22
4046	20
4046	18
4046	16
4046	14
4046	12
4046	10
4046	8
4046	7
4046	6
4046	4
4046	1
4050	47
4050	46
4050	41
4050	39
4050	37
4050	36
4050	35
4050	34
4050	33
4050	32
4050	31
4050	29
4050	27
4050	25
4050	23
4050	20
4050	18
4050	16
4050	15
4050	13
4050	11
4050	9

SCHEDULE A	
Unlotted Street Bed Adjacent to Block	**Unlotted Street Bed Adjacent to Lot**
4050	7
4050	5
4050	1
4050	85
4050	82
4050	77
4050	71
4050	68
4050	62
4050	52
4050	49
4046	47
4046	41
4046	37
4046	35
4045	44
4045	40
4045	17
4045	19
4045	21
4045	31
4045	29
4064	27
4064	23
4064	21
4064	19
4064	17
4064	15
4064	14
4064	12
4064	56
4064	8
4064	6
4064	1
4065	9
4065	8
4065	6
4065	4
4065	1
4067	42
4067	41
4067	40
4067	31
4066	34
4066	32
4066	31
4066	30
4066	28
4066	22
4066	20
4066	18
4066	17
4066	16
4066	15
4066	14
4066	12
4066	9
4066	8
4066	7
4066	6
4066	4
4066	3
4066	2
4066	1

SCHEDULE A	
Unlotted Street Bed Adjacent to Block	**Unlotted Street Bed Adjacent to Lot**
4067	9
4067	5
4067	1
4069	50
4069	47
4069	45
4068	53
4068	50
4068	49
4068	44
4068	43
4068	41
4068	39
4068	36
4068	33
4068	31
4068	30
4068	28
4068	25
4068	22
4068	20
4068	18
4068	16
4068	14
4068	11
4068	8
4069	1
4069	84
4069	82
4069	80
4069	79
4069	78
4069	76
4069	75
4069	74
4069	72
4069	70
4069	69
4069	67
4069	65
4069	64
4069	63
4069	61
4069	60
4069	57
4069	54
4069	52
4067	61
4067	59
4067	58
4067	56
4067	55
4067	53
4067	51
4067	49
4067	47
4067	45
4067	43
4065	55
4065	53
4065	50
4065	49
4065	47
4065	45

SCHEDULE A	
Unlotted Street Bed Adjacent to Block	**Unlotted Street Bed Adjacent to Lot**
4065	43
4065	40
4065	38
4076	22
4077	23
4077	21
4077	20
4077	19
4077	16
4077	13
4077	10
4077	8
4077	5
4077	1
4085	38
4085	34
4085	32
4085	30
4085	29
4085	51
4085	24
4085	19
4085	16
4085	13
4085	11
4085	9
4085	7
4086	1
4086	7
4086	10
4086	13
4086	15
4086	17
4086	22
4086	24
4086	27
4086	28
4086	30
4086	32
4086	34
4086	36
4086	40
4086	37
4088	28
4088	26
4088	25
4088	24
4088	20
4088	19
4088	15
4088	14
4088	13
4088	12
4088	10
4088	8
4088	7
4088	4
4088	2
4088	1
4070	1
4070	188
4070	187
4070	185
4070	183

SCHEDULE A	
Unlotted Street Bed Adjacent to Block	**Unlotted Street Bed Adjacent to Lot**
4070	181
4070	179
4070	177
4070	176
4070	174
4070	172
4070	170
4070	168
4070	166
4070	164
4070	162
4070	160
4070	158
4070	60
4070	58
4070	150
4070	148
4070	51
4071	43
4071	40
4071	39
4071	38
4071	37
4071	36
4071	35
4071	34
4071	33
4071	32
4071	31
4071	30
4071	29
4071	28
4071	27
4071	26
4071	25
4071	24
4071	23
4071	22
4071	21
4071	10
4071	20
4071	19
4071	18
4071	17
4071	15
4071	14
4071	13
4071	9
4071	8
4068	1
4068	85
4068	84
4068	83
4068	81
4068	79
4068	77
4068	75
4068	74
4068	73
4068	72
4068	70
4068	69
4068	68
4068	67

SCHEDULE A	
Unlotted Street Bed Adjacent to Block	**Unlotted Street Bed Adjacent to Lot**
4068	166
4068	65
4068	63
4068	62
4068	61
4068	60
4068	59
4068	58
4068	56
4068	54
4066	52
4066	50
4066	49
4066	48
4066	47
4066	46
4066	39
4066	36
4064	51
4064	50
4064	149
4064	48
4064	47
4064	46
4064	45
4064	60
4064	40
4064	38
4064	35
4065	28
4065	27
4065	25
4065	22
4065	21
4065	20
4065	19
4065	18
4065	17
4065	15
4065	14
4065	13
4065	12
4067	29
4067	27
4067	24
4067	22
4067	20
4067	18
4067	16
4067	14
4067	10
4069	42
4069	40
4069	36
4069	35
4069	34
4069	134
4069	133
4069	33
4069	31
4069	30
4069	29
4069	28
4069	27

SCHEDULE A	
Unlotted Street Bed Adjacent to Block	**Unlotted Street Bed Adjacent to Lot**
4069	26
4069	24
4069	23
4069	21
4069	19
4069	17
4069	15
4069	13
4069	12
4069	111
4069	11
4069	110
4069	5
4050	45
4050	44
4076	7
4076	20

Index No. CY4506/2021

SUPREME COURT OF THE STATE OF NEW YORK
COUNTY OF RICHMOND

In the Matter of the Application of the CITY OF NEW YORK Relative to Acquiring Title in Fee Simple Absolute to certain Real Property, located in Staten Island where not hereto acquired for the same purpose, for

ROMA AVENUE AND HETT AVENUE

in the generally bounded Milton Avenue, to the north, Navesink Place, to the west, Cedar Grove Avenue, to the south and New Dorp Lane, to the east, in the Borough of Staten Island, City and State of New York

NOTICE OF ACQUISITION

GEORGIA M. PESTANA
Corporation Counsel of the City of New York
Attorney for the Condemnor
100 Church Street
New York, NY 10007

Stephanie M. Fitos of Counsel
(212) 356-4064

Law Dept. Number No. 2018-00983

n29-d10

PROPERTY DISPOSITION

CITYWIDE ADMINISTRATIVE SERVICES

■ **SALE**

The City of New York in partnership with PropertyRoom.com posts vehicle and heavy machinery auctions online every week, at:
https://www.propertyroom.com/s/nyc+fleet

All auctions are open, to the public and registration is free.

Vehicles can be viewed in person, at:
Kenben Industries Ltd., 1908 Shore Parkway, Brooklyn, NY 11214
Phone: (718) 802-0022

No previous arrangements or phone calls are needed to preview.
Hours are Monday and Tuesday from 10:00 A.M. – 2:00 P.M.

f23-a4

HOUSING PRESERVATION AND DEVELOPMENT

■ PUBLIC HEARINGS

All Notices Regarding Housing Preservation and Development Dispositions of City-Owned Property appear in the Public Hearing Section.

j4-d30

PROCUREMENT

"Compete To Win" More Contracts!

Thanks to a new City initiative - "Compete To Win" - the NYC Department of Small Business Services offers a new set of FREE services to help create more opportunities for minority and Women-Owned Businesses to compete, connect and grow their business with the City. With NYC Construction Loan, Technical Assistance, NYC Construction Mentorship, Bond Readiness, and NYC Teaming services, the City will be able to help even more small businesses than before.

● ***Win More Contracts, at nyc.gov/competetowin***

"The City of New York is committed to achieving excellence in the design and construction of its capital program, and building on the tradition of innovation in architecture and engineering that has contributed, to the City's prestige as a global destination. The contracting opportunities for construction/construction services and construction-related services that appear in the individual agency listings below reflect that commitment to excellence."

HHS ACCELERATOR PREQUALIFICATION

To respond to human services Requests for Proposals (RFPs), in accordance with Section 3-16 of the Procurement Policy Board Rules of the City of New York ("PPB Rules"), vendors must first complete and submit an electronic HHS Accelerator Prequalification Application using the City's PASSPort system. The PASSPort system is a web-based system maintained by the City of New York for use by its Mayoral Agencies to manage procurement. Important business information collected in the Prequalification Application is required every three years. Documents related to annual corporate filings must be submitted on an annual basis to remain eligible to compete. Prequalification applications will be reviewed to validate compliance with corporate filings and organizational capacity. Approved organizations will be eligible to compete and would submit electronic proposals through the PASSPort system. The PASSPort Public Portal, which lists all RFPs, including HHS RFPs that require HHS Accelerator Prequalification, may be viewed at https://passport.cityofnewyork.us/page.aspx/en/rfp/request_browse_public. All current and prospective vendors should frequently review information listed on roadmap to take full advantage of upcoming opportunities for funding. For additional information about HHS Accelerator Prequalification and PASSPort, including background materials, user guides and video tutorials, please visit https://www1.nyc.gov/site/mocs/systems/about-go-to-passport.page.

BROOKLYN NAVY YARD DEVELOPMENT CORP.

■ SOLICITATION

Construction / Construction Services

INVITATION FOR BIDS FOR RECONSTRUCTION OF BERTH 6 AT THE BROOKLYN NAVY YARD - Public Bid - PIN# 000201 - Due 1-12-22 at 1:00 PM.

The invitation for Bids documents will be available on December 3rd, on our website: https://brooklynnavyyard.org/about/contract-opportunities.

A mandatory virtual Pre-Bid Meeting will be held on December 9th, 2021. Further information is available in the RFB.

Use the following address unless otherwise specified in notice, to secure, examine or submit bid/proposal documents, vendor pre-qualification and other forms; specifications/blueprints; other information; and for opening and reading of bids at date and time specified above.
Brooklyn Navy Yard Development Corporation, Building 77, 141 Flushing Avenue, Suite 801, Brooklyn, NY 11205. Emily Rubenstein (718) 907-5900; erubenstein@bnydc.org

d3-10

CITYWIDE ADMINISTRATIVE SERVICES

■ INTENT TO AWARD

Goods and Services

US BANK NATIONAL ASSOCIATION - Negotiated Acquisition - Other - PIN#85722N0001 - Due 12-15-21 at 12:00 A.M.

In accordance with Section 3-04(b)(2)(D) of the Procurement Policy Board Rules, the Department of Citywide Administrative Services (DCAS), is seeking to use the Negotiated Acquisition method, to extend its current contract with U.S. Bank National Association, whose primary office is located at, 901 Marquette Avenue, Minneapolis, MN 55402, to maintain an uninterrupted Citywide procurement card service program, for a period of 12 months. The contract term shall be from December 9, 2021 to December 8, 2022. Contract Amount: $55,000,000.00. This advertisement is for informational purposes only.

There is a compelling need for services that cannot be timely met, via competitive sealed bidding. The proposed term of the extension, is the minimum time necessary to meet the need, until a new contract is available.

Use the following address unless otherwise specified in notice, to secure, examine or submit bid/proposal documents, vendor pre-qualification and other forms; specifications/blueprints; other information; and for opening and reading of bids at date and time specified above.
Citywide Administrative Services, 1 Centre Street, 18th Floor, New York, NY 10007. Nazmije Toci (212) 386-0441; ntoci@dcas.nyc.gov

d9-15

DESIGN AND CONSTRUCTION

■ SOLICITATION

Construction / Construction Services

BROOKLYN MUSEUM BUILDING ENVELOPE RENOVATION - Competitive Sealed Bids - PIN# 85022B0025 - Due 1-19-22 at 2:00 P.M.

This Project consists of the following repairs being performed at the rear façades of the building: localized masonry repairs, masonry arch lintel repairs, brick and stone masonry cleaning, localized stone repairs, stone replacement including sills and copings. The project also includes, stucco repair, steel lintel replacement and waterproofing, concrete work including patching, crack repair, and steel beam encasement, window repair and replacement, and roof railing installation.

Community Board: Brooklyn 9

Project #: PV235BDEV/EPIN: 85022B0025

Late Bids will not be accepted.

There will be an optional Pre-Bid Conference. Details will be provided in the PASSPort procurement.

This contract is subject to Special Experience Requirements.

This project is subject to HireNYC

This Competitive Sealed Bid (CSB) is being released through PASSPort, New York City's online procurement portal.

Responses to this CSB must be submitted via PASSPort. To access the solicitation, vendors should visit the PASSPort Public Portal at https://www1.nyc.gov/site/mocs/systems/about-go-to-passport.page, and click on the "Search Funding Opportunities in PASSPort" blue box. This will take you to the Public Portal of all procurements in the PASSPort system. To quickly locate the CSB, insert the EPIN (85022B0025) into the Keywords search field.

Pre-Bid Conference location -1000 Washington Avenue, Brooklyn, NY 11225. Mandatory: no Date/Time - 2022-01-05 10:00:00

☛ **d10**

ECONOMIC DEVELOPMENT CORPORATION

CONTRACTS

■ **SOLICITATION**

Goods and Services

ARCHITECTURAL AND ENGINEERING DESIGN REVIEW & RELATED CONSULTING SERVICES AT BROOKLYN ARMY TERMINAL - Request for Proposals - PIN# 98130001 - Due 1-27-22 at 11:59 P.M.

New York City Economic Development Corporation ("NYCEDC") is seeking a consultant to provide architectural and engineering design review and related consulting services required for proposed improvements to tenant spaces at the Brooklyn Army Terminal, including but not limited, to the following: (1) thorough initial inspection of the sites, (2) review of all proposed tenant improvements including design specifications, building systems, building codes, any surrounding impacted tenant spaces, and compliance with active property leases, (3) performance of cyclical inspections on tenant spaces and building systems undergoing or adjacent to any current renovation, and (4) acting in the capacity of an owner's representative for NYCEDC.

NYCEDC plans to select a consultant on the basis of factors stated in the RFP which include, but are not limited to: the proposed Consultant Team's experience in providing services similar, to the Scope of Services, the quality of the proposed Consultant Team, the quality of the proposal and the degree to which it demonstrates the respondent's full understanding of and the ability to perform the Services to be rendered, the respondent's proposed plans for encouraging participation by minority- and Women-Owned Business enterprises in connection with the Services, and the proposed fee and cost schedules.

It is the policy of NYCEDC to comply with all Federal, State and City laws and regulations which prohibit unlawful discrimination because of race, creed, color, national origin, sex, age, disability, marital status, and other protected category and to take affirmative action in working with contracting parties, to ensure certified Minority- and Women-Owned Business Enterprises ("MWBEs") share in the economic opportunities generated by NYCEDC's projects and initiatives. Please refer, to the Equal Employment and Affirmative Compliance for Non-Construction Contracts Addendum in the RFP.

This project has M/WBE participation goals, and all respondents will be required to submit an M/WBE Participation Plan with their response. To learn more about NYCEDC's M/WBE program, visit http://edc.nyc/opportunity-mwdbe. For the list of companies who have been certified with the New York City Department of Small Business Services as M/WBE, please go, to the www.nyc.gov/buycertified.

NYCEDC established the Contract Financing Loan Fund programs for Minority, Women and Disadvantaged Business Enterprise ("M/W/DBE") interested in working on public construction projects. Contract Financing Loan Fund facilitates financing for short-term mobilization needs such as insurance, labor, supplies and equipment. Bidders/subcontractors are strongly encouraged to visit the NYCEDC website, at http://edc.nyc/opportunity-mwdbe to learn more about the program.

An optional informational session will be held, on Thursday, December 16, 2021, at 10:00 A.M. via Microsoft Teams. Participants may access the informational session by following the link in the RFP or by dialing in (audio only), at (347) 378-3690; Phone Conference ID: 891 568 90#. Additional meeting details can be obtained on the project website, at https://edc.nyc/rfps. Those who wish to, attend should RSVP by email to BATBuildRFP@edc.nyc on or before December 15, 2021.

An optional site visit session will be held, on Thursday, January 6, 2022, at 10:00 A.M., at Brooklyn Army Terminal, 140 58th Street, Brooklyn, NY 11220, Building A Entrance. Those who wish to, attend should RSVP by email to BATBuildRFP@edc.nyc on or before January 5, 2022.

Respondents may submit questions and/or request clarifications from NYCEDC no later than 5:00 P.M. on Thursday, January 13, 2022. Questions regarding the subject matter of this RFP should be directed to BATBuildRFP@edc.nyc. Answers to all questions will be posted by Thursday, January 20, 2022, to https://edc.nyc/rfps. Questions regarding the subject matter of this RFP will not be accepted after 5:00 P.M. on Thursday, January 13, 2022, however, technical questions pertaining to downloading and submitting proposals to this RFP may be directed to rfprequest@edc.nyc on or before Thursday, January 27, 2022.

Detailed submission guidelines and requirements are outlined in the RFP, available as of Friday, December 10, 2021. To download a copy of the solicitation documents please visit https://edc.nyc/rfps. RESPONSES ARE DUE NO LATER THAN 11:59 P.M. on Thursday, January 27, 2022. Please click the link in the "Deadlines" section of this project's web page (which can be found on https://edc.nyc/rfps) to electronically upload a proposal for this solicitation.

Use the following address unless otherwise specified in notice, to secure, examine or submit bid/proposal documents, vendor pre-qualification and other forms; specifications/blueprints; other information; and for opening and reading of bids, at date and time specified above.
Economic Development Corporation, One Liberty Plaza, New York, NY 10006. Ruby Singh (212) 312-3787; rsingh@edc.nyc

☛ **d10**

HEALTH AND MENTAL HYGIENE

■ **AWARD**

Human Services / Client Services

VACCINE OUTREACH AND COUNSELING PROGRAM - Emergency Purchase - PIN# 22EQ016701R0X00 - AMT: $1,237,475.00 - TO: Healthfirst Healthplan Inc., 100 Church Street, 18th Floor, New York, NY 10007-2601, US New York County.

☛ **d10**

AGENCY CHIEF CONTRACTING OFFICER

■ **INTENT TO AWARD**

Human Services / Client Services

HOUSING OPPORTUNITIES FOR PEOPLE LIVING WITH AIDS (HOPWA) - Government to Government - PIN# 22DA025101R0X00 - Due 12-20-21 at 12:00 P.M.

NYC, has been designated by HUD as the eligible applicant for the EMSA (Eligible Metropolitan Statistical Area), which consists of Rockland County and the City of NY, for the purpose of submitting an application to HUD and receiving a grant from HUD. DOHMH, intends to award the County of Rockland, to provide Housing Opportunities for People Living With AIDS, for the period of 4/1/2022 to 3/31/2031. The anticipated contract amount will be $1,745,226.00.

Potentiential vendors may submit an expression of interest for providing such services in the FUTURE. Expressions are due no later 12:00 P.M., on December 20, 2021.

Use the following address unless otherwise specified in notice, to secure, examine or submit bid/proposal documents, vendor pre-qualification and other forms; specifications/blueprints; other information; and for opening and reading of bids at date and time specified above.
Health and Mental Hygiene, 42-09 28th Street, Long Island City, NY 11101. Shamecka L Williams (347) 396-6656; swillia9@health.nyc.gov

d6-10

HUMAN RESOURCES ADMINISTRATION

CONTRACTS

■ **INTENT TO AWARD**

Human Services / Client Services

NAE FOR COMUNILIFE NYNYIII PERMANENT CONGREGATE - Negotiated Acquisition - Other - PIN# 06922N0029 - Due 12-15-21 at 2:00 P.M.

For Informational Purposes Only

The Human Resources Administration/HIV/AIDS Services Administration (HASA), intends to enter into a Negotiated Acquisition Extension, with Comunilife Inc., for the provision of non-emergency permanent congregate housing and supportive services for PLWAs, for 9 months (10/1/2021 - 6/30/2022). The Contract Amount for this NAE is $704,991.00.

Under this Negotiated Acquisition Extension, the vendor will continue to provide housing and supportive services for PLWAs.

Use the following address unless otherwise specified in notice, to secure, examine or submit bid/proposal documents, vendor pre-qualification and other forms; specifications/blueprints; other information; and for opening and reading of bids at date and time specified above.
Human Resources Administration, 150 Greenwich Street, 37th Floor, New York, NY 10007. Jacques Frazier (929) 221-5554; frazierjac@dss.nyc.gov

d8-14

PARKS AND RECREATION

CAPITAL PROGRAM MANAGEMENT

■ **INTENT TO AWARD**

Construction / Construction Services

84622Y0158-SECURITY MEASURES CENTRAL PARK - Request for Information - PIN# 84622Y0158 - Due 12-17-21 at 2:00 P.M.

Department of Parks and recreation, Capital Projects Division, intends to enter into a Sole Source Agreement with Central Park Conservancy, a not-for-profit organization, located on 14 East 60th Street, New York, NY 10022, Borough of Manhattan, to provide all necessary support services for the design, construction management, and construction of the Project.

Any firms that would like to express their interest in providing services for similar projects in the future, may do so. All expressions of interest must be in writing, to the address listed here and received by December 17, 2021. You may join the City Bidders list by filling out the "NYC-FMS Vend Enrollment Application" available on-line, at "NYC.gov/selltonyc" and hard copy by calling the Vendor Enrollment Center (212) 857-1680.

d7-14

REVENUE AND CONCESSIONS

■ **INTENT TO AWARD**

Construction Related Services

SECURITY MEASURES CENTRAL PARK - Sole Source - Available only from a single source - PIN# 84622Y0158 - Due 12-17-21 at 2:00 P.M.

Department of Parks and Recreation, Capital Projects Division, intends to enter into a Sole Source Agreement with Central Park Conservancy, a not-for-profit organization, located on 14 East 60th Street, New York New York 10022. Borough of Manhattan, to provide all necessary support services for design, construction management, and construction of the project.

Any firms that would like to express their interest in providing services for similar projects in the future, may do so. All expressions of interest must be in writing, to the address listed here and received by December 17, 2021. You may join the City Bidders list by filling out the "NYC-FMS Vendor Enrollment Application" available on-line, at"NYC.gov/selltonyc" and hard copy by calling the Vendor Enrollment Center (212) 857-1689.

Use the following address unless otherwise specified in notice, to secure, examine or submit bid/proposal documents, vendor pre-qualification and other forms; specifications/blueprints; other information; and for opening and reading of bids, at date and time specified above.
Parks and Recreation, Olmsted Center, Annex, Flushing Meadows-Corona Park, Flushing, NY 11368. Grace Fields-Mitchell (718) 760-6687; Grace.FieldsMitchell@parks.nyc.gov; RFP submissions@parks.nyc.gov

d7-13

■ **SOLICITATION**

Goods and Services

REQUEST FOR PROPOSALS FOR THE RENOVATION, OPERATION & MAINTENANCE OF AN INDOOR TENNIS SPORTS FACILITY AT ALLEY POND PARK, QUEENS - Competitive Sealed Proposals - Judgment required in evaluating proposals - PIN# Q1-A-SB-IT-2021 - Due 2-11-22 at 3:00 P.M.

In accordance with Section 1-13 of the Concession Rules of the City of New York, the New York City Department of Parks and Recreation ("Parks") is issuing, as of the date of this notice a significant Request for Proposals ("RFP") for the for The Renovation, Operation & Maintenance of an Indoor Tennis Sports Facility, at Alley Pond Park, Queens.

There will be a recommended remote proposer meeting on Friday, December 17, 2021, at 2:00 P.M. If you are considering responding to this RFP, please make every effort to, attend this recommended remote proposer meeting. Subject to availability and by appointment only, we may set up a meeting, at the proposed concession site, (Block #7860 & Lot #11) ("Licensed Premises"), 79-20 Winchester Boulevard Queens Village, NY 11427.

All proposals submitted in response to this RFP must be submitted no later than Friday, February 11, 2022, at 3:00 P.M. Hard copies of the RFP can be obtained, at no cost, commencing Friday, December 10, 2021 through Friday, February 11, 2022 by contacting Phylicia Murray, Project Manager, at (212) 360-3407 or, at Phylicia.Murray@parks.nyc.gov. The RFP is also available for download, on Friday, December 10, 2021 through Friday, February 11, 2022, on Parks' website. To download the RFP, visit http://www.nyc.gov/parks/businessopportunities and click on the "Concessions Opportunities, at Parks" link. Once you have logged in, click on the "download" link that appears adjacent, to the RFP's description.

For more information or to request to receive a copy of the RFP by mail, prospective proposers may contact Phylicia Murray, Project Manager at (212) 360-3407 or at Phylicia.Murray@parks.nyc.gov.

TELECOMMUNICATION DEVICE FOR THE DEAF (TDD) (212) 504-4115

Use the following address unless otherwise specified in notice, to secure, examine or submit bid/proposal documents, vendor pre-qualification and other forms; specifications/blueprints; other information; and for opening and reading of bids, at date and time specified above.
Parks and Recreation, The Arsenal, 830 5th Avenue, New York, NY 10065. Phylicia Murray (212) 360-3407; phylicia.murray@parks.nyc.gov

☛ **d10-23**

NYC PARKS: REQUEST FOR BIDS FOR MOBILE FOOD CONCESSIONS AT CITY PARKS - Competitive Sealed Bids - PIN# CWB-2021-A - Due 1-5-22 at 5:00 P.M.

In accordance with Section 1-12 of the Concession Rules of the City of New York, the New York City Department of Parks and Recreation ("Parks"), has issued a Request for Bids ("RFB"), for the sale of food from mobile food units, at various parks Citywide. Hard copies of the RFB can be obtained, at no cost, commencing December 6, 2021, through January 5, 2022, between the hours of 9:00 A.M. and 5:00 P.M., excluding weekends and Holidays, at the Revenue Division of the New York City Department of Parks and Recreation, which is located, at 830 Fifth Avenue, Room 407, New York, NY 10065. All bids submitted in response to this RFB, must be submitted, by no later than January 5, 2022, at 5:00 P.M.

The RFB is also available for download from December 6, 2021, through January 5, 2022, on Parks' website. To download the RFB, visit www.nyc.gov/parks/businessopportunities, click on the link for "Concessions Opportunities at Parks" and, after logging in, click on the "download" link that appears adjacent to the RFB's description. For more information related to the RFB, contact Angel Williams (for the Bronx and Staten Island Parks), at (212) 360-3495, or via email: Angel.Williams@parks.nyc.gov; Andrew Coppola (for Brooklyn Parks), at (212) 360-3454, or via email: Andrew.Coppola@parks.nyc.gov; or Glenn Kaalund (Manhattan and Queens Parks), at (212) 360-3482, or via email: Glenn.Kaalund@parks.nyc.gov.

TELECOMMUNICATION DEVICE FOR THE DEAF (TDD) (212) 504-4115.

Use the following address unless otherwise specified in notice, to secure, examine or submit bid/proposal documents, vendor pre-qualification and other forms; specifications/blueprints; other information; and for opening and reading of bids at date and time specified above.
Parks and Recreation, The Arsenal, 830 Fifth Avenue, Room 407, New York, NY 10065. Glenn Kaalund (212) 360-3482; glenn.kaalund@parks.nyc.gov

Accessibility questions: Glenn Kaalund (212) 360-3482, by: Monday, January 3, 2022, 5:00 P.M.

d6-17

Services (other than human services)

RFP FOR SPORTS/RECREATION AND FOOD SERVICE FACILITY AT FERRY POINT PARK - Competitive Sealed Proposals - Judgment required in evaluating proposals - PIN# X126-O-2020 - Due 1-28-22 at 3:00 P.M.

In accordance with Section 1-13 of the Concession Rules of the City of New York, the New York City Department of Parks and Recreation ("Parks") is issuing, as of the date of this notice, a significant Request for Proposals (RFP) for the Development, Operation, and Maintenance of a Sports/Recreation and Food Service Facility at Ferry Point Park, Bronx.

There will be a recommended remote proposer meeting on Friday, December 17, 2021 at 12:00 P.M. If you are considering responding to this RFP, please make every effort to attend this recommended remote proposer meeting. Subject to availability and by appointment only, we may set up a meeting at the proposed concession site (Block #5622 & Lot #1) ("Licensed Premises"), which is located at the site bounded by Westchester Creek, Hutchinson River Parkway South and southbound I-678.

All proposals submitted in response to this RFP must be submitted no later than Friday, January 28, 2022 at 3:00 P.M. Hard copies of the RFP can be obtained at no cost, commencing Friday, December 10, 2021 through January 28, 2022 by contacting Andrew Coppola, Senior Project Manager at (212) 360-3454 or at Andrew.Coppola@parks.nyc.gov. The RFP is also available for download, on December 10, 2021 through January 28, 2022, on Parks' website. To download the RFP, visit http://www.nyc.gov/parks/businessopportunities and click on the "Concessions

Opportunities at Parks" link. Once you have logged in, click on the "download" link that appears adjacent to the RFP's description.

For more information or if you cannot attend the remote proposer meeting, prospective proposers may contact Andrew Coppola, Senior Project Manager, at (212) 360-3454 or at Andrew.Coppola@parks.nyc.gov.

TELECOMMUNICATION DEVICE FOR THE DEAF (TDD) 212-504-4115

Use the following address unless otherwise specified in notice, to secure, examine or submit bid/proposal documents, vendor pre-qualification and other forms; specifications/blueprints; other information; and for opening and reading of bids at date and time specified above.
Parks and Recreation, The Arsenal, 830 Fifth Avenue, New York, NY 10065. Andrew Coppola (212) 360-3454; andrew.coppola@parks.nyc.gov

☛ **d10-23**

TRANSPORTATION

TRAFFIC OPERATIONS

■ **SOLICITATION**

Construction / Construction Services

TRAFFIC SIGNAL SAFETY PROJECTS IN THE CITY OF NEW YORK - Competitive Sealed Bids - PIN# 84122B0008 - Due 1-19-22, at 11:00 A.M.

Furnishing, Installation and/or removal of Electrical Traffic Signal Equipment's throughout the City of New York

Pre-Bid Conference location -https://zoom.us/j/99968956415?pwd=QkdEWGdDeVhYc0pVNGk1SWkxdTloQT09

Meeting ID: 999 6895 6415;

Passcode: 593140; +19292056099,,99968956415#,,,,*593140#

US (New York) New York, NY 10041.

Mandatory: no Date/Time - 2021-12-16 10:00:00

☛ **d10**

EXECUTIVE OPERATIONS/TRAFFIC OPERATIONS

■ **SOLICITATION**

Services (other than human services)

MANAGEMENT AND OPERATION OF THE JEROME/190TH STREET MUNICIPAL PARKING GARAGE - Competitive Sealed Bids - PIN# 84121B0014 - Due 1-12-22 at 11:00 A.M.

The services required by this contract are for the Management and Operation of the Jerome/190 Street Municipal Parking Garage on a 24-hour basis. This will permit an extension of the on-street parking available to motorists, thus reducing traffic congestion in New York City. Therefore, it is in the best interest of the City to contract out these services.

Responses to this IFB must be submitted via PASSPort. To access the IFB, vendors should visit the PASSPort public Portal at https://www1.nyc.gov/site/mocs/systems/about-go-to-passport.page. Click on the "Search Funding Opportunities in PASSPort" blue box. Doing so will take one to the public portal of all procurements in the PASSPort system. To quickly locate the IFB, insert the 84121B0014, into the Keyword search field. In order to respond to the IFB, vendors must create an account within the PASSPort system if they have not already done so.

A Pre-Bid Conference via ZOOM is scheduled for 12/17/2021 at 11:00 A.M. Those who wish to attend must email the authorized agency contact for a link no later than December 15, 2021 by 4:00 P.M. The deadline for the submission of questions via email is 12/23/2021 by 4:00 P.M. to the authorized agency contact person. The bid due date (submission via PASSPort) is 1/6/22 by 11:00 A.M.

This procurement is subject to participation goals for Minority-Owned Business Enterprises (MBEs) as required by Section 6-129 of the New York Administrative Code. The M/WBE goal for this project is 28%.

Any inquiries concerning this IFB should be directed by email, under the subject line "84121B0014- 84121BXTR422 Management and Operation of the Jerome/190th Street Municipal Parking Garage" to the email address of the Authorized Agency Contact, Shaneza Shinath, at sshinath@dot.nyc.gov or through the PASSPort communication function. Bid Opening Information You are invited to a Zoom webinar.

When: Jan 6, 2022 12:00 P.M. Eastern Time (US and Canada) Topic: Bid Opening for 84121B0014 -84121MNTR422

Please click the link below to join the webinar: https://zoom.us/j/98859361095?pwd=QjhCOWlaZVk4angxb3A4UlgxT0orZz09

Passcode: 464966 Or One tap mobile : US: +19292056099,,98859361095#,,,,*464966# or +13126266799,,98859361095#,,,,*464966# Or Telephone: Dial(for higher quality, dial a number based on your current location): US: +1 929 205 6099 or +1 312 626 6799 or +1 301 715 8592 or +1 253 215 8782 or +1 346 248 7799 or +1 669 900 6833

Webinar ID: 988 5936 1095
Passcode: 464966 International numbers available: https://zoom.us/u/ac990rMLCx

Pre-Bid Conference location -Virtual N/A NY N/A Mandatory: no Date/Time - 2021-12-17 11:00:00

☛ **d10**

84121B0004-84121MNTR421 MANAGEMENT AND OPERATION OF THE DELANCEY & ESSEX MUNICIPAL PARKING GARAGE - Competitive Sealed Bids - PIN#84121B0004 - Due 1-12-22 at 11:00 A.M.

The services required by this contract are for the Management and Operation of the Delancey and Essex Street Municipal Parking Garage on a 24-hour basis. This will permit an extension of the on-street parking available to motorists, thus reducing traffic congestion in New York City. Therefore, it is in the best interest of the City to contract out these services.

Responses to this IFB must be submitted via PASSPort. To access the IFB, vendors should visit the PASSPort public Portal at https://www1.nyc.gov/site/mocs/systems/about-go-to-passport.page. Click on the "Search Funding Opportunities in PASSPort" blue box. Doing so will take one to the public portal of all procurements in the PASSPort system. To quickly locate the IFB, insert the 84121B0004, into the Keyword search field. In order to respond to the IFB, vendors must create an account within the PASSPort system if they have not already done so.

A Pre-Bid Conference via ZOOM is scheduled for 12/17/2021 at 11:00 A.M. Those who wish to attend must email the authorized agency contact for a link no later than December 15, 2021 by 4:00 P.M. The deadline for the submission of questions via email is 12/23/2021 by 4:00 P.M. to the authorized agency contact person. The bid due date (submission via PASSPort) is 1/12/22 by 11:00 A.M.

This procurement is subject to participation goals for Minority-Owned Business Enterprises (MBEs) as required by Section 6-129 of the New York Administrative Code. The M/WBE goal for this project is 28%.

Any inquiries concerning this IFB should be directed by email, under the subject line "84121B0004- 84121MNTR421 Management and Operation of the Delancey & Essex Municipal Parking Garage" to the email address of the Authorized Agency Contact, Shaneza Shinath, at sshinath@dot.nyc.gov or through the PASSPort communication function. Bid Opening Information You are invited to a Zoom webinar.

When: Jan 12, 2022 12:00 P.M. Eastern Time (US and Canada) Topic: Bid Opening for 84121B0004 -84121MNTR421

Please click the link below to join the webinar: https://zoom.us/j/98859361095?pwd=QjhCO WlaZVk4angxb3A4UlgxT0orZz09
Passcode: 464966 Or One tap mobile : US: +19292056099,,98859361095#,,,,*464966# or +13126266799,,98859361095#,,,,*464966# or Telephone: Dial (for higher quality, dial a number based on your current location): US: +1 929 205 6099 or +1 312 626 6799 or +1 301 715 8592 or +1 253 215 8782 or +1 346 248 7799 or +1 669 900 6833

Webinar ID: 988 5936 1095
Passcode: 464966 International numbers available: https://zoom.us/u/ac990rMLCx

Pre-Bid Conference location -Virtual N/A Mandatory: no Date/Time - 2021-12-17 11:00:00

☛ **d10**

VETERANS' SERVICES

■ **INTENT TO AWARD**

Services (other than human services)

CORRECTIVE NOTICE: DISCHARGE UPGRADE ASSISTANCE PROGRAM - Negotiated Acquisition - Other - PIN# 06322DUALS1 - Due 12-13-21 at 5:00 P.M.

Pursuant to Section 3-04(b)(2)(i)(D) of the Procurement Policy Board Rules, the New York City Department of Veterans Services (DVS), intends to enter into negotiations with Veteran Advocacy Project, (with its headquarters located at 1 Liberty Plaza 23rd Floor, New York, NY 10006) and New York Legal Assistance Group, (with its headquarters located at 100 Pearl Street 19th Floor, New York, NY 10004), for the provision of the Discharge Upgrade Assistance Legal program. This program will assist veterans who seek to upgrade their discharge status to be eligible for a broader range of veteran benefits. The proposed contract is in the amounts are $250,000 per year, per vendor. The contract terms shall be from December 1, 2021, to November 30, 2024, with 2 options to renew for 1 year each, from December 1, 2024, to November 30, 2025, and December 1, 2025 to November 31, 2026.

Veteran Advocacy Project – Epin 06322N0002001

New York Legal Assistance Group - Epin 06322N0001001

This notice is for informational purposes only. Organizations interested in future solicitations for these services, are invited to do so by registering with the NYC Mayor's Office of Contract Services (MOCS) PASSPort system. To register with PASSPort, please go to www.nyc.gov/PASSPort. There you will find additional guides to assist you with the registration process.

Use the following address unless otherwise specified in notice, to secure, examine or submit bid/proposal documents, vendor pre-qualification and other forms; specifications/blueprints; other information; and for opening and reading of bids at date and time specified above.
Veterans' Services, ggarcia@veterans.nyc.gov

d7-13

YOUTH AND COMMUNITY DEVELOPMENT

■ **AWARD**

Human Services / Client Services

COMPASS NEGOTIATED ACQUISITION EXTENSION - Negotiated Acquisition - Other - PIN# 26021N0684001 - AMT: $273,794.00 - TO: Friends of Crown Heights Educational Centers Inc, 671 Prospect Place, Brooklyn, NY 11216.

SONYC Non Public School Sites NAE

☛ **d10**

COMPASS PROGRAMMING AT PS 24 - Negotiated Acquisition - Other - PIN# 26022N0195001 - AMT: $977,506.00 - TO: Morningside CTR for Teaching Social Responsibility, 475 Riverside Drive, #550, New York, NY 10115.

COMPASS School Base NAE

☛ **d10**

COMPASS PROGRAMMING AT PS 214 - Negotiated Acquisition - Other - PIN# 26022N0171001 - AMT: $960,574.00 - TO: Morningside Ctr for Teaching Social Responsibility, 475 Riverside Drive, #550 New York, NY 10115.

COMPASS School Base NAE

☛ **d10**

COMPASS NEGOTIATED ACQUISITION EXTENSION - Negotiated Acquisition - Other - PIN# 26022N0380001 - AMT: $535,218.00 - TO: Friends of Crown Heights Educational Centers Inc, 671 Prospect Place, Brooklyn, NY 11216.

COMPASS School Base NAE

☛ **d10**

CONTRACT AWARD HEARINGS

NOTE: LOCATION(S) ARE ACCESSIBLE TO INDIVIDUALS USING WHEELCHAIRS OR OTHER MOBILITY DEVICES. FOR FURTHER INFORMATION ON ACCESSIBILITY OR TO MAKE A REQUEST FOR ACCOMMODATIONS, SUCH AS SIGN LANGUAGE INTERPRETATION SERVICES, PLEASE CONTACT THE MAYOR'S OFFICE OF CONTRACT SERVICES (MOCS) VIA E-MAIL AT DISABILITYAFFAIRS@MOCS.NYC.GOV OR VIA PHONE AT (212) 788-0010. ANY PERSON REQUIRING REASONABLE ACCOMMODATION FOR THE PUBLIC HEARING SHOULD CONTACT MOCS AT LEAST THREE (3) BUSINESS DAYS IN ADVANCE OF THE HEARING TO ENSURE AVAILABILITY.
♿

INFORMATION TECHNOLOGY AND TELECOMMUNICATIONS

■ **PUBLIC HEARINGS**

NOTICE IS HEREBY GIVEN that a Contract Public Hearing will be held, on Monday, December 27, 2021, at 10:00 AM. The Public Hearing will be held via Conference Call. Call-in #: 1-917-410-4077, ACCESS CODE: 224 081 087.

IN THE MATTER OF a proposed Purchase Order/Contract between the New York City Department of Information Technology and Stralto, Inc., located at 222 Broadway, 19th Floor, New York, NY 10038, for MWBE HRO Business Process and Subject Matter Specialist. The amount of this Purchase Order/Contract will be $189,336.00. The term will be two years from issuance of Notice to Proceed. PIN #: 20220050115. E-PIN #: 85822W0042001.

The Vendor has been selected by M/WBE Noncompetitive Small Purchase Method, pursuant to Section 3-08 (c)(1)(iv) of the Procurement Policy Board Rules.

Pursuant to Section 2-11(c)(3) of the Procurement Policy Board Rules, if DoITT does not receive, by December 17, 2021, from any individual a written request to speak, at this hearing, then DoITT need not conduct this hearing. Written notice should be sent to Mark Polyak, NYC DoITT, via email to mpolyak@doitt.nyc.gov.

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NOTICE IS HEREBY GIVEN that a Contract Public Hearing will be held, on Monday, December 27, 2021, at 10:00 AM. The Public Hearing will be held via Conference Call. Call-in #: 1-917-410-4077, ACCESS CODE: 224 081 087.

IN THE MATTER OF a proposed Purchase Order/Contract between the New York City Department of Information Technology and Donnelly and Moore Corporation, located, at 70 Havermill Road, Suite 101, New City, NY 10956, for MWBE NYC3 Identity and Access Management Project Manager. The amount of this Purchase Order/Contract will be $232,960.00. The term will be two years from issuance of Notice to Proceed. PIN #: 20210201080, E-PIN #: 85822W0033001.

The Vendor has been selected by M/WBE Noncompetitive Small Purchase Method, pursuant to Section 3-08 (c)(1)(iv) of the Procurement Policy Board Rules.

Pursuant to Section 2-11(c)(3) of the Procurement Policy Board Rules, if DoITT does not receive, by December 17, 2021, from any individual a written request to speak, at this hearing, then DoITT need not conduct this hearing. Written notice should be sent to Mark Polyak, NYC DoITT, via email to mpolyak@doitt.nyc.gov.

☛ **d10**

AGENCY RULES

ENVIRONMENTAL PROTECTION

■ **NOTICE**

Notice of Public Hearing and Opportunity to Comment on Proposed Rules

What are we proposing? The Department of Environmental Protection ("Department" or "DEP") is proposing to amend its rules governing management of construction and post-construction stormwater sources (Title 15, chapter 19.1 of the Rules of the City of New York ("RCNY")).

When and where is the hearing? The Department will hold a public hearing on the proposed rule amendments. The public hearing will take place at 11 am on January 10, 2022. To participate in the public hearing, please follow these instructions:

Microsoft Teams meeting

Join on your computer or mobile app

Click here to join the meeting

Or call in (audio only)

+1 347-921-5612,,98510248#

Phone Conference ID: 985 102 48#

How do I comment on the proposed rules? Anyone can comment on the proposed rules by:

- **Website.** You can submit comments to the Department through the NYC rules web site at http://rules.cityofnewyork.us.
- **Email.** You can email written comments to nycrules@dep.nyc.gov.
- **Mail.** You can mail written comments to the Department, Bureau of Legal Affairs, 59-17 Junction Boulevard, 19th Floor, Flushing, NY 11373.
- **Fax.** You can fax written comments to the Department, Bureau of Legal Affairs, at 718-595-6543.
- **By speaking at the hearing.** Anyone who wants to comment on the proposed rule at the public hearing must sign up to speak.

You can sign up before the hearing by calling 718-595-6531. You can speak for up to three minutes.

Is there a deadline to submit written comments? Yes, you must submit written comments by January 10, 2022.

What if I need assistance to participate in the hearing? You must tell the Department's Bureau of Legal Affairs if you need a reasonable accommodation of a disability at the hearing. You must tell us if you need a sign language interpreter. You can tell us by postal mail or email to the addresses given above. You may also tell us by telephone at 718-595-6531. You must tell us by January 3, 2022.

Can I review the comments made on the proposed rules? You can review the comments made online on the proposed rules by going to the website at http://rules.cityofnewyork.us/. A few days after the hearing, a transcript of the hearing and copies of the written comments will be available to the public at the Bureau of Legal Affairs.

What authorizes the Department to make these rules? Section 1043(b-1) of the New York City Charter ("City Charter") and section 24-553 of the Administrative Code of the City of New York authorize the Department to make these proposed rules which were included in the Department's regulatory agenda for fiscal year 2022.

Where can I find the Department's rules? The Department's rules are in Title 15 of the Rules of the City of New York.

What laws govern the rulemaking process? The Department must meet the requirements of Section 1043 of the City Charter when creating or changing rules. This notice is made according to the requirements of Section 1043(b) of the City Charter.

Statement of Basis and Purpose

The New York City Department of Environmental Protection ("DEP" or "Department") proposes to amend its rules governing management of construction and post-construction stormwater sources (Title 15, chapter 19.1 of the Rules of the City of New York ("RCNY")).

Section 1403(b-1) of the Charter of the City of New York provides that the Commissioner of Environmental Protection ("Commissioner") has "the power to administer and enforce provisions of law, rules and regulations relating to the management and control of discharges and runoff from public and private property, including but not limited to stormwater discharges, which may convey pollutants and other materials that may enter and have an adverse impact on the waters of the state." Title 24 of the Administrative Code of the city of New York, Chapter 5-A establishes stormwater management controls for construction projects to reduce the flow of stormwater runoff and water borne pollutants into sewers that empty directly into the waters of the state or that overflow into such waters because of rain or snowmelt that exceeds the design capacity of wastewater treatment plants.

The proposed amendments to Chapter 19.1 would extend to the combined sewer area the Department's permitting, inspection and enforcement program for covered development projects, as defined in the rule, including requirements for construction and post-construction stormwater controls, standards for such controls, and penalties for non-compliance with the rules and permit conditions.

DEP is proposing these amendments as part of a unified stormwater rule, to be administered citywide, which will align Chapter 19.1 Construction/Post-Construction permitting program water quality requirements with Chapter 31 stormwater quantity and flow rate requirements, encouraging development projects greater than or equal to 20,000 SF to use green infrastructure to meet requirements of both Chapters, where feasible. These amendments will allow for reduction in combined sewer overflows and flooding, increase in green space, greater consistency across stormwater programs, flexibility in design options and improvements in water quality. DEP is also proposing, as an appendix to this chapter, a NYC Stormwater Manual to provide additional procedural and technical guidance to owners, developers and applicants.

The proposed amendments to §19.1-01.2 Definitions would:

- change the definition of "covered development project" to include development activity that involves or results in an amount of soil disturbance greater than or equal to 20,000 square feet or creation of 5,000 square feet or more of impervious surface or covered maintenance activity.
- add a definition for "covered maintenance activity" to include roadway maintenance that involves 20,000 sf or more.
- change the definition of "development activity**"** to include creation of impervious surface.
- change the definition of "SWPPP acceptance form" to delete reference to the MS4 and the NYS Department of Environmental Conservation.
- change the definition of "MS4 area" to delete reference to the MS4 map. add a definition for MS4 project.
- delete the definition of new development.
- change the definitions of "notice of intent" or "NOI" and notice of termination" or "NOT" to add reference to their applicability in the MS4 area.
- add a definition for "NYC Stormwater Manual"
- delete the definition of "redevelopment."
- change the definition of "retention system" for consistency with Chapter 31 of these rules.
- add a definition of "roadway maintenance" as work in the ROW, including milling and filling of existing asphalt pavements, etc.
- change the definition of "routine maintenance activity" to eliminate full depth milling and filling of existing asphalt pavements, etc.

The proposed amendments to §19.1-03.1 Applicability would include deletion of reference to the MS4 map and changes in grandfathering provisions.

The proposed amendments to §19.1-03.3 Permits would clarify permit application requirements including requirement to identify any elements of the design not in conformance with the design criteria in the technical standard, including the reason for the deviation or alternative design and demonstration that the deviation or alternative design is equivalent to the technical standard; and reference to preference for post-construction practices that rely on infiltration/ retention to those that rely on filtration/detention.

The proposed amendments would add §19.1-03.4 on Selecting Stormwater Management Practices (SMPs), as further described in the NYC Stormwater Manual, using the SMP Hierarchy, which requires implementing vegetated retention practices to the maximum extent practicable.

Permit issuance for covered development projects, meaning projects that involve or result in at least 20,000 square feet of soil disturbance or creation of 5,000 square feet or more of impervious surface or covered maintenance activities, is not subject to environmental review pursuant to 6 NYCRR Section 617.5(c)(19).

New material is underlined. Deleted material is shown in [brackets].

"Shall" and "must" denote mandatory requirements and may be used interchangeably in the rules of the department, unless otherwise specified or unless the context clearly indicates otherwise.

Section 1. Section 19.1-01.1 of Chapter 19.1 of Title 15 of the Rules of the City of New York is amended to read as follows:

§ **19.1-01.1 Applicability. Applicability.** These rules apply to discharges from industrial stormwater sources within those portions of the city of New York served by the municipal separate storm sewer system (MS4) and the discharge of stormwater from [property within those portions of the city of New York served by the municipal separate storm sewer system (MS4) including, but not limited to, discharges from industrial stormwater sources and] covered development projects.

§2. The definitions of "covered development project," "detention system," "developer," "development activity," "MS4 SWPPP acceptance form," "MS4 area," "new development," , "notice of intent" or "NOI," "notice of termination" or "NOT," "pollutants of concern" or "POCs," "Redevelopment," "retention system," routine maintenance activity" and "storm sewer"set forth in section 19.1-01.2 of Chapter 19.1 of title 15 of the rules of the city of New York are amended and new definitions of "covered maintenance activity," "MS4 project" "NYC stormwater manual" and "roadway maintenance" are added to such section to read as follows:

Covered development project. The term "covered development project" means development activity,private or public, that involves or results in an amount of soil disturbance [within the MS4 area] greater than or equal to [one acre] 20,000 square feet or creation of 5,000 square feet or more of impervious surface, or covered maintenance activity. Such term includes development activity that is part of a larger common plan of development or sale involving or resulting in soil disturbance [within the MS4 area] greater than or equal to [one acre] 20,000 square feet or creation of 5,000 square feet or more of impervious surface. [Such term must include all development activity within the MS4 area that requires a SWPPP pursuant to the New York State Department of Environmental Conservation (NYSDEC) construction general permit.]

Covered Maintenance Activity. The term "covered maintenance activity" means roadway maintenance that involves 20,000 sf or more.

Detention system. The term "detention system" means a system [that slows] designed to slow and temporarily [holds] hold an accumulation of stormwater runoff [so that it can be released] and release it at a controlled rate.

Developer. The term "developer" means a person that owns or leases land on which development activity that is part of a covered development project is occurring, or a person that has operational control over the development activity's or covered maintenance activity's plans and specifications, including the ability to make modifications to the construction plans and specifications.

Development activity. The term "development activity" means creation of impervious surface and/or soil disturbance on a site including but not limited to land contour work, clearing, grading,

excavation, demolition, construction, reconstruction, [new development, redevelopment,] [creation or replacement of impervious surface,] stockpiling activities or placement of fill. Clearing activities include but are not limited to logging equipment operation, the cutting and skidding of trees, stump removal, and/or brush root removal. Such term does not include routine maintenance [(such as road resurfacing) performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility].

[MS4] SWPPP acceptance form. The term "[MS4] SWPPP acceptance form" means the form [developed by NYSDEC to be] used to indicate acceptance of a SWPPP by [a municipality] the department.

MS4 area. The term "MS4 area" means those portions of the city of New York served by separate storm sewers and separate stormwater outfalls owned or operated by the city of New York or areas served by separate storm sewers owned or operated by the city of New York that connect to combined sewer overflow pipes downstream of the regulator owned or operated by the city of New York, and areas in which municipal operations and facilities drain by overland flow to waters of the state, as determined by the department [and described on the map of the MS4 area set forth in these rules and available on the department's website].

MS4 Project: The term "MS4 project" means a covered development project that is subject to the NYSDEC construction general permit.

[New development. The term "new development" means any construction or disturbance of a parcel of land that is currently undisturbed or unaltered by human activities and in a natural state.]

Notice of intent or NOI. The term "notice of intent" or "NOI" means for MS4 projects or industrial stormwater sources in the MS4 area the document submitted to NYSDEC to obtain coverage under the NYSDEC construction general permit or the MSGP.

Notice of termination or NOT. The term "notice of termination" or "NOT" means for MS4 projects or industrial stormwater sources in the MS4 area the document submitted to NYSDEC to terminate coverage under the NYSDEC construction general permit or the MSGP. For non-MS4 area projects, the term "notice of termination" or "NOT" means the document submitted to DEP to terminate coverage under the DEP SW construction permit.

NYC Stormwater Manual. The term "NYC Stormwater Manual" (the "Manual") refers to the procedural and technical guidance document developed to inform owners/developers/applicants how to meet stormwater requirements set forth in this chapter and in Chapter 31 of these rules; the Manual is attached as an appendix to this chapter.

Pollutants of concern (POCs). The term "pollutants of concern" or "POCs" means pollutants [that might reasonably be expected to be present in stormwater in quantities that may cause or contribute to an exceedance of water quality standards. These pollutants include but are not limited to nitrogen, phosphorus, silt and sediment, pathogens, floatables, petroleum hydrocarbons, heavy metals, and polycyclic aromatic hydrocarbons (PAHs).] causing the impairment of an impaired water segment listed in Appendix I of the New York City MS4 permit, including nitrogen, phosphorus, fecal coliform, and garbage and refuse.

[Redevelopment. The term "redevelopment" means reconstruction of or modification to any existing previously developed land such as residential, commercial, industrial, institutional or road/highway, which involves soil disturbance. Redevelopment is distinguished from new development in that new development refers to construction on land where there had not been previous construction. Redevelopment specifically applies to constructed areas with impervious surface or fill.]

Retention system. The term "retention system" means a system [that captures] designed to capture an accumulation of stormwater runoff on site [with no release] through infiltration, evapo-transpiration, storage for reuse, or some combination of these.

Roadway Maintenance. The term "roadway maintenance" means work in the right of way (ROW) including milling and filling of existing asphalt pavements ("milling and paving"), replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six inches of subbase material; and long-term use of equipment storage areas at or near highway maintenance facilities.

Routine maintenance activity. The term "routine maintenance activity" means a maintenance activity [that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility,] including, but not limited to:

- Re-grading of gravel roads or parking lots;
- Stream bank restoration projects (does not include the placement of spoil material);
- Cleaning and shaping of existing roadside ditches and culverts that maintains the approximate original line and grade, and hydraulic capacity of the ditch;
- Cleaning and shaping of existing roadside ditches that does not maintain the approximate original grade, hydraulic capacity and purpose of the ditch if the changes to the line and grade, hydraulic capacity or purpose of the ditch are installed to improve water quality and quantity controls (e.g. installing grass lined ditch);
- Placement of aggregate shoulder backing that makes the transition between the road shoulder and the ditch or embankment;
- [Full depth milling and filling of existing asphalt pavements, replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six inches of subbase material;]
- [Long-term use of equipment storage areas at or near highway maintenance facilities;]
- Removal of sediment from the edge of the highway to restore a previously existing sheet-flow drainage connection from the highway surface to the highway ditch or embankment;
- Replacement of curbs, gutters, sidewalks, and guide rail posts; and
- Repairs made to SMPs to restore them to former condition or to operating order.

Storm sewer. The term "storm sewer" means a sewer, [the primary purpose of which is to carry], which conveys only stormwater.

§3. Subdivision (a) of section 19.1-02.1 of chapter 19.1 of title 15 of the rules of the city of New York is amended to read as follows:

(a) Applicability.

This section applies to industrial stormwater sources within the MS4 area and industrial or commercial premises or facilities in the MS4 area that the department determines may [generate significant contributions of pollutants of concern into impaired waters] contribute a significant pollutant load to the MS4.

§4. Subdivision (b) of section 19.1-02.3 of chapter 19.1 of title 15 of the rules of the city of New York ia amended to read as follows:

(b) Unpermitted industrial and commercial facilities.

The department or an authorized inspection agent may enter and inspect any unpermitted premises or facilities within the MS4 area, as required by the MS4 permit, during normal operating hours. The department will inspect unpermitted facilities to identify those that [generate significant contributions of pollutants of concern to impaired waters] may contribute a significant pollutant load to the MS4 and will refer those to NYSDEC. The department or an authorized inspection agent may inspect the facility, including, but not limited to, its equipment, practices, operations and records,nsistent with applicable law.

§5. Section 19.1.3.1 of chapter 19.1 of title 15 of the rules of the city of New York is amended to read as follows:

§ 19.1-03.1 Applicability

(a)[This rule] Section 19.1-03 of this chapter applies to covered development projects, public and private, that discharge to a [separate storm] sewer system owned or operated by the City, and covered development projects that are located on municipally owned or operated sites that drain by overland flow to waters of the state.

[(b) The MS4 map set forth in these rules is not the sole basis for determining whether a development activity is a covered development project. The map is an approximation of the boundaries of the MS4 area at a point in time. Such boundaries may change with changes to the separate storm sewer system and refinement of the map. The map is intended as a convenience and is not dispositive of whether a development project is within the MS4 area. When in doubt, developers should submit a record request form found on the department's website for information on sewer drainage.]

[c.] (b) Grandfathering

(1) [This rule] Section 19.1-03 of this chapter does not apply to any development activity with a letter of acknowledgment of notice of intent for coverage under the NYSDEC construction general permit issued by NYSDEC before [the effective date of this rule] June 1, 2019.

(2) [This rule] Section 19.1-03 of this chapter does not apply to any development activity with a valid individual State Pollutant Discharge Elimination System (SPDES) permit issued by NYSDEC for construction activity before [the effective date of this rule] June 1, 2019.

(3) Section 19.1-03 of this chapter does not apply to any covered development project, other than an MS4 project, where an application for construction document approval for the construction of such project was filed with the Department of Buildings or the Department of Small Business Services, as applicable, prior to March 26, 2021.

(4) The amendments to this chapter effective on {insert effective date of rule} do not apply to any development activity with an MS4 SWPPP acceptance form issued within two years prior to such date.

(5) Section 19.1-03 of this chapter does not apply to any covered development project of less than 1 acre (other than a project of less than 1 acre all or any part of which is within an area that was rezoned as a result of a zoning map amendment application filed by the Department of City Planning, that received final approval after November 15, 2021, but before the effective date of this rule, and which project seeks to develop a parcel of land pursuant to the rezoning), if prior to the effective date of the rule an application for construction document approval was filed with the Department of Buildings or the department of small business services for such project.

(6) Section 19.1-03 of this chapter does not apply to any covered development project of less than 1 acre all or any part of which is within an area that was rezoned as a result of a zoning map amendment application filed by the Department of City Planning, that received final approval after November 15, 2021, and which seeks to develop a parcel of land pursuant to the rezoning, if prior to December 10, 2021, a permit for the construction of such project was issued by the Department of Buildings or the Department of Small Business Services, as applicable.

§6. Section 19.1-03.3 of chapter 19.1 of title 15 of the rules of the city of New York is amended to read as follows:

§ 19.1-03.3 Permits

(a) Permit Program Requirements

(1) Permit applications and applications to amend permits must be filed electronically on the department's web site.

(2) The developer and owner of a site must certify that the application is being submitted on their behalf.

(3) Qualified professionals who have prepared application materials are required to certify that the materials submitted meet the technical standards included in the NYSDEC construction general permit and these rules.

(4) [Stormwater] In addition to technical standards included in this section, stormwater management practices must be designed and constructed in accordance with the following technical standards for performance and design:

(i) The New York City Stormwater Manual, incorporated as an appendix to this chapter.

[(i)](ii)The New York State Stormwater Management Design Manual January 2015 or its successor including the enhanced phosphorus removal standards.

[ii] (iii) New York Standards and Specifications for Erosion and Sediment Control, dated November 2016, or its successor.

[(iii)The New York City StormwateManual.]

(5) Where, in any specific case, different provisions of this chapter or of the technical standards incorporated by reference specify different materials, methods of construction or other requirements, the most restrictive shall govern.

(b) Stormwater Construction Permit

(1) No developer may commence development activity in connection with a covered development project [located in the MS4 area], public or private, without having first obtained a stormwater construction permit from the department. The commissioner, in his or her discretion, may impose such terms and conditions in the permit as he or she deems necessary to protect the [MS4] sewer system or to protect the public health or welfare.

(2) The following activities are not considered covered development projects:

(i) Routine maintenance activities; and

(ii) [Repairs to any stormwater management practice or facility deemed necessary by the department; and

(iii)] Emergency activities that are immediately necessary for the protection of life, property, or natural resources.

(3) Permit application requirements

(i) To obtain a permit, an applicant must complete and file an application available on the department's website. The application must be accompanied by a processing fee of $1,000 dollars in addition to a $2,000 dollar fee per acre of land disturbed.

(ii)When a covered development project consists entirely of installation of an environmental enhancement project made up of one or more stormwater management practices, and does not include other development [or redevelopment], DEP may exempt the owner or developer from payment of any fees associated with these rules.

(iii)The application must include certification by a developer that the covered development project that is the subject of the application is in full compliance with City Environmental Quality Review, Chapter 5 of Title 62 of the Rules of the City of New York.

[(iii)] (iv)The application must include a SWPPP prepared, signed, and sealed by a qualified professional. [The SWPPP must be submitted in an electronic format acceptable to the department, as further detailed on the department's website, and must contain all the elements required in the NYSDEC construction general permit and in these rules, as follows:]

[(ii)](v) All components of the SWPPP that involve the practice of engineering, as defined by Article 145 of the NYS Education Law, must be prepared by, or under the direct supervision of, a professional engineer licensed to practice in the State of New York. The SWPPP must be submitted in an electronic format acceptable to the department, as further detailed on the department's website, and must contain all the elements required in the NYSDEC construction general permit and in this chapter, as follows:

A. Background information about the scope of the project, including type and size of project;

B. Site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map should show:

(1) The total site area;

(2) All improvements including underground utilities;

(3) Areas of disturbance;

(4) Areas that will not be disturbed;

(5) Existing vegetation;

(6) On-site and adjacent off-site surface water(s);

(7) Floodplain/floodway boundaries;

[(7)] (8) Wetlands and drainage patterns that could be affected by the [construction] development activity;

[(8)] (9)Existing and final contours;

[(9)] (10) Location of soil types with boundaries;

[(10)] (11) Material, waste, borrow or equipment storage areas located on adjacent properties; and

[[11)] (12) Location(s) of the stormwater discharge(s).

C. A description of the soil(s) present at the site;

D. A construction phasing plan describing the intended sequence of development activities, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance;

E. A description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a pollutant source in stormwater runoff;

F. A description of the minimum erosion and sediment control practices to be installed or implemented for each [construction] development activity that will result in soil disturbance or creation of impervious surface and for each covered maintenance activity, including a schedule that identifies the timing of initial placement or implementation of each erosion and sediment control practice and the minimum time frames that each practice should remain in place or be implemented;

G. A site map or construction drawing or drawings specifying the location, size and length of each erosion and sediment control practice;

H. Dimensions, material specifications and installation details for all erosion and sediment control practices, including the siting and sizing of any temporary sediment basins and structural practices that will be used to divert flows from exposed soils;

I. A temporary and permanent soil stabilization plan that meets the requirements of these rules and the technical standard, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of final stabilization;

J. A maintenance inspection schedule for the trained contractor(s) to ensure continuous and effective operation of the erosion and sediment control practices;

K. The name or names of the receiving waters;

L. A delineation of SWPPP implementation responsibilities for each part of the site;

M. A description of structural practices designed to divert flows from exposed soils, store flows, or otherwise limit the runoff and the discharge of pollutants from exposed areas of the site to the degree attainable; and

N. Any existing data that describe the stormwater runoff at the site including but not limited to calculations to size erosion control practices.

O. Identification of any elements of the design that are not in conformance with the design criteria in the technical standards listed in (a)(4) of this section. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is equivalent to the technical standard.

[(iv) When a covered development project consists entirely of repair or installation of an environmental enhancement project made up of one or more stormwater management practices, and does not include other development or redevelopment, DEP may exempt the owner or developer from payment of any fees associated with these rules.]

P. Development activities that are on Table 2.3 of the NYC Stormwater Manual in covered development projects under these rules must prepare a SWPPP that includes post-construction stormwater management practices. However, with respect to covered development projects for road construction or reconstruction that are less than one acre and for covered maintenance activities, erosion and sediment control practices will be required, but no post-construction stormwater management practices will be required.

(4)Development activities that alter hydrology, reduce perviousness or include the reconstruction of an impervious surface that disturbs soil, must develop a SWPPP that includes post-construction stormwater management practices.

[(4)] (5)SWPPPs for projects that require post-construction stormwater management practices must be prepared, signed, and sealed by a qualified professional who has an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics, and the SWPPPs must include the following items:

(i)All information required in § 19.1-03.3(b)(3), above;

(ii) A description of each post-construction stormwater management practice designed to retain or infiltrate stormwater or documentation, as further required by the NYC Stormwater Manual, that retention or infiltration is not possible and a description of the selected practice;

(iii) A site map or construction drawing or drawings showing the specific location and size of each post-construction stormwater management practice;

(iv) Dimensions, material specifications and installation details for each post-construction stormwater management practice;

(v) A hydrologic and hydraulic analysis for all structural components of the stormwater management system for the applicable design storms that includes, but is not limited to:

A. Map or maps showing pre-development conditions, including watershed/subcatchments boundaries, flow paths/routing and design points;

B. Map or maps showing post-development conditions, including watershed/subcatchments boundaries, flow paths/routing, design points and post-construction stormwater management practices;

C. Results of stormwater modeling (i.e. hydrology and hydraulic analysis) for the required storm events. Include supporting calculations (model runs), methodology, and a summary table that compares pre- and post-development runoff rates and volumes for the different storm events;

D. Summary table, with supporting calculations, which demonstrates that each post-construction stormwater management practice has been designed in conformance with the sizing criteria included in the technical standards, as further described in § 19.1-03.3(a)(4) above; and

E. Identification of any elements of the design that are not in conformance with the performance criteria in the technical standards. Include the reason or reasons for the deviation or alternative design and provide information, which demonstrates that the deviation or alternative design is equivalent to the technical standards.(vi)Soil testing results and locations (test pits, borings);

(vi) Soil testing results and locations(test pits borings)

(vii) Infiltration testing results and locations when an infiltration practice will be implemented;

(viii) An operations and maintenance plan that includes inspection and maintenance schedules and actions to ensure continuous and effective operation of each post-construction stormwater management practice. The plan must identify the entity that will be responsible for the long-term operation and maintenance of each practice;

(ix) For flood management projects, the SWPPP must include an analysis of the impact of the project on existing water quality of receiving waters;

(x) For covered development projects located in the watersheds identified in Appendix 1 of the NYC MS4 permit NY-0287890, or most current, and for which there is an increase in impervious area, the SWPPP must include a pollutant loading analysis that demonstrates that the proposed post-construction stormwater management practices meet the no net increase requirement as further provided in the New York City Stormwater [Management Design] Manual; and

[(xi) Certification by a developer that the covered development project that is the subject of the application is in full compliance with City Environmental Quality Review, Chapter 5 of Title 62 of the Rules of the City of New York; and]

[(xii)] (xi) Plans, drawings and maps that are part of the SWPPP must be submitted at a scale not smaller than 1"=50' unless otherwise specified by the department.

~~(1)~~ [(5)] (6) Additional requirements for projects that disturb five acres or more

The owner or developer of a development activity must not disturb greater than five acres of soil at any one time without prior written authorization from the department. At a minimum, the owner or developer must comply with the following requirements in order to be authorized to disturb greater than five acres of soil at any one time:

(i) The owner or developer must have a qualified inspector conduct at least two site inspections in accordance with the NYSDEC construction general permit every seven-calendar days, for as long as greater than five acres of soil remain disturbed. The two inspections must be separated by a minimum of two full calendar days;

(ii) In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven days from the date the current soil disturbance activity ceased. The soil stabilization measures selected must be in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016;

(iii) The owner or developer must prepare a phasing plan that defines maximum disturbed area per phase and shows required cuts and fill; and

(iv) The owner or developer must install any additional site-specific practices needed to protect water quality.

~~(2)~~ [(6)] (7) Application review and determinations

(i) The department or a qualified professional employed by the City of New York will review applications for compliance with the NYSDEC construction general permit and these rules.

(ii) The department will issue a determination within 45 days of submittal of the complete application and fee to the department. However, with respect to submissions that include non-conforming designs per sections 19.1-03.3 (b)(3)(iv)(O) and 19.1-03.3 (b)(4)(v)(E), the department will issue a determination within 60 days of submittal of the complete application and fee to the department.

(iii) If an application meets the standards set forth herein, the department will provide the applicant with [an MS4] a SWPPP acceptance form [for submission to NYSDEC as required by the NYSDEC construction general permit]. If the developer does not obtain a stormwater construction permit for the project within two years from the date of issuance of the SWPPP acceptance form, the plan approval will expire and a new permit application must be submitted.

(iv) If an application does not meet the standards set forth herein, the department will send notice to the developer indicating the specific deficiencies that caused the department to reject the application. Applicants may re-apply upon addressing the deficiencies.

~~(3)~~ [(7)] (8) Issuance of the Stormwater Construction Permit.

(i) Permit issuance under the rule is not subject to environmental review pursuant to 6 NYCRR § 617.5(c)(25).

(ii) The owner or developer must file a Permit Initiation Form, including the name and contact information for a qualified inspector.

(iii) Before the department will issue a stormwater construction permit for an MS4 project, the applicant must provide a copy of the NYSDEC SPDES permit number and NOI acknowledgement letter.

(iv) The contractor with primary responsibility for the project site must file a Permit Request Form that includes a certification that the contractor will comply with these rules, with the SWPPP and with the terms and conditions of this permit, and provides credentials for the trained contractor who will be responsible for overseeing day-to-day operations at the project site during construction.

(v) When the department requires post-construction stormwater management practices, it must not issue a stormwater

construction permit for the project until the execution and recording of a maintenance easement, as follows:

A. The maintenance easement will be binding on all subsequent owners of the real property served by such post-construction stormwater management practice.

B. The maintenance easement must provide for access to post-construction stormwater management practices at reasonable times in accordance with the law for periodic inspection by the department or qualified professionals authorized by the department to ensure that such practices are maintained in good working condition to meet the applicable design standards.

C. The grantor must record the maintenance easement in the office of the city register or, if applicable, the county clerk, after approval by the corporation counsel.

D. A maintenance easement is not required when the corporation counsel has determined that such a maintenance easement is not necessary due to the property's ownership or use by a public agency or instrumentality. For post-construction stormwater management practices subject to such an exception, when there is a subsequent conveyance or cessation of public use, the corporation counsel may require the execution and recording of a maintenance easement at that time.

~~(4)~~ [(8)] (9) Permit conditions

(i) The applicant and all contractors and subcontractors responsible for implementation of the SWPPP must comply with these rules, the SWPPP, NYSDEC construction general permit, if applicable, and the terms and conditions of the stormwater construction permit.

(ii) A stormwater construction permit must be renewed every two years from date of issuance.

(iii) An application for permit renewal for two years or for a permit extension for up to one year must be submitted to the department pursuant to § 19.1-03.3(b)(9).

(iv) The contractor or developer must notify the department no fewer than 7 days prior to the start of development activity.

(v) A copy of the permit must be retained and displayed at the site of the development activity during construction, from the date of initiation of development activities to the date of final stabilization of the site.

(vi) A copy of the approved SWPPP must be retained at the site of the development activity from the date of initiation of development activities to the date of final stabilization

(vii) The developer must have a trained contractor inspect daily the erosion and sediment control practices and pollution prevention measures being implemented within the active work area to ensure that they are being maintained in effective operating condition at all times. The trained contractor must document (e.g., log) these daily inspections. If deficiencies are identified, the contractor shall begin implementing corrective actions within one business day and shall complete the corrective actions in a reasonable time frame.

(viii) The developer must have a qualified inspector conduct site inspections and document the effectiveness of all erosion and sediment control practices every seven days, as detailed in the NYSDEC construction general permit. If deficiencies are identified, the contractor must begin implementing corrective actions within one business day and must complete the corrective actions in a reasonable timeframe.

(ix) The developer must notify the department of an anticipated temporary shutdown a minimum of seven days before the shutdown, and must submit documentation showing that the site is stable and that all stormwater management practices are operational. The developer will be responsible for having a qualified inspector visit the site and inspect it at least once every 30 days during the shutdown. In addition, all permits must be kept current during the suspension of development activity.

(x) If the developer terminates construction without completing the project, the developer must submit a closure plan demonstrating that the site will remain stable and that all completed stormwater management practices are operating as designed and in compliance with department rules. Any project that has post-construction stormwater management practices that are constructed and operating must comply with § 19.1-03.3(c) of these rules.

(xi) All amendments to the SWPPP must be submitted to the department.

(xii) Major amendments to the SWPPP must be submitted to the department and will be processed and approved or disapproved in the same manner as the original SWPPP. An application must be accompanied by a $1,000 dollar fee per disturbed acre for processing of the amendment. Major amendments include, but are not limited to:

A. Changes to structural stormwater management practices; or

B. Changes that require new stormwater modeling or changes to modeling methodology.

[(9)] (10) Expiration and extension of plan approval and permit, and permit renewal

(i) A plan approval will expire if the permit is not requested within two years of issuance of the SWPPP acceptance form. The department may, upon written presentation of sufficient justification for delay and a fee of $1,000 per disturbed acre, made 30 days prior to the expiration of a plan approval, grant an extension of time of up to one year to request a permit. If the plan approval expires, a new permit application must be submitted.

(ii) A stormwater construction permit will expire if:

A. The commencement of development activities does not take place within one year of the permit issuance; or

B. Development activity is not completed by a date specified in the permit; or

C. The permitted work is suspended or abandoned for a continuous period of 12 months (or less than 12 months if the permit expires earlier).

(iii) The department may, upon written presentation of sufficient justification for delay and a fee of $1,000 per disturbed acre made 30 days prior to the expiration of a permit, grant a one-time extension of time of up to one year to begin or complete the work prescribed under the permit. Expired permits will require re-application as detailed in the permit conditions.

(iv) An application for permit renewal for two years must be submitted to the department no less than 30 days prior to the permit expiration date and must be accompanied by a processing fee in the amount of $1,000 dollars in addition to a $2,000 dollar fee per acre of land disturbed.

~~(10)~~ [(10)] (11) Notice of Termination

(i) An owner or developer of a covered development project that has completed all development activities must submit a completed NOT to the department for sign-off prior to submitting the NOT to NYSDEC. The department will review the completed NOT to ensure that the following conditions have been met:

A. All development activities identified in the SWPPP have been completed;

B. All areas of disturbance have achieved final stabilization;

C. All temporary structural erosion and sediment control measures have been removed; and

D. Any post-construction stormwater management practices identified in the SWPPP have been constructed in conformance with the SWPPP and are operational.

(ii) An owner or developer of a covered development project that requires a planned shutdown with partial project completion must submit a completed NOT to the department for sign-off prior to submitting the NOT to NYSDEC. The department will review the completed NOT to ensure that the following conditions have been met:

A. All soil disturbance has ceased;

B. All areas disturbed as of the project shutdown date have achieved final stabilization;

C. All temporary structural erosion and sediment control measures have been removed; and

D. Any post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

~~(11)~~ [(11)] (12) Recordkeeping. The developer must keep and maintain records of all inspections and tests required to be performed during construction throughout the period of construction and for five years after completion of construction.

(c) Stormwater Maintenance Permit

(1) Permit application

(i) Upon final stabilization of the site, covered development projects requiring a SWPPP that includes post-construction stormwater management practices under these regulations will be required to obtain and maintain a stormwater maintenance permit.

(ii) To obtain a permit, an owner must file an application on the department's website. The application must be accompanied by the following:

A. NYSDEC NOT as provided for under 19.1.3-03(b)(10);

B. As-built plan of the site's stormwater management practices, including inverts in and out of all structures, at a scale no less than 1" to 50' in an electronic format acceptable to the department signed and sealed by a qualified professional;

C. An operation and maintenance manual, in an electronic format acceptable to the department;

D. Name and contact information for the person or company designated to maintain the practices; and

E. Sewer certification, as required by the department (pursuant to Chapter 19 of Title 15 of the Rules of the City of New York).

(2) Post-construction stormwater management practices are not required for the following covered development projects:

(i) Covered development projects identified as activities that require only an erosion and sediment control component in the NYSDEC construction general permit except for the installation of underground, linear utilities, such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains; and

(ii) Installation of underground, linear utilities, such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains where surface will be restored to the existing condition.

(3) Permit conditions

(i) The Maintenance Entity must document (e.g., log) any maintenance activities undertaken pursuant to the operation and maintenance plan.

(ii) The owner must submit to the department annually, not more than 30 days before and not later than the anniversary date of the issuance of the stormwater maintenance permit, a certification signed by the owner that the stormwater management practices are operating as designed.

(iii) The owner of the site must renew the stormwater maintenance permit every five years. An application for renewal must be submitted to the department no less than 30 days prior to the permit expiration date and must be accompanied by a report certified by a qualified professional that the stormwater management practices are operating as designed and a fee of $1,500.

(iv) A licensed professional engineer must perform inspections and certifications of any post-construction stormwater management practices that include structural components, such as a dam for an impoundment.

(v) The owner of the site must notify the department of any sale or conveyance of the premises and must provide the name of and contact information for the new owner.

(4) Modification of a practice covered by a stormwater maintenance permit

(i) Should the owner wish to modify a stormwater management practice covered by a stormwater maintenance permit, the owner must submit an application for modification of the stormwater maintenance permit (available on the department's website).

(ii) The application for modification of the stormwater maintenance permit must include calculations and supporting documentation to demonstrate that the practice is at least as protective of water quality as the existing practice and that it controls stormwater flows as required by the NYSDEC construction general permit.

(iii) The department will review the application following the criteria for new applications.

(5) Inspections. As also provided in § 19.1-03.2, the department or an authorized inspection agent may conduct periodic inspections to ensure that post-construction stormwater management practices are maintained in good working condition to meet the applicable design standards.

(6) Recordkeeping. The owner must keep and maintain records of all required post-construction inspections and tests for five years after performance of such inspections or tests. The owner must keep and maintain all as-built drawings for the life of the post-construction stormwater management practice.

(7) Should any provision of these rules and a provision in the NYS construction general permit differ, the more stringent of the two provisions will apply.

§7. Chapter 19.1 of title 15 of the rules of the city of New York is amended by adding a new section 19.1-03.4 to read as follows:

§ 19.1-03.4 Selecting SMPs using the SMP Hierarchy

(a)SMPs must be selected, using the SMP hierarchy, as follows, and as more fully described in the NYC Stormwater Manual:

(1) *Vegetated retention* practices must be used to the maximum extent practicable to meet requirements.

(2) Where vegetated retention practices are not possible or cannot meet the entire runoff reduction volume due to site constraints, the site constraints must be documented in the SWPPP and *non-vegetated retention* practices must be used to the maximum extent practicable to meet requirements.

(3) Where both vegetated and non-vegetated retention practices are not possible or cannot meet the entire runoff reduction volume due to site constraints, the site constraints must be documented in the SWPPP and:

(i) In the combined sewer service area, any remaining requirements must be met using either *vegetated or non-vegetated detention* practices;

(ii) In the MS4 area, any remaining requirements must be met using either *vegetated or non-vegetated treatment* practices.

(b)When SMPs are deemed infeasible due to site constraints, including soil, subsurface, "hotspot," surface and space constraints, the designer must provide the appropriate documentation that demonstrates each constraint.

(c)All documentation for constraints and justification for the selection of practices must be included in the SWPPP and are subject to review and approval by the Department.

NEW YORK CITY MAYOR'S OFFICE OF OPERATIONS
253 BROADWAY, 10th FLOOR
NEW YORK, NY 10007
212-788-1400
CERTIFICATION / ANALYSIS
PURSUANT TO CHARTER SECTION 1043(d)

RULE TITLE: Amendment of rules governing construction and post-construction stormwater sources
REFERENCE NUMBER: DEP-82
RULEMAKING AGENCY: Department of Environmental Protection

I certify that this office has analyzed the proposed rule referenced above as required by Section 1043(d) of the New York City Charter, and that the proposed rule referenced above:

(i) Is understandable and written in plain language for the discrete regulated community or communities;

(ii) Minimizes compliance costs for the discrete regulated community or communities consistent with achieving the stated purpose of the rule; and

(iii) Does not provide a cure period because it does not establish a violation, modification of a violation, or modification of the penalties associated with a violation.

/s/ Francisco X. Navarro — *November 23, 2021*
Mayor's Office of Operations — Date

NEW YORK CITY LAW DEPARTMENT
DIVISION OF LEGAL COUNSEL
100 CHURCH STREET
NEW YORK, NY 10007
212-356-4028

CERTIFICATION PURSUANT TO
CHARTER §1043(d)

RULE TITLE: Amendment of rules governing construction and post-construction stormwater sources
REFERENCE NUMBER: 2021 RG 060
RULEMAKING AGENCY: Department of Environmental Protection

I certify that this office has reviewed the above-referenced proposed rule as required by section 1043(d) of the New York City Charter, and that the above-referenced proposed rule:

(i) is drafted so as to accomplish the purpose of the authorizing provisions of law;

(ii) is not in conflict with other applicable rules;

(iii) to the extent practicable and appropriate, is narrowly drawn to achieve its stated purpose; and

(iv) to the extent practicable and appropriate, contains a statement of basis and purpose that provides a clear explanation of the rule and the requirements imposed by the rule.

/s/ STEVEN GOULDEN — Date: 11/23/2021
Acting Corporation Counsel

NEW YORK CITY STORMWATER MANUAL

TABLE OF CONTENTS

ACRONYMS

Aic: Area of new impervious cover

A.S.T.M. The American Standards for the Testing of Materials, latest edition.

BEPA: Bureau of Environmental Planning & Analysis or its successor.

BMP: Best Management Practice

BWSO: The Bureau of Water & Sewer Operations or its successor.

CSO: Combined Sewer Overflow

CSS: Combined Sewer System

DEP: The New York City Department of Environmental Protection or its successor Agency.

DO: Dissolved Oxygen

DOB: The New York City Department of Buildings or its successor Agency.

DOF: The New York City Department of Finance or its successor Agency.

DOT: The New York City Department of Transportation or its successor Agency.

ESC: Erosion and Sedimentation Control

HCP: House Connection Proposal

HSG: Hydrologic Soil Group

IC: Impervious Cover

MS4: Municipal Separate Storm Sewer System

NNI: No Net Increase

NOI: Notice of Intent

NOT: Notice of Termination

NYC SWM: New York City Stormwater Manual

NYSDEC: The New York State Department of Environmental Conservation.

NYS SWMDM: New York State Stormwater Management Design Manual

O&M: Operations and Maintenance

PC: Post-Construction

POC: Pollutant of Concern

PPGH: Pollution Prevention and Good Housekeeping

ROW: Right of Way

RR: Runoff Reduction

RRv: Runoff Reduction Volume

SCP: Site Connection Proposal

sf: square feet

SMP: Stormwater Management Practice

SWPPP: Stormwater Pollution Prevention Plan

SWPTS: Stormwater Permitting and Tracking System

TN: Total Nitrogen

Vv: Sewer Operations Volume

WQ: Water Quality

WQv: Water Quality Volume

WRRF: Wastewater Resource Recovery Facility

GLOSSARY

Agency: An agency of the City.

Applicant: The person filing the online application for a stormwater construction permit or a stormwater maintenance permit. This may be the owner, developer, qualified professional, or other person that is a registered user in the online application system.

Building: A structure having a specific Block and Lot (or tax sub-lot). In general, a structure will be considered a Building if it has a separate entrance from an outdoor area.

City: The City of New York.

Cleanout: Structure to allow access to subsurface pipes for cleaning.

Cleanout Pipes: Pipes that provide a connection between the cleanout and internal pipes to allow for regular maintenance.

Code: The Administrative Code of the City of New York.

Combined Sewer: A sewer receiving a combination of sanitary and/or industrial wastewater and stormwater runoff.

Combined Sewer Overflow (CSO): Sometimes, during heavy rain and snowstorms, a combined sewer system receives higher than normal flows. NYC wastewater resource recovery facilities (WRRFs) are unable to handle flows that are more than twice their design capacity and when this occurs, a mix of excess stormwater and untreated wastewater discharges directly into the City's waterways at certain outfalls to prevent upstream flooding. This is called a combined sewer overflow.

Combined Sewer System (CSS): A sewer system used to convey both wastewater and stormwater in a single pipe to WRRFs.

Commissioner: The Commissioner of the New York City Department of Environmental Protection.

Connection permit: A written authorization issued by the DEP to connect to an existing sewer or drain or an approved outlet.

Contractor: An entity retained by the Owner/Applicant to construct a facility.

Contributing (or contributory) drainage area: A drainage area bounded by the ridgelines of the furthest boundaries from which flow reaches a point of discharge.

Controlled-Flow Orifice: Orifice located within the outlet control structure used to reduce the flow rate out of a practice.

Conveyance Pipes: Umbrella term used to describe pipes that convey stormwater, which can include yard drains, as well as SMP specific pipes, such as bypass pipes, overflow pipes, and intake pipes.

Covered development project: development activity that involves or results in an amount of soil disturbance greater than or equal to 20,000 square feet; or creation of 5,000 square feet or more of impervious surface; or a covered maintenance activity. Such term includes development activity that is part of a larger common plan of development or sale involving or resulting in soil disturbance greater than or equal to 20,000 square feet or creation of 5,000 square feet or more of impervious surface.

Covered Maintenance Activity: roadway maintenance activity that involves an area of 20,000 or more square feet.

CSO Outfall: The physical point where a municipally owned or operated combined sewer discharges to surface waters of the state.

Department: The New York City Department of Environmental Protection (DEP).

Designer: A Qualified Professional.

Detention System: A system designed to slow and temporarily hold an accumulation of stormwater runoff and release it at a controlled rate.

Developer: A person that owns or leases land on which development activity that is part of a covered development project is occurring, or a person that has operational control over the development or maintenance activity's plans and specifications, including the ability to make modifications to the plans and specifications.

Development Activity: Creation of impervious surface and/or soil disturbance on a site including but not limited to land contour work, clearing, grading, excavation, demolition, construction, reconstruction, stockpiling activities or placement of fill. Clearing activities can include but are not limited to logging equipment operation, the cutting and skidding of trees, stump removal, and/or brush root removal. Such term does not include routine maintenance.

Disturbance Threshold: The minimum area of disturbed soil or created impervious surface as a result of development activities that triggers the need for a Stormwater Construction Permit.

Discharge: The introduction or release of any substance, whether knowing or unknowing, accidental or otherwise, to a public sewer or private sewer connected to a public sewer or to waters of the State and shall include indirect discharges as defined herein.

Drawdown: The process of stormwater emptying a practice storage area (surface or subsurface) through one or more of infiltration, evapotranspiration, reuse, filtration, or an outlet pipe.

Dual Function System: Cases in which one stormwater management practice is configured to support runoff management via two, equally contributing functions.

Erosion and Sediment Controls (ESC): Stormwater management practices designed to minimize the discharge of pollutants during development activities including, but not limited to, structural erosion and sediment control practices, construction sequencing to minimize exposed soils, soil stabilization, dewatering control measures, and other pollution prevention and good housekeeping practices (PPGH) appropriate for construction sites.

Evapotranspiration System: A system designed primarily to capture stormwater for evaporation and/or transpiration back into the atmosphere.

Filtration System: A system designed primarily to remove pollutants from stormwater by trapping and separating particles in stormwater as it passes through a porous media.

Floatables: Manmade materials, such as plastics, papers, or other products which, when improperly disposed of onto streets or into catch basins, can ultimately find their way to waterbodies and may create nuisance conditions with regard to aesthetics, recreation, navigation, and waterbody ecology.

Flow: A continuous movement of storm water or wastewater.

Forebay: A separate segment within a stormwater basin used to trap sediment, chosen to facilitate maintenance and removal of the sediment. Use of a forebay is intended to facilitate sedimentation and thus protect other unit treatment processes.

Fronting: An existing sewer or drain abutting an existing or proposed development.

Green Infrastructure (GI): Also known as and referred to throughout this manual as stormwater management practices (SMPs), are designed to protect, restore, or mimic the natural water cycle within built environments by retaining, detaining, and/or treating stormwater runoff. Generally includes practices such as rain gardens, green or blue roofs, porous pavements, subsurface stormwater storage systems, and stormwater reuse systems.

GreenHUB: DEP's web-based application with data management capabilities that provides asset management for the green infrastructure practices citywide over their lifecycle, where designers upload the Project Tracking Spreadsheet.

Groundwater: Any existing water in subsoil stratums, including water from springs and natural underground streams, but excluding water from wells used for the delivery of potable or processed water.

Groundwater table: The actual depth of ground water below surface.

Head (Hydraulic Head): Energy represented as a difference in elevation. In slow-flowing open systems, the difference in water surface elevation, e.g., between an inlet and outlet.

House connection proposal (HCP): A plan showing proposed Sewer connection(s) to a City sewer, a Private sewer, a Private drain, or an approved outlet to serve Fee Simple One (1), Two (2) or Three (3) Family Dwelling Units less than 20,000 square feet in total site area, connecting to a sewer that is fronting the site.

Hybrid System: Cases in which two or more stormwater management practices of the same function are integrated as one practice.

Impaired Water: Includes (i) a water body for which NYSDEC has established a total maximum daily load ("TMDL"), (ii) a water body for which NYSDEC expects that existing controls such as permits will resolve the impairment, and (iii) a water body identified by NYSDEC as needing a TMDL. A list of impaired waters is issued by NYSDEC pursuant to section 303(d) of the federal water pollution control act, chapter 26 of title 33 of the United States code.

Impervious Area (Cover): All impermeable surfaces that cannot effectively infiltrate rainfall. This includes paved, concrete and gravel surfaces (e.g., parking lots, driveways, roads, runways and sidewalks); building rooftops and miscellaneous impermeable structures such as patios, pools, and sheds.

Impervious Surface: Any surface that cannot effectively infiltrate rainfall: generally, rooftops, pavements, sidewalks, and driveways.

Infiltration: Process of water percolating through a porous media, mainly in a downward direction, due to gravity. Infiltration rate (or infiltration capacity) is the maximum rate at which a soil in a given condition will absorb water.

Infiltration System: A system designed primarily to infiltrate stored or detained stormwater into soils below.

Inlet: Any structure that captures water which eventually drains to a practice, usually located at the low points of a site.

Internal Pipes: Perforated pipes inside the practice that can be used to evenly distribute or drain water in the stone base

Invert: The bottom elevation of a channel, pipe, or manhole.

Larger Common Plan of Development or Sale: A contiguous area where multiple separate and distinct development activities are occurring, or will occur, under one plan. The term "plan" in "larger common plan of development or sale" is broadly defined as any announcement or piece of documentation including a sign, public notice of hearing, sales pitch, advertisement, drawing, permit application, uniform land use review procedure (ULURP) application, state environmental quality review act (SEQRA) or city environmental quality review (CEQR) application, application for a special permit, authorization, variance or certification pursuant to the zoning resolution, subdivision application, computer design, or physical demarcation (including boundary signs, lot stakes, and surveyor markings) indicating that development activities may occur on a specific plot. Such term does not include area-wide rezonings or projects discussed in general planning documents. For discrete development activities that are located within a larger common plan of development or sale that are at least 1/4 mile apart, each activity can be treated as a separate plan of development or sale provided that any interconnecting road, pipeline or utility project that is part of the same "common plan" is not concurrently being disturbed.

Lot: A tax lot as shown on the Tax map of the City.

Maintenance Entity: The entity identified by the owner that will be responsible for the long-term operation and maintenance of each post-construction stormwater management practice.

MS4 Area: Those portions of the city of New York served by separate storm sewers and separate stormwater outfalls owned or operated by the city of New York or areas served by separate storm sewers owned or operated by the city of New York that connect to combined sewer overflow pipes downstream of the regulator owned or operated by the city of New York, and areas in which municipal operations and facilities drain by overland flow to waters of the state,

as determined by the department.

MS4 Project: Covered Development Project that is located in the MS4 area and has submitted a SWPPP to the SWPTS.

Multi-sector general permit (MSGP): The NYSDEC SPDES Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity, Permit No. GP-0-17-004 or its successor.

Municipal Operations and Facilities: Any operation or facility serving a New York city governmental purpose and over which the City of New York has operational control.

No Net Increase (NNI): A pollutant load analysis included in the SWPPP that demonstrates adequate controls are in place such that the change in pollutant loading will not result in a net increase.

Notice of Intent (NOI): For MS4 projects or industrial stormwater sources in the MS4 area, the document submitted to NYSDEC to obtain coverage under the NYSDEC construction general permit or the multi-sector general permit, respectively.

Notice of Termination (NOT): For MS4 projects or industrial stormwater sources in the MS4 area, the document submitted to NYSDEC to terminate coverage under the NYSDEC construction general permit or the multi-sector general permit, respectively. For non-MS4 area projects, the term "notice of termination" or "NOT" means the document submitted to DEP to terminate coverage under the DEP SW construction permit.

NYC MS4 No Net Increase Calculator for Nitrogen: Interactive spreadsheet tool developed by DEP to help developers calculate post-development nitrogen load increases and select SMPs to manage total nitrogen. The calculator takes pre- and post-development inputs from the user and outputs net runoff volume and nitrogen load changes.

NYC MS4 Permit: The SPDES permit for MS4s of New York city, SPDES No. NY-0287890 or its successor

NYSDEC Construction General Permit (CGP): The SPDES general permit for stormwater discharges from construction activities, Permit No. GP-0-15-002 or its successor.

Observation Well: Structure located within the footprint of a practice that allows monitoring of subsurface water levels.

Outlet Control Structure: Any structure that houses a controlled-flow device or weir that regulates drainage from a practice.

Outlet Pipe: A pipe that can drain water from a stormwater management practice before it is full, which typically connects the storage zone of the practice with a point of discharge.

Owner (for purposes of Chapter 19.1): A person having legal title to premises, a mortgagee or vendee in possession, a trustee in bankruptcy, a receiver, or any other person having legal ownership or control of premises.

Owner (for purposes of Chapter 31): Any individual, firm, corporation, company, association, society, institution or any other legal entity that owns the property, appurtenances, and easements compromising an existing or a proposed development.

Pathogens: disease-producing agents such as bacteria, viruses, or other microorganisms. Fecal coliform is a pathogen-related water quality parameter.

Peak Runoff: The maximum stormwater runoff rate (cfs) determined for the design storm, or design rainfall intensity.

Person: Means an individual, corporation, partnership, limited-liability company or other legal entity.

Pollutant: Dredged soil, filter backwash, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand and industrial, municipal, and agricultural waste discharged into water; which may cause or might reasonably be expected to cause pollution of the waters of the State in contravention of the standards or guidance values adopted as provided in 6 New York codes, rules and regulations ("NYCRR") section 750-1.2(a).

Pollutant of Concern (POC): Pollutants causing the impairment of an impaired water segment listed in Appendix I of the New York City MS4 permit, including nitrogen, phosphorus, pathogens, and floatables.[1]

Ponding Depth: The depth of surface water within a practice.

Post-Construction Stormwater Management Practice or Post-Construction Practice: A stormwater management practice serving a developed site and consisting of technology or strategies designed to reduce pollutants in stormwater runoff or reduce runoff rate or volume from the developed site through infiltration, retention, detention, direct plant uptake, filtration, or other method or treatment. Such term includes, but is not limited to, detention systems and retention systems.

Post-Development: Relating to the site conditions such as land use, land coverage, topography, zoning, and corresponding hydrologic functions that will exist following proposed development activities.

Pre-Development: Relating to the site conditions such as land use, land coverage, topography, zoning, and corresponding hydrologic functions that exist prior to proposed development activities.

Qualified Inspector: A person who is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, a Certified Professional in Erosion and Sediment Control (CPESC), or a Registered Landscape Architect.

This term can also mean someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided that person has training in the principles and practices of erosion and sediment control. Training in the principles and practices of erosion and sediment control means that the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect has received four (4) hours of NYSDEC endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other NYSDEC endorsed entity. After receiving the initial training, the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect shall receive four (4) hours of training every three (3) years. This term can also mean a person that meets the Qualified Professional qualifications in addition to the Qualified Inspector qualifications.

Note: Inspections of any post-construction stormwater management practices that include structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.

Qualified Professional: A person who is knowledgeable in the principles and practices of stormwater management and treatment such as a licensed professional engineer or a registered landscape architect or other NYSDEC endorsed individual(s).

Individuals preparing SWPPPs that require the post-construction stormwater management practice component must have an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics. All components of the SWPPP that involve the practice of engineering, as defined by Article 145 of the NYS Education Law, shall be prepared by, or under the direct supervision of, a professional engineer licensed to practice in the State of New York.

Reuse System: A system designed primarily to store or detain stormwater for onsite uses.

Retention: The process of holding or retaining runoff close to the source for infiltration, evapotranspiration, or reuse.

Retention System: A system designed to capture an accumulation of stormwater runoff on site through infiltration, evapotranspiration, storage for reuse, or some combination of these.

Roadway Maintenance: Work in the right of way (ROW) including milling and filling of existing asphalt pavements ("milling and

[1] The 2018 NYS 303(d) list and Appendix I (Impaired Water Segments And Pollutants Of Concern) of the pending renewal of the MS4 Permit have replaced reference to "pathogens" with "fecal coliform" and reference to "floatables" with "garbage and refuse;" see also Table 2.4 of this manual.

paving"), replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six inches of subbase material; or long-term use of equipment storage areas at or near highway maintenance facilities.

Routine Maintenance Activity: A maintenance activity, including, but not limited to:

- Re-grading of gravel roads or parking lots
- Stream bank restoration projects (does not include the placement of spoil material);
- Cleaning and shaping of existing roadside ditches and culverts that maintains the approximate original line and grade, and hydraulic capacity of the ditch;
- Cleaning and shaping of existing roadside ditches that does not maintain the approximate original grade, hydraulic capacity and purpose of the ditch if the changes to the line and grade, hydraulic capacity or purpose of the ditch are installed to improve water quality and quantity controls (e.g. installing grass lined ditch);
- Placement of aggregate shoulder backing that makes the transition between the road shoulder and the ditch or embankment;
- Removal of sediment from the edge of the highway to restore a previously existing sheet-flow drainage connection from the highway surface to the highway ditch or embankment; and
- Replacement of curbs, gutters, sidewalks, and guide rail posts; and
- Repairs made to SMPs to restore them to former condition or to operating order.

Runoff: Overland stormwater flow that is not absorbed into the ground.

Runoff Coefficient: The fraction of total rainfall (volume or rate) that appears as total runoff (volume or rate) for a given type of land cover.

Separate Stormwater Outfall: A point where stormwater from a storm sewer or other source of concentrated stormwater flow, owned or operated by the city of New York, is discharged into a water of the state or to a separate storm sewer system that requires coverage under the NYSDEC MS4 general permit.

Sewer: A pipe or conduit for carrying sewage and/or stormwater. Except where otherwise specified or where the context clearly dictates otherwise, the term "sewer" must refer to a public sewer.

Sewer Certification: A house connection proposal application or site connection proposal application to certify the adequacy of the existing abutting sewer to receive site storm and sanitary discharge from a development.

Sewer Connection: That part of a sanitary, stormwater, or combined sewer disposal pipe, which extends from the property line to an existing City sewer, a Private sewer, a Private drain, or an approved outlet under the jurisdiction of the DEP.

Site: The area that is being developed.

Site Connection Proposal (SCP): A plan showing proposed Sewer connection(s) from existing or proposed developments other than a House Connection Proposal.

Site Connection Proposal (SCP) Certification: The Department's acceptance of a Site Connection Proposal.

Slope: Land gradient described as the vertical rise divided by the horizontal run expressed in percent.

Storm Sewer: A sewer, which conveys only stormwater.

Stormwater or Stormwater Runoff: The excess water running off the surface of a drainage area during, and immediately following, a period of precipitation. For the purposes of the stormwater construction permit, precipitation includes rain events or snowmelt.

Stormwater Construction Permit: A permit issued by the department authorizing development activity on land on which

there is a covered development project with an approved SWPPP.

Stormwater Maintenance Permit: A permit issued by the department where maintenance is required of post-construction stormwater management practices by owners of real property benefited by such facilities.

Stormwater Management Practice (SMP): Measure to prevent flood damage or to prevent or reduce point source or nonpoint source pollution inputs to stormwater runoff and water bodies. Such term includes ESC, post-construction SMPs, and practices to manage stormwater runoff from industrial activities.

Stormwater Permitting and Tracking System (SWPTS): The Department's online system for submitting applications for a Stormwater Construction Permit or for checking the status of an existing application.

Stormwater Pollution Prevention Plan (SWPPP): (i) when used in connection with a covered development project, a plan for controlling stormwater runoff and pollutants during construction and, where required by these rules, after construction is completed, or (ii) when used in connection with an industrial stormwater source, a plan, which is required by the MSGP, for controlling stormwater runoff and pollutants.

Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form: The form used to indicate acceptance of a SWPPP by the Department.

Stormwater Pollution Prevention Plan (SWPPP) Approval: The Department's initial approval of the application for a Stormwater Construction Permit

Stormwater Release Rate: The rate at which stormwater is released from a site, calculated in terms of cubic feet per second (cfs)

Subsurface Loaded Practices: Practices designed to have stormwater enter the facility below-grade.

Surface Loaded Practices: Practices designed to have stormwater enter the facility through the surface.

Surface Waters of the State or Waters of the State: Lakes, bays, sounds, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic ocean within the territorial seas of the state of New York and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction.

Temporary Shutdown: The suspension of development activity at a site with an approved stormwater construction permit.

Time of Concentration (Tc): The time for runoff to travel from the hydraulically most distant point of the drainage area to the watershed outlet or study point.

Trained Contractor: An employee of a contracting (construction) company, who has received four hours of NYSDEC-endorsed training in proper erosion and sediment control principles from a soil and water conservation district, or other NYSDEC-endorsed entity. After receiving the initial training, the trained contractor must receive four hours of training every three years. The term can also mean an employee of a contracting (construction) company who meets the qualifications required to be a qualified inspector. The trained contractor is responsible for the day-to-day implementation of the SWPPP during development activities.

Tributary Drainage Area: The amount of surface area that drains to a practice or point of study.

Weighted Runoff Coefficient: The fraction of total rainfall (volume or rate) that appears as total runoff (volume or rate) for a drainage area, calculated as an area-based, weighted average of the runoff coefficients for the various types of land cover present in the drainage area.

1. INTRODUCTION

The New York City Department of Environmental Protection (DEP) is charged with preserving and enriching the environment and safeguarding public health for all New Yorkers. Stormwater management is a critical element of DEP's work, and with the promulgation of a Unified Stormwater Rule and release of this NYC Stormwater Manual (SWM), NYC is entering a new era of stormwater management. The Unified Stormwater Rule updates and aligns water quantity requirements in the city's combined sewer drainage areas with water quality requirements in separately sewered drainage areas, providing a comprehensive, citywide stormwater management policy for public and private development. This NYC Stormwater Manual (SWM) provides technical guidance for developers, designers, and engineers who will work with DEP on stormwater permitting.

The Unified Stormwater Rule and the technical guidance within this Manual emphasize a retention-first, green infrastructure approach to stormwater management practice selection and design, applying lessons learned during ten years of implementing the NYC Green Infrastructure Program, through which DEP and partners have constructed over 11,000 distributed green infrastructure practices across the city.

Green infrastructure practices, also known as and referred to throughout this manual as *stormwater management practices (SMPs),* are designed to protect, restore, or mimic the natural water cycle within built environments by retaining, detaining, and/or treating stormwater runoff. SMPs generally include practices such as rain gardens, green or blue roofs, porous pavements, subsurface stormwater storage systems, and stormwater reuse systems. These practices are an important and demonstrably effective tools for stormwater management in NYC, allowing stormwater to be managed where it falls and reducing, filtering and/or slowing the amount of stormwater entering the City's sewer system.

In NYC, SMPs are reducing Combined Sewer Overflows (CSOs), decreasing the amount of polluted stormwater runoff entering waterbodies, and increasing capacity within City infrastructure. When coupled with vegetation or other siting goals, SMPs provide benefits beyond stormwater management: increased urban greening, reduced urban heat island, minimized urban flooding, and improved habitats for birds and pollinators.

The Unified Stormwater Rule brings together two DEP stormwater regulation programs: Site/House Connection Proposal Certification and Stormwater Construction/Stormwater Maintenance Permitting ("Stormwater Permitting"). This unification allows applicants and designers to approach projects with a clear understanding of the individual permit objectives and the technical requirements for compliance. It also, for the first time, creates a consolidated technical approach for applicants that seek to implement SMPs to meet both application objectives.

This NYC SWM provides the technical guidance necessary for compliance with the Unified Stormwater Rule, providing the core benefits summarized below:

- Consistent approach to water quality and sewer operation objectives across combined sewer system (CSS) and Municipal Separate Stormwater Sewer System (MS4) areas;
- A retention-first SMP hierarchy that requires a feasibility assessment of implementation of retention-based practices to reduce the amount of stormwater entering City sewers and to maximize SMP benefits;
- Increased on-site detention requirements to reduce loading rates on City sewers; and
- Prioritization of green, vegetated SMPs to provide co-benefits to NYC residents and to align with the sustainable roofing requirements of the Climate Mobilization Act of 2019.

This chapter provides more information on NYC's stormwater management regulatory framework, the purpose and scope of this Manual, and an overview of the other chapters and technical guidance included.

1.1. Background

Like other ultra-urban cities, NYC is faced with increasing challenges from managing stormwater runoff from impervious surfaces. Unmanaged stormwater runoff overburdens the City's sewer system and wastewater resource recovery facilities, contributes to CSOs and increases pollutant loads into receiving waterbodies. Development offers an opportunity to improve on-site stormwater management on properties that were developed at a time when stormwater management best practices were not well-understood or widely implemented and current stormwater management regulations were not yet in place.

The NYC Charter gives DEP authority over and responsibility for the city's drainage plan and stormwater management. Through DEP approval of sewer certifications (approval that the city sewer can accept the development's proposed discharge) and subsequent sewer connection permits (authorization to connect to a sewer), DEP limits the flow from developed lots to ensure adequate capacity in the sewer system. NYC's 2012 house/site connection stormwater rule had the goal of reducing the adverse impacts on City sewers from runoff during rainstorms more severe than combined sewers are designed to handle. Sewer overflows, floods, and sewer backups can occur when excessive stormwater from impervious surfaces enters the sewer system too quickly.

The 2012 rule set forth a new performance standard, which applied to development in combined sewer areas of the City, allowing the City to more effectively manage stormwater runoff by prescribing standards for the permitting, construction and inspection of sewer connections to the City's combined sewer system. The revised performance standard provided a mechanism to reduce peak discharges to the city's sewer system during rain events by requiring greater on-site storage of stormwater runoff and slower release to the sewer system.

DEP, pursuant to the MS4 permit the NYS Department of Environmental Conservation (NYSDEC) issued to the City in 2015, is also responsible for administering a construction/post-construction program equivalent to the state's NYS SPDES General Permit for Stormwater Discharges from Construction Activity. Through approval of Stormwater Construction and Stormwater Maintenance permits, including approval of Stormwater Pollution Prevention Plans (SWPPPs) for all applicable construction projects, DEP requires owners and developers to implement measures in the MS4 areas of the City to reduce pollution in stormwater runoff from developments with the goal of protecting and improving water quality in the City's waterbodies.

NYC's 2017 stormwater rule required stormwater management controls for construction projects to reduce the flow of stormwater runoff and water borne pollutants into sewers that empty directly into the waters of the state or that overflow into such waters because of rain or snowmelt events that exceed the design capacity of wastewater resource recovery facilities. The revisions to that rule incorporated in the Unified Stormwater Rule will extend citywide DEP's permitting, inspection, and enforcement program, including requirements for construction and post-construction stormwater controls and standards for such controls.

Specifically, the Unified Stormwater Rule brings together and updates these existing stormwater management requirements by:

- Increasing on-site stormwater detention requirements and updating release rate requirements for CSS and establishing new release rate requirements for MS4 areas for Sewer Certification and Sewer Connection Permitting;
- Expanding the Stormwater Permitting requirements citywide to include CSS areas; reducing the soil disturbance threshold from 1 acre to 20,000 square feet; adding the creation of 5,000 square feet of impervious area as an additional trigger; and including covered maintenance activities as a trigger;
- Requiring a retention-first approach to SMP design for Stormwater Permitting requirements; and
- Providing a clear technical path for using SMPs constructed under Stormwater Permitting requirements to satisfy requirements for SMPs under Sewer Certification and Sewer Connection Permitting.

Users of this manual are encouraged to review Chapters 31 and 19.1 of Title 15 of the Rules of the City of New York for the requirements of the Unified Stormwater Rule.

1.2. Manual Purpose and Scope

The NYC SWM provides a comprehensive overview of NYC stormwater management requirements, and design guidance for developers of and design professionals on projects that must comply with the requirements of the DEP Sewer Certification/Sewer Connection Permitting and Stormwater Permitting. The intent of the SWM is to provide a clear and consolidated approach for meeting stormwater management requirements that, when followed, results in successful and streamlined project implementation. The SWM replaces the Guidelines for the Design and Construction of Stormwater Management Systems (2012), the Criteria for Detention Facility Design (2012), and the NYC Stormwater Design Manual (2018).

In addition, this SWM provides the information needed to complete and submit applications for Stormwater Permits in NYC. Application guidance and materials for Sewer Certification and Sewer Connection Permitting are not a part of this manual and are available on DEP's website https://www1.nyc.gov/site/dep/about/sewer-connections.page.

Table 1.1 Chapters in this SWM and the purpose of each.

Chapter	Purpose
Chapter 1 Introduction	Provides an overview of the NYC Stormwater Manual and the Sewer Certification/Sewer Connection Permitting and Stormwater Permitting Programs.
Chapter 2 Stormwater Management Requirements	Details NYC stormwater management requirements and how to determine applicability.
Chapter 3 City Development & Review Process	Provides an overview of the review process for projects that trigger either Sewer Certification/Sewer Connection Permitting or Stormwater Permitting or both and step-by-step instructions for submitting projects that trigger Stormwater Permitting Program.
Chapter 4 Stormwater Management Practice (SMP) Selection & Design	Defines SMP types and functionalities and provides guidance on how to select and design an appropriate SMP.
Chapter 5 Post-Construction Stormwater Management Requirements	Provides SMP operation and maintenance procedures and requirements for Stormwater Maintenance Permits.
Chapter 6 Right-of-Way Stormwater Management Requirements	Provides guidance for right-of-way covered development projects that trigger Stormwater Construction Permits.
Appendix A Stormwater Management Practice Hierarchy Checklist	Lists SMPs by implementation tier, function type, and practice type and indicates which constraints would impact SMP feasibility. Also indicates which SMPs can be used toward sewer operations criteria.
Appendix B Nitrogen No-Net-Increase Calculator Guide	Provides an example for NYC MS4 No-Net Increase Calculator for Nitrogen.
Appendix C Stormwater Management Practice Siting Criteria	Provides SMP siting criteria for on-site projects.
Appendix D Stormwater Management Practice Sizing Examples	Provides example SMP sizing calculations for each practice function.
Appendix E Site Design Example	Provides an example design for an entire site.
Appendix F Controlled-Flow Pump Workbook	An Excel-based workbook, which includes a template for controlled-flow pump calculations and a design example.
Appendix G Detention in Series Workbook and Examples	An Excel-based workbook available to assist designers with detention in series calculations.
Appendix H Right-of-Way Guidance Materials	Supplemental guidance materials referenced in Chapter 6.

2. STORMWATER MANAGEMENT REQUIREMENTS

The Unified Stormwater Rule links and enhances two previously unconnected rules. The first rule aims to improve water quality through a Stormwater Construction Permitting program. The second rule aims to manage flow rates in City sewers through a Site/House Connection Proposal Certification program. Together, these rules and permits make up the Unified Stormwater Rule, as further described in this Manual. Between the two rules, there are a total of five stormwater management requirements that may apply to projects in NYC. In addition to bringing these requirements under one umbrella, the Rule updates several requirements to help meet the City's stormwater management goals.

This chapter will cover the applicability of each permit (Section 2.1), the applicability of requirements within those permits (Section 2.2), the criteria for meeting each requirement (Section 2.3), and the requirements for geotechnical investigations (Section 2.4).

2.1. Permit Applicability

Stormwater Construction Permit

In accordance with Chapter 19.1 of Title 15 of the Rules of the City of New York, the Stormwater Construction Permit applies to all covered development projects. A covered development project is any development in New York City, public or private, that meets one or more of the following criteria:

- Disturbs 20,000 sf or more of soil; OR
- Creates 5,000 sf or more new impervious area OR
- Is a covered maintenance activity

Covered maintenance activities apply only to Right-of-Way projects. For discussion of Right-of-Way projects, refer to Chapter 6.

There are several types of activities that are not considered covered development projects per Chapter 19.1 of Title 15 of the Rules of the City of New York. Examples of projects not considered covered development projects are listed below, but readers should refer to the rules noted above for the most up-to-date list of exclusions and definitions:

- Routine maintenance activities.
- Emergency activities that are immediately necessary for the protection of life, property, or natural resources.

Soil Disturbance

Disturbed area is the area of soil disturbed by development activities, such as building, demolition, renovation, replacement, restoration, rehabilitation, or alteration of any structure or road; or land clearing, land grading, excavation, filling or stockpiling.

Activities that do not disturb soils, such as interior renovations, and surface markings of paved areas, are not considered in the estimation of disturbed areas.

There are two important clarifications to consider when determining the disturbed area. First, all soil disturbances, even those outside the bounds of the developed property, are counted as part of the disturbed area. Second, if an individual project disturbs less than the soil disturbance threshold but is part of a larger common plan of phased development or sale that will exceed the soil disturbance threshold, the individual project is also considered a covered development project.

Impervious Area

An **impervious surface** is any surface that cannot effectively infiltrate rainfall: generally, impervious hardscapes such as rooftops, pavements, sidewalks, and driveways. Impervious surfaces can also include miscellaneous structures such as patios, pools, and sheds. In addition, pervious hardscapes such as gravel roadways, parking lots, driveways, and sidewalks are also considered impervious surfaces unless a geotechnical investigation indicates that the permeability rate of underlying soils is sufficient for reducing runoff. More specifically, underlying soils must have a permeability rate of at least 0.5 in/hr.

An increase (or decrease) in impervious area is calculated as the difference in total impervious area from pre-to-post development. The pre-development case must represent the least amount of impervious surface for the disturbed area within the last 5 years prior to proposed development. When possible, photos, plans, and/or satellite images should be used to determine the appropriate pre-development impervious area.

House/Site Connection Proposals

In general, house or site connection proposals are required when one or more of the following are true:

- Project proposes a new sewer connection
- DOB requires a house or site connection proposal
- Applicant agency's process requires a house or site connection proposal

Readers are encouraged to refer to Chapter 31 of Title 15 of RCNY for the latest details on when house and site connection proposals are required.

For projects that require a house or site connection proposal, the house connection proposal (HCP) shall be used for 1-3 family (fee simple) residential homes that do not meet the definition of covered development project. All other projects shall use a site connection proposal (SCP).

Before proceeding to the specific requirements of each permit, it is worth noting that the criteria set forth in the Unified Stormwater Rule supersede the 2012 NYC Stormwater Rule and the 2012 NYC BWSO Criteria for Detention Facility Design.

In all other cases, the Unified Stormwater Rule does not obviate the need for compliance with any existing city, state, or federal permit that may be otherwise required for the covered development project. The owner is responsible for identifying and complying with all other rules applicable to that development activity, including, but not limited to, any applicable NYC DOB construction code regulations.

2.2. Permit Requirements

For projects that require a Stormwater Construction Permit, a stormwater pollution prevention plan (SWPPP) must be prepared that meets up to four stormwater management requirements:

- **Erosion and sediment control (ES)** – aims to minimize the discharge of pollutants during construction activities.
- **Water quality (WQ)** – aims to manage runoff from small, frequent storm events that can significantly impact the quality of receiving waters in both MS4 and CSS areas.
- **Runoff reduction (RR)** – aims to maintain a minimum level of runoff reduction during small storms to preserve natural hydrologic functions.
- **No net increase (NNI)** – aims to reduce pollutants of concern in MS4 areas that discharge to an impaired waterbody.

For projects that require a House/Site Connection Proposal, the proposal must meet the following stormwater management requirement:

- **Sewer operations (Vv)** – aims to manage runoff from larger storm events to maintain optimal flow rates in the City's sewer system and, in turn, improve overall sewer operations.

The applicability of each stormwater management requirement is shown in Table 2.1; such applicability is based on several factors including soil disturbance area, new impervious area, activity type, sewershed type, receiving water body, and whether a house or site connection proposal is required. A brief description of how to determine the applicability of each requirement is provided in the following paragraphs.

Table 2.1 Applicability criteria for each stormwater management requirement.

SMR	Applicable Projects
Erosion & Sediment Control (ESC)	Covered development project
Water Quality (WQ)	Covered development project Except for activities listed in Table 2.2
Runoff Reduction (RR)	Covered development project Except for activities listed in Table 2.2
No-net Increase (NNI)	Project area of 20,000 sf or more AND Project located in MS4 area AND Discharges to an impaired water body AND Increases impervious area
Sewer Operations (Vv)	Project requires a house connection proposal OR Project requires a site connection proposal

The ESC requirement applies to all covered development projects. The WQ and RR requirements apply to all covered development projects that are not listed in Table 2.2. While not exhaustive, a list of typical development projects that require WQ and RR requirements is included in Table 2.3.

In the case of highly complex projects, such as those with irregular site conditions, significant drainage areas, complex drainage systems, or complex SMPs, additional

criteria or submittals not described in this Manual may be required at the discretion of DEP.

Table 2.2. Covered development projects that require the preparation of a SWPPP that includes only erosion and sediment control (ESC) requirements.

Covered Development Activity
Installation of underground, linear utilities such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains
Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects
Pond construction
Linear bike paths running through areas with vegetative cover, including bike paths surfaced with an impervious cover
Cross-country ski trails and walking/hiking trails
Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are not part of residential, commercial or institutional development;
Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that include incidental shoulder or curb work along an existing highway to support construction of the sidewalk, bike path or walking path.
Slope stabilization projects
Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics
Spoil areas that will be covered with vegetation
Vegetated open space projects (i.e. recreational parks, lawns, meadows, fields, downhill ski trails) excluding projects that alter hydrology from pre- to post-development conditions,
Athletic fields (natural grass) that do not include the construction or reconstruction of impervious area and do not alter hydrology from pre to post development conditions
Demolition project where vegetation will be established, and no redevelopment is planned
Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with impervious cover
Temporary access roads, median crossovers, detour roads, lanes, or other temporary impervious areas that will be restored to pre-construction conditions once the construction activity is complete
Road reconstruction projects where the total soil disturbance from all activities is less than 1-acre

Table 2.3. Covered development projects that require the preparation of a SWPPP that includes ESC requirements, as well as WQ and RR requirements.

Covered Development Activity
Single family home directly discharging to one of the impaired segments listed in Appendix 2 of the MS4 Permit
Single family home that disturbs five (5) or more acres of land
Single family residential subdivisions directly discharging to one of the impaired segments listed in Appendix 2 of the MS4 Permit
Single family residential subdivisions Multi-family residential developments; includes duplexes, townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
Airports
Amusement parks
Breweries, cideries, and wineries, including establishments constructed on agricultural land
Cemeteries that include the construction or reconstruction of impervious area (>5% of disturbed area) or alter the hydrology from pre to post development conditions
Commercial developments
Churches and other places of worship
Golf courses
Institutional development; includes hospitals, prisons, schools and colleges
Industrial facilities; includes industrial parks
Landfills
Municipal facilities; includes highway garages, transfer stations, office buildings, POTW's, water treatment plants, and water storage tanks
Office complexes
Playgrounds that include the construction or reconstruction of impervious area
Sports complexes
Racetracks; includes racetracks with earthen (dirt) surface
Road construction, including roads constructed as part of the covered development projects listed in Table 2.2
Road reconstruction, except as indicated in Table 2.2 when the total soil disturbance from all activities is less than 1-acre
Parking lot construction or reconstruction, including parking lots constructed as part of the covered development projects listed in Table 2.2
Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or alter the hydrology from pre to post development conditions
Athletic fields with artificial turf
Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with impervious cover, and constructed as part of an over-head electric transmission line project, wind-power project, cell tower project, oil or gas well drilling project, sewer or water main project or other linear utility project
Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a residential, commercial or institutional development
Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a highway construction or reconstruction project
All other covered development projects that include the construction or reconstruction of impervious area or alter the hydrology from pre to post development conditions, and are not listed in Table 2.2

The NNI requirement is applicable only when all four of the following conditions are met:

- Disturbed area is 20,000 sf or more[2]
- Project is located in an MS4 area
- Project discharges to an impaired waterbody, and
- Project results in an increase in impervious area.

A project is **located in the MS4 area** if stormwater drains from the project to surface waters through a separate storm sewer, high-level storm sewer, or bluebelt owned or operated by the City that is connected to either an MS4 outfall or combined sewer overflow (CSO) outfall downstream of a regulator. Projects involving NYC municipal operations and facilities where stormwater drains from the project directly to surface waters are also considered to be in the NYC MS4 area. Non-municipal projects that drain directly to surface waters follow separate guidance from NYSDEC (see https://www.dec.ny.gov/chemical/43133.html).

The MS4 Interactive Map (www.nyc.gov/dep/ms4map) is available to assist applicants in locating outfalls and drainage areas that are part of the NYC MS4 area. Applicants should recognize that all projects that require house/site connection proposal approval for connection to a DEP storm sewer are likely located in the MS4 area. The interface of the MS4 Interactive Map is shown in Figure 2.1 for illustrative purposes. However, readers should refer to the website for the latest maps and to help determine the sewershed status of their project.

An **impaired waterbody** is one that does not meet water quality standards for its intended use in accordance with the Clean Water Act. Impairments can be due to several pollutants of concern (POCs), including fecal coliform, garbage and refuse, phosphorus, and nitrogen. Impaired waterbodies in and around NYC are identified in Appendix I of the NYC MS4 Permit, which is provided in Table 2.4 for ease of reference.

The MS4 Interactive Map can also be used to help determine whether a project ultimately discharges to an impaired waterbody. By selecting the MS4 area associated with a project, the map brings up a table of additional details that include the name of the receiving waterbody, as well as a "yes or no" indication about whether the waterbody is impaired by each POC (Figure 2.2).

Increases in impervious area are determined by comparing the total area of impervious surfaces for the project from pre- to post-development. The pre-development case must represent the least amount of impervious surface for the disturbed area within the last 5 years prior to proposed development. Section 2.1 includes definitions of impervious surfaces and suggested resources for selecting the appropriate pre-development case.

The sewer operations requirement is applicable to all projects that require a house or site connection proposal, as described in Section 2.1.

[2] Except in ROW, where threshold is 1 acre or more. See Chapter 6 of this Manual.

2-6

Figure 2.1. Interface of the MS4 Interactive Map for NYC.

2-7

Figure 2.2. Using the MS4 Interactive Map to identify impaired waterbodies in and around NYC.

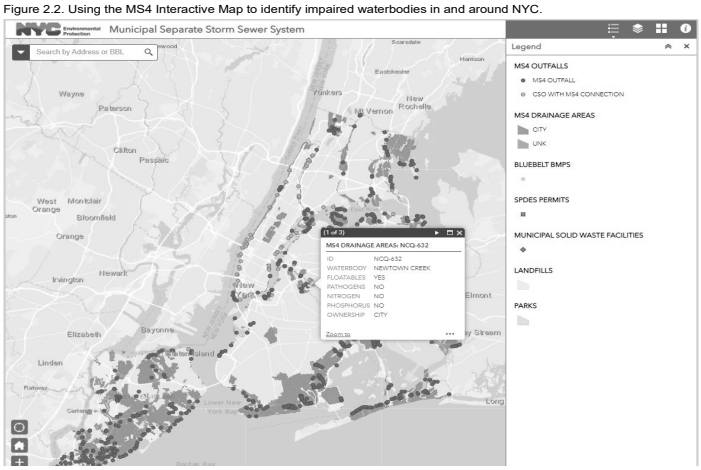

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Table 2.4. Impaired Water Segments and Pollutants of Concern in and Around NYC (Source: Final 2018 NYS 303(d) list, which is the basis for Appendix I of the pending renewal of the NYC MS4 Permit)

Waterbody Name	Waterbody Identification Number (WIN)	Pollutant
Alley Creek/little Neck Bay Trib	(MW2.5) ER/LIS-LNB-19 thru 20	Fecal Coliform
Arthur Kill (Class I) and minor tribs	(MW1.2) SI (portion 1)	Garbage & Refuse
Arthur Kill (Class SD) and minor tribs	(MW1.2) SI (portion 2)	Garbage & Refuse
Atlantic Ocean Coastline	(MWO.O) AO (portion 1)	Fecal Coliform
Bergen Basin	(MW8.5a) JB-247	Fecal Coliform
Bergen Basin	(MW8.5a) JB-247	Nitrogen
Bergen Basin	(MW8.5a) JB-247	Garbage & Refuse
Bronx River, Lower	(MW2.4) ER-3	Fecal Coliform
Bronx River, Lower	(MW2.4) ER-3	Garbage & Refuse
Bronx River, Middle, and tribs	(MW2.4) ER-3	Fecal Coliform
Bronx River, Middle, and tribs	(MW2.4) ER-3	Garbage & Refuse
Coney Island Creek	(MW1.1) LB/GB-253	Fecal Coliform
Coney Island Creek	(MW1.1) LB/GB-253	Garbage & Refuse
East River, Lower	(MW2.1) ER (portion 1)	Garbage & Refuse
East River, Upper	(MW2.3) ER (portion 2)	Garbage & Refuse
East River, Upper	(MW2.3) ER (portion 3)	Garbage & Refuse
Flushing Creek/Bay	(MW2.5) ER-LI-12	Fecal Coliform
Flushing Creek/Bay	(MW2.5) ER-LI-12	Garbage & Refuse
Gowanus Canal	(MW1.3) UB-EB- 1	Garbage & Refuse
Grasmere Lake/Brady's Pond	(MW1.2) SI.P1039,P1051,P1053	Phosphorus
Harlem Meer	(MW2.2) ER..P1036	Phosphorus
Harlem River	(MW2.3) ER-1	Garbage & Refuse
Hendrix Creek	(MW8.6) JB-249a	Fecal Coliform
Hendrix Creek	(MW8.6) JB-249a	Nitrogen
Hendrix Creek	(MW8.6) JB-249a	Garbage & Refuse
Hutchinson River, Lower, and tribs	(MW3.2) LIS- 2	Garbage and Refuse
Jamaica Bay, Eastern, and tribs (Queens)	(MW8.5b) JB	Fecal Coliform
Jamaica Bay, Eastern, and tribs (Queens)	(MW8.5b) JB	Nitrogen
Jamaica Bay, Eastern, and tribs (Queens)	(MW8.5b) JB	Garbage & Refuse
Kill Van Kull	(MW1.2) SI (portion 4)	Garbage & Refuse
Kissena Lake	(MW2.5) ER-LI-12-P76	Phosphorus
Little Neck Bay	(MW2.5) ER/LIS-LNB	Fecal Coliform
Meadow Lake	(MW2.5) ER-LI-12-100a	Phosphorus
Mill Basin and tidal tribs	(MW8.6a) JB-250b	Garbage & Refuse
Newark Bay	(MW1.2) SI (portion 3)	Garbage & Refuse
Newtown Creek and tidal tribs	(MW2.1) ER- LI- 4	Fecal Coliform
Newtown Creek and tidal tribs	(MW2.1) ER- LI- 4	Garbage & Refuse
Paerdegat Basin	(MW8.6a) JB-250a	Garbage & Refuse
Prospect Park Lake	(MW8.6a) JB-P0009	Phosphorus
Raritan Bay (Class SA)	(MW1.2) RB (portion 1)	Fecal Coliform
Shellbank Basin	(MW8.5a) JB-248a	Nitrogen
Spring Creek and tribs	(MW8.5a) JB-249	Garage & Refuse
The Lake in Central Park	(MW2.2) ER .P1029	Phosphorus
Thurston Basin	(MW8.5a) JB-241a	Fecal Coliform
Thurston Basin	(MW8.5a) JB-241a	Garbage & Refuse
Van Cortlandt Lake	(MW2.3) ER-1-5-P1043	Phosphorus
Westchester Creek	(MW2.4) ER-4	Garbage & Refuse
Willow Lake	(MW2.5) ER-LI-12-100f	Phosphorus

2-9

A three-step flowchart was created to further assist readers in determining which requirements and procedures are applicable to their projects (Figure 2.3). Each step is described further in the following paragraphs.

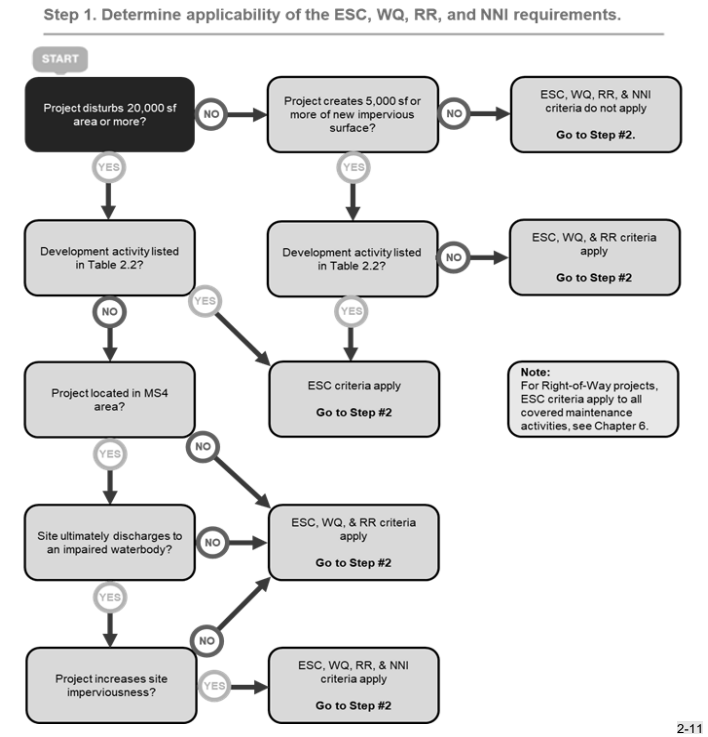
Step 1 of the flowchart asks a series of questions to help determine the applicability of the ESC, WQ, RR and NNI requirements.

Step 2 of the flowchart asks a series of questions to help determine the applicability of the sewer operations criteria. Readers are again encouraged to refer to Chapter 31 of Title 15 of RCNY for the latest details on when HCP and SCP are required.

Finally, step 3 of the flowchart shows readers where they can find details on the requirement criteria, submittal process, and design criteria for each applicable stormwater management requirement.

2-10

Figure 2.3. Flowchart to help determine applicable stormwater management requirements and procedures.



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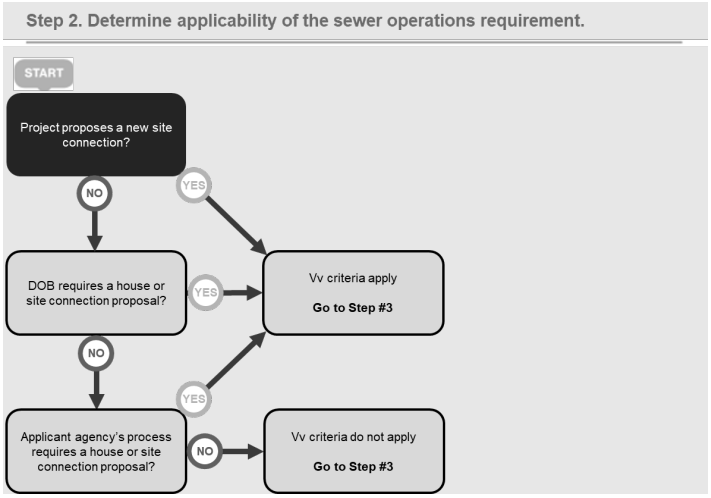

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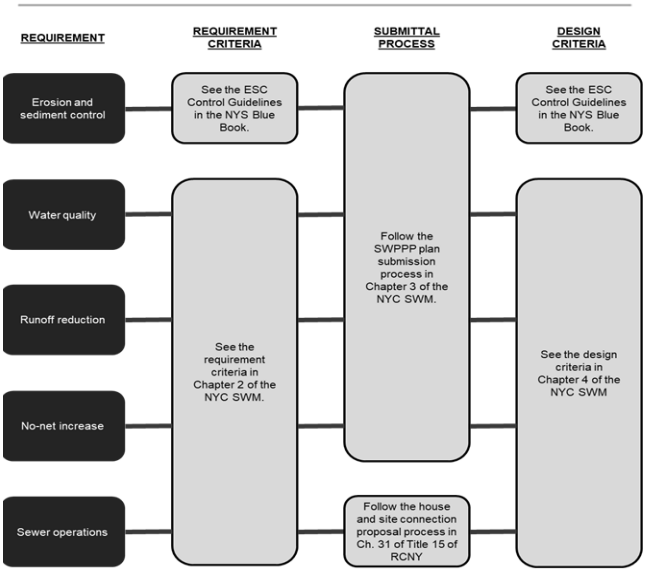


2-13

2.3. Requirement Criteria

This subsection outlines the specific criteria that must be met for each stormwater management requirement applicable to a project.

Erosion and sediment criteria

Erosion and sediment control (ESC) refers to stormwater management practices (SMPs) that are designed to minimize the discharge of pollutants during construction activities.

ESC measures can include, but are not limited to, structural controls (e.g., sediment barriers), intentional sequencing of construction to minimize exposed soils, soil stabilization measures, dewatering control measures, and other pollution prevention and good housekeeping (PPGH) measures that are appropriate for construction sites.

All covered development projects must implement ESC measures in accordance with the NYS Standards and Specifications for Erosion and Sediment Control (The Blue Book), dated November 2016 (https://www.dec.ny.gov/chemical/29066.html).

Water quality criteria

The water quality (WQ) requirement aims to manage runoff from small, frequent storm events that can significantly impact the quality of receiving waters in both MS4 and CSS areas.

In MS4 areas, runoff from these events tends to contain higher pollutant levels. Therefore, retention and treatment of small storm runoff in MS4 areas help to remove those pollutants and, in turn, improve WQ.

In CSS areas, these events trigger the majority of CSO events. Therefore, retention and detention of small storm runoff in CSS areas helps to reduce CSOs and, in turn, improves water quality.

The WQ criterion is met by managing runoff from the applicable small storm design event. NYS DEC defines this design event as the 90th percentile rain event. In New York City, the 90th percentile rain event is 1.5 inches of rainfall (Figure 4.1 of the NYS SWMDM).

The volume of runoff from the 90th percentile rain event, which must be managed by SMPs, is also referred to as the water quality volume (WQ_V). The following equation can be used to calculate the WQ_V:

EQ2.1:

$$WQ_V = \frac{1.5"}{12} * A * R_V$$

where:
WQ_V: water quality volume (cf)
A: contributing area (sf)
R_V: runoff coefficient relating total rainfall and runoff
R_V: 0.05 + 0.009(I),
I: percent impervious cover

The SWPPP must show how the WQv is managed at the practice and site levels. This requirement means that the contributing area, runoff coefficient, and WQv must be determined for each individual practice – and that, in total, the practices must manage the WQv across the entire site. It is also important to note that the contributing area includes all tributary areas, even those which may be outside the covered development project area.

SMPs used to meet WQv must be selected in accordance with the SMP hierarchy (Section 4.2). Refer to Chapter 4 for details on the sizing and design of SMPs.

Runoff reduction criteria

The runoff reduction (RR) requirement aims to maintain a minimum level of RR during small storms in order to preserve natural hydrologic functions. Runoff is considered reduced when it is retained by SMPs for infiltration, evapotranspiration, or reuse. Ideally the entire WQv will be reduced by SMPs when the SMP hierarchy is followed (Section 4.2), however if site constraints are such that reducing the entire WQv is not possible, the application must demonstrate that the minimum RRv has been met.

In no case shall the runoff reduction volume (RRv) of SMPs be less than the minimum RRv resulting from the newly constructed impervious areas, determined by the following equation:

EQ2.2:

$$RR_V = \frac{1.5"}{12} * 0.95 * Aic * S$$

where:

2-14

Aic: total area of new impervious cover (sf)
S: specific reduction factor, see Table 2.5

Sites that meet the WQv using only retention practices will, by default, also meet the RR criteria. All other cases must check that the RR criterion is met.

The specific reduction factor used to calculate RRv will depend on the hydrologic soil group (HSG) of soils underlying the project site, as defined in Part 630 of the National Engineering Handbook (NRCS 2007). As indicated in the handbook, there are four HSG categories based on saturated hydraulic conductivity, depth to water impermeable layer, and/or depth to high water table. Designers may classify soils based on results of the geotechnical investigation or refer to the NRCS web soil survey for data on HSGs by location.

Changes in the specific reduction factor for each HSG reflect differences in the underlying soils' ability to infiltrate water. Refer to table 2.5 for specific reduction factor values by category.

Table 2.5. Specific reduction factors based on hydrologic soil group (HSG).

S	Description
0.55	HSG-A
0.40	HSG-B
0.30	HSG-C
0.20	HSG-D

The total area of new impervious cover (Aic) is determined by comparing the total area of impervious surfaces for the project from pre-to-post development. The pre-development case must represent the least amount of impervious surface for the covered development project within the last 5 years prior to proposed development. Section 2.1 includes definitions of impervious surfaces and suggested resources for selecting the appropriate pre-development case.

In most cases, using the SMP hierarchy (Section 4.2) to meet the WQ requirement, will also result in the project meeting the RR requirement. Refer to Chapter 4 for details on the sizing and design of SMPs.

No net increase criteria

The NNI requirement aims to reduce POCs in MS4 areas that discharge to an impaired waterbody. POCs can include:

- Pathogens[3] – disease-producing agents such as bacteria, viruses, or other microorganisms
- Floatables[4] – manmade materials such as plastics, papers, or other products, which have made their way to a waterbody
- Phosphorus – a nutrient that can lead to algae blooms that deplete oxygen in the water, which can kill aquatic life
- Nitrogen – another nutrient that can lead to algae blooms that deplete oxygen in the water, which can kill aquatic life

Pathogens

Pathogens are disease-producing agents such as bacteria, viruses, or other microorganisms. Most pathogens found in stormwater runoff are from human and animal fecal matter. The presence of fecal indicator bacteria, such as fecal coliform, can provide evidence of fecal contamination and the potential presence of pathogenic organisms.

To meet the NNI requirements for pathogens, BMPs must be implemented as provided in the post-construction O&M manual to mitigate potential sources of pathogens present at the developed site. Table 2.6 lists examples of BMPs that may address pathogen sources per land use. This list is not exhaustive or prescriptive, and applicants may propose additional BMPs to mitigate site-specific pathogen sources.

Floatables

Floatables are manmade materials, such as plastics, papers, or other products that, when improperly disposed

[3] The current NYS 303(d) list and Appendix I of the pending renewal of the MS4 Permit have replaced references to "pathogens" with "fecal coliform." Fecal coliform is a pathogen-related water quality parameter; see also Table 2.4 of this manual.

[4] The current NYS 303(d) list and Appendix I of the pending renewal of the MS4 Permit have replaced reference to "floatables" with "garbage and refuse." The meanings of the terms are analogous; see also Table 2.4 of this manual.

2-15

of onto streets or into catch basins, can ultimately find their way to local waterbodies.

The NYS SWMDM contains provisions for floatables control in the design of SMPs. These provisions include pretreatment, settling or filtration, outlet controls and maintenance that will effectively capture and remove floatables and settleable trash and debris prior to discharge.

To meet the NNI requirements for floatables, refer to Chapter 4 of the NYS SWMDM to determine the required garbage and refuse removal features of post-construction SMPs.

Phosphorus
Phosphorus is a nutrient that is a natural part of aquatic ecosystems and supports the growth of algae and aquatic plants. However, excess phosphorus can cause nuisance algae blooms and aquatic weed growth, which reduces water clarity and dissolved oxygen (DO) and can harm aquatic life. Sources of phosphorus include lawn/plant fertilizer, illicit discharges of sanitary waste, pet and wildlife waste, and leaves, branches, and grass clippings.

Part II.B.1.b.ii of the NYC MS4 Permit states, "For phosphorus-limited waterbodies, compliance with Chapter 10 of the NYS SWMDM (January 2015) will satisfy the No Net Increase requirement." To meet the NNI requirements for phosphorus, refer to Chapter 10 of the NYS SWMDM to design SMPs.

Nitrogen
Nitrogen is a nutrient that occurs naturally in aquatic ecosystems but can be harmful in high concentrations. Sources of nitrogen in stormwater are the same as those described above for phosphorus.

Projects in MS4 areas that discharge to nitrogen-impaired waters must provide calculations to demonstrate NNI in total nitrogen (TN) loading from existing conditions to post-development conditions. If the project will increase the TN load, excess nitrogen must be removed through the implementation of SMPs. Procedures for completing these calculations are detailed in Appendix B.

Table 2.6. BMPs for pathogen removal by land use.

BMP	Source of Pathogen	Applicable Land Use
Install signs, distribute public education and outreach materials, and implement trainings to support pathogen reduction programs.	All	All
Inspect and clean areas where animal waste may be present (e.g., dumpsters, grease storage, waterfowl congregation areas, and dog parks).	Pets and Wildlife	All
Discourage free-range pets. Adopt rules within a development to pick up pet wastes. Offer bags and waste receptacles to make it easy for pet owners to pick up and dispose of waste products. Distribute educational materials and signage to support program.	Pets	Residential, Open Space & Outdoor Recreation, Commercial & Office Buildings (pet store, veterinarian)
Identify areas with high bird populations and evaluate deterrents, habitat modifications, and other measures.	Wildlife	Open Space & Outdoor Recreation, Residential (common areas in a development), Vacant Lots
Reduce food sources accessible to urban wildlife (e.g., manage restaurant dumpsters/grease traps and residential garbage).	Wildlife	Residential, Commercial & Office Buildings (restaurants, groceries), Public Facilities & Institutions, Industrial
Use latched or heavy-lidded trash containers to deter wildlife.	Wildlife	Open Space & Outdoor Recreation, Residential, Commercial & Office Buildings (restaurants, groceries), Public Facilities & Institutions, Industrial
Increase collections and waste disposal for private haulers.	Wildlife	Commercial & Office Buildings (restaurants, groceries)
Reduce attractive odors that may draw wildlife.	Wildlife	Residential, Commercial & Office Buildings (restaurants, groceries)
Introduce strategies to reduce food, shelter, and habitats for overpopulated urban wildlife.	Wildlife	All
Inhibit access to open water by managing vegetation growth, limit food sources-seeds, and discourage feeding wildlife, especially on impervious surfaces, near open water, or near practices that discharge directly to open waters. Provide educational materials to support program.	Wildlife	Open Space & Outdoor Recreation, Residential (common areas in a development)
Inspect and clean catch basins regularly and distribute educational materials to support program.	Wildlife	Residential, Commercial & Office Buildings, Parking
Monitor for illegal dumping into catch basins.	Human and Pet	All
Monitor illicit connections by tenants to storm sewer. Look for dry weather flows in storm sewer system.	Human	All
Minimize stormwater runoff that is directly connected to the system from impervious areas.	All	All
Clean main sewer line that connects to building, pump septic tank, or leaching pit. Pressure test or inspect sewer main or septic tank for leakage once every five years.	Human	Residential, Commercial & Office Buildings, Industrial, Public Facilities & Institutions
Locate portable toilets away from storm drains or open water.	Human	All (especially during construction and temporary public events)

Sewer operations criteria
The sewer operations volume (Vv) requirement aims to manage runoff from larger storm events in order to maintain optimal flow rates in the City's sewer system and, in turn, improve overall sewer operations. Compliance with this requirement is usually achieved by detention practices, but some retention practices may also be used as part of the Unified Stormwater Rule and as clarified by this Manual (see Chapter 4).

There are two elements to the sewer operations criteria; a volume (V_V) that must be provided to temporarily store water – and a maximum release rate (Q_{DRR}) that must be maintained via flow control systems. This volume (Vv) is consistent with the stormwater management volume in Chapter 31 of Title 15 of RCNY, but will be referred to hereafter as the sewer operations volume for clarity in the context of this Manual. The two elements (Vv and Q_{DRR}) work in tandem to manage peak flow rates from the site.

Consistent with previous Bureau of Water and Sewer Operations (BWSO) rules for the connections to the City's sewer, sites must manage the peak rate of runoff for the 10YR rainfall event. The following equation can be used to determine the sewer operations volume (Vv):

EQ2.3:

$$V_V = \frac{R_D}{12} * A * C_W$$

where:
V_V: sewer operations volume (cf)
R_D: rainfall depth (in)
A: contributing area (sf)
C_W: weighted runoff coefficient relating peak rate of rainfall and runoff

The rainfall depth (R_D) used to calculate V_V will vary based on sewershed type and connection proposal type for the project, as shown in Table 2.7. This variation in applied rainfall depth reflects the different operational goals between CSS and MS4 areas, as well as a reduction in requirements for small, residential lots that apply for HCPs. As before, the contributing area includes all tributary areas, even those which may be outside the disturbed area.

Table 2.7. Applied rainfall depth by sewershed type and connection proposal type.

R_D	Description
1.85	CSS areas with SCP
1.50	CSS areas with HCP
1.50	MS4 areas wiith SCP
1.10	MS4 areas with HCP

The runoff coefficient is based on surface type, where values for common surfaces are provided in Table 2.8.

Table 2.8. C values for various surface types.

C	Surface Description
0.95	Roof areas
0.85	Paved areas
0.70	Green roof with 4 in. growing media
0.70	Porous asphalt/Porous Concrete[a]
0.70	Synthetic turf fields[a]
0.65	Gravel parking lot
0.30	Undeveloped areas
0.20	Grass, bio-swales, or landscaped areas

[a] Using a C value of 0.7 for the indicated surface types typically requires the use of an outlet pipe, with approval at the discretion of DEP.

In cases where the contributing area includes more than one surface type, the area weighted runoff coefficient across all surface types shall be used in the calculation of V_V, which may be calculated as follow:

EQ2.4:

$$C_W = \frac{(C_1A_1 + C_2A_2 + \cdots etc.)}{A_t}$$

where:
C_W = weighted runoff coefficient relating peak rate of rainfall and runoff
C_1 = runoff coefficient for surface type 1
A_1 = area of surface type 1 (sf)
C_2 = runoff coefficient for surface type 2
A_2 = area of surface type 2 (sf)
A_t = total area (sf)

While there is no hierarchy for the selection of SMPs to meet the sewer operations criteria, the SMP hierarchy checklist (Appendix A) does include SMPs that can be

used toward this goal. Refer to Chapter 4 for details on the sizing and design of SMPs.

In cases where two detention practices are proposed in series, the upstream detention system may reduce the effective C_W value used to determine Vv for the downstream system. Technical notes on the design of detention systems in series are provided in Section 4.11.

The second element of the sewer operations criteria, the maximum release rate, will also vary based on sewershed type. This variation again reflects the different operational goals between MS4 and CSS areas. Values for the maximum release rate per acre (q) are shown in Table 2.9 and defined in Chapter 31 of Title 15 of RCNY.

Table 2.9. Maximum release rate per acre (cfs/acre) by sewershed type.

q (cfs/acre)	Description
1.0	MS4 areas
0.1	CSS areas

The maximum release rate per acre (q) can then be used to calculate the maximum release rate for the contributing area (Q_{DRR}) using the following equation:

EQ2.5:

$$Q_{DRR} = \frac{q\left(\frac{cfs}{acre}\right) * A(sf)}{43560(\frac{sf}{acre})} \; or \; 0.046 \; [whichever \; is \; greater]$$

Q_{DRR}: maximum release rate, site (cfs)
q: maximum release rate, per acre (cfs/acre)
A: contributing area (sf)

The equation above includes a conversion factor from square feet to acres. All house or site application proposals for the sewer operations criteria must be in units of square feet, not acres.

The maximum release rate must be maintained using flow control systems, such as an orifice or other controlled-flow device. Technical notes on the design of flow controls can be found in Section 4.10.

When the sewer operations requirement is applicable, projects must meet both the volume (Vv) and maximum release rate (Q_{DRR}) criteria. In addition, the proposal must show how the Vv and Q_{DRR} criteria are met at the practice and site level. Therefore, the contributing area, weighted runoff coefficient, and maximum release rate must be determined for each individual practice and, in total, the practices must meet the criteria across the entire site. It is also important to note that the contributing area includes all tributary areas, even those which may be outside the disturbed area.

2.4. Geotechnical investigation

An understanding of subsurface conditions is needed to determine the feasibility of using various SMP types. This is illustrated by the SMP hierarchy in Section 4.2, which indicates the potential for soil and subsurface constraints to impact the selection of SMPs.

Therefore, unless otherwise directed by DEP, a limited geotechnical investigation is required to characterize subsurface conditions of the site. The limited geotechnical investigation shall include soil borings and permeability tests to, at a minimum, determine the following:

- Soil characteristics and texture
- Depth to groundwater (if encountered)
- Depth to bedrock (if encountered)
- Infiltration rate of soils at specified depths
- Any potential contamination concerns (if encountered)

Procedures
Geotechnical investigations shall be conducted in accordance with the NYS SWMDM procedures (Appendix D: Infiltration Testing Requirements). The minimum number of soil boring and permeability tests, collectively referred to as B/PTs, is based on the footprint area of the proposed SMP, as follows:

- SMPs with areas less than 1000sf: at least one B/PT per SMP
- SMPs with areas of 1000sf or more, but less than 5000 sf: at least two B/PT per SMP
- SMPs with areas of 5000sf or more: at least two B/PTs plus an additional B/PT for every 5000 sf of SMP area

Additionally, the designer must make a reasonable determination as to whether additional tests may be needed based on field conditions, such as soil textural classifications and the standard penetration tests. This determination is particularly critical in areas of fill soils where characteristics will vary greatly over small distances.

The owner is responsible for obtaining all applicable permits and approvals related to conducting the geotechnical investigation.

2-20

3. CITY DEVELOPMENT AND REVIEW PROCESS

Two DEP offices review NYC stormwater management permit applications. Bureau of Water and Sewer Operations (BWSO) reviews Site and House Connection Proposals and Bureau of Environmental Planning & Analysis (BEPA) reviews Stormwater Construction Permits. This chapter predominantly provides application guidance for projects that require a Stormwater Construction Permit and outlines the process through which applications will be submitted to and reviewed by DEP's BEPA. However, because some projects may trigger both permitting requirements, section 3.2 provides an overview of the joint review process in place for such projects. Prior to using Chapter 3, the applicant must review the stormwater regulations and project applicability requirements described in Chapter 2.

3.1. Projects that Require Site or House Connection Proposals Only

As noted above, this Chapter predominantly provides application guidance for projects that require a Stormwater Construction permit. For Site and House Connection Proposal applications and associated guidelines, see DEP's website: https://www1.nyc.gov/site/dep/about/sewer-connections.page.

Refer to other chapters of this Manual for technical requirements and stormwater management practice (SMP) design guidance for projects that trigger a Site or House Connection Proposal.

3.2. Projects that Require both Site Connection Proposal and Stormwater Construction Permit

Some projects will require both a Site Connection Proposal and a Stormwater Construction Permit. For projects that trigger both requirements, this section outlines that process through which the applications will be reviewed by the respective bureaus responsible for enforcing the requirements and how the reviews will be coordinated. An applicant may submit the applications in any sequence or simultaneously, as appropriate to the project timeline. Two DEP offices (as noted above, BWSO for the Site Connection Proposal and BEPA for the Stormwater Construction Permit) will review these applications.

As part of the BWSO review process, the initial application for a sewer connection from the property is the Site Connection Proposal (SCP), and BWSO's acceptance of that proposal is the SCP Certification. The main DEP BWSO office at LeFrak in Queens issues the SCP Certification, though other BWSO offices may review and issue certifications, especially for House Connection Proposals, depending on the circumstances. The SCP Certification is required under all circumstances in which: (1) the applicant proposes a new connection, (2) DOB requires the certification, or (3) the applicant agency's process includes the requirement. Before making the physical site connection, applicants must also obtain a Sewer Connection Permit. BWSO's local offices issue the Sewer Connection Permits.

As part of the BEPA review process, the initial application for stormwater management compliance includes the Stormwater Pollution Prevention Plan (SWPPP), and BEPA's approval of that plan is known as SWPPP Acceptance. In addition to the SWPPP Acceptance, covered development projects must also obtain a Stormwater Construction Permit and a Stormwater Maintenance Permit from BEPA, as further detailed below.

For projects that require both the Site Connection Proposal and Stormwater Construction Permit, the Site Connection Proposal Certification, Sewer Connection Permit, SWPPP Acceptance, and Stormwater Construction Permit are inter-related as follows:

- The Site Connection Proposal Certification and SWPPP Acceptance are required before BEPA issues the Stormwater Construction Permit, which is required before a shovel goes into the ground.
- BWSO does not issue the Sewer Connection Permit until the connection to a City sewer is necessary. The Site Connection Proposal Certification includes a condition that BWSO will not issue the Sewer Connection Permit until the applicant obtains the Stormwater Construction Permit.
- BEPA will not issue a Stormwater Maintenance Permit until BWSO issues the Sewer Connection Permit.

3-1

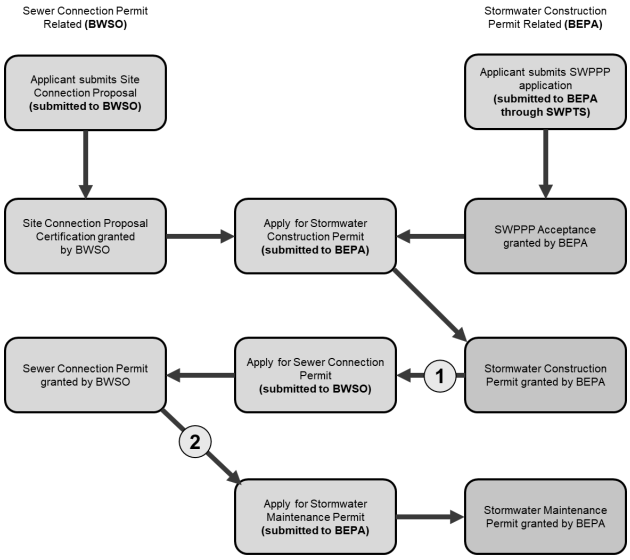
Figure 3.1 illustrates how each submission, approval, and/or permit is inter-related. Overall, the order of the DEP process can be summarized in four steps:
Step 1 – Submit Site Connection Proposal and Stormwater Construction Permit Application/SWPPP, which may be done in parallel
Step 2 – Site Connection Proposal Certification and SWPPP Acceptance required for issuance of the Stormwater Construction Permit
Step 3 – Stormwater Construction Permit required for construction to begin and for issuance of the Sewer Connection Permit
Step 4 – Sewer Connection Permit required for sewer connection work to begin and issuance of the Stormwater Maintenance Permit

For Site and House Connection Proposal applications and guidelines, see DEP's website https://www1.nyc.gov/site/dep/about/sewer-connections.page.

For projects that require a Stormwater Construction Permit, see section 3.3 for submittal requirements, review processes, and the Stormwater Permitting and Tracking System (SWPTS)

3-2

Figure 3.1. Flowchart outlining the inter-relation of BWSO and BEPA submissions, approvals, and permits.



1 Construction work may begin, contingent on any other required permits

2 Site connection work may begin

3-3

3.3. Projects that Require Stormwater Construction Permit (All)

To simplify the submittal and approval process, DEP has created an online project application system, the Stormwater Permitting and Tracking System (SWPTS), (https://deppermits.microsoftcrmportals.com/), which will enable applicants to submit a SWPPP and Stormwater Construction Permit application, as well as to follow the status of DEP's review.

The SWPTS will allow DEP to confirm that each permit application meets the requirements for erosion & sediment control, water quality, runoff reduction, and no net increase, as applicable. The review time for the DEP SWPPP approval process is forty-five (45) days. Applicants should note that DEP Stormwater Construction Permits and DEP Stormwater Maintenance Permits issued under the requirements of Title 15, Chapter 19.1, do not obviate the need for obtaining any other existing city, state or federal permit that may be required for the covered development project.

A user-friendly template for SWPPP applications can be found on DEP's website www.nyc.gov/dep/stormwaterpermits. The template is an editable document file where text, tables, and figures can be added or removed as needed. In total, the template includes eight sections and 14 appendices, with instructions on what information is needed for each. For ease of reference, the following sections are included in the SWPPP template:

- Contact Information / Responsibilities
- Site Evaluation, Assessment, and Planning
- Erosion and Sediment Controls
- Construction Inspection
- Post Construction Stormwater Controls
- Certification and Notification
- Retention of Records
- Required Drawings

For projects in MS4 areas, upon receiving DEP SWPPP Acceptance, the applicant may proceed to request coverage under the New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (CGP) for the covered development project.

typically works for the developer must certify that all ESC SMPs are constructed and removed in accordance with the SWPPP.

Contractor – Responsible for construction of project and implementation of SWPPP. Contractors must certify that they will agree to comply with the SWPPP as well as all applicable permits, including the NYC Stormwater Construction Permit and/or the CGP. The Contractor reports to the Developer.

Trained Contractor – Responsible for daily inspection, implementation and maintenance of ESC. Reports to Contractor and must be an employee of the Contractor.

3-5

As part of the SWPTS, DEP has identified roles and responsibilities for people involved with the development project, as provided below and in Table 3.1. While in some instances the roles and responsibilities may overlap, the following major roles are identified in the SWPTS and used throughout the following sections of this manual.

Owner – Owner of the property undergoing development is the individual, corporation, partnership, limited-liability company or other legal entity having legal title to premises, a mortgagee or vendee in possession, a trustee in bankruptcy, a receiver, or any other person having legal ownership or control of premises. Owners must certify that they are aware of the development activity and understand their role under RCNY Title 15 Chapter 19.1. The owner may also be the Developer.

Developer – Primary project contact, is the person who owns or leases land on which development activity that is part of a covered development project is occurring, or a person who has operational control over the development or maintenance activity's plans and specifications, including the ability to make modifications to the plans and specifications. Developers must certify that they have overseen the SWPPP development and that the project has been completed as designed. The Developer may also be the Owner.

Applicant – Fills in applications and uploads reports, plans and other documentation to the SWPTS.

SWPPP Preparer – Must be a qualified professional. Creates the SWPPP for review and submittal to the SWPTS. The SWPPP Preparer, who typically works for the Developer, must certify that the SWPPP was prepared in accordance with RCNY Title 15 Chapter 19.1.

Qualified Professional (Construction) – Responsible for inspection and certification of installed SMPs. Qualified Professional (Construction), who typically works for the Developer, must certify that all SMPs have been constructed in accordance with the SWPPP.

Qualified Inspector – Responsible for inspection and certification that final stabilization has been achieved at the site. Performs weekly inspections of erosion and sediment control (ESC) practices. The Qualified Inspector, who

3-4

Table 3.1. Roles and responsibilities in the SWPTS.

Role	Responsibility	Minimum Professional Registration/ Certification	Signoff/ Certification Required for Plan Approval/ Construction Permitting?	Signoff/ Certification Required for Construction Closeout/ Maintenance Permitting?
Applicant	Fills in application and uploads reports and plans to the SWPTS.	N/A	N/A	N/A
Contractor	Responsible for construction of project and implementation of SWPPP.	NYC DOB	Yes	N/A
Developer	Primary project contact, responsible for payments and project staff. May be the same entity as Owner.	N/A	Yes	Yes
Owner	Must provide permission for work to occur on property. May be liable for all fees and fines.	N/A	Yes	N/A
Owner/Developer	See 'Owner ' and 'Developer'.	N/A	Yes	Yes
Qualified Inspector	Responsible for w eekly (bi-weekly) inspections. Reports to Developer.	NYS PE or RLA or works under the direct supervision of same or CPESC.	N/A	Yes
Qualified Professional (Construction)	Responsible for inspection and certification of installed SMPs. Reports to Developer. May also serve as the SWPPP Preparer or Qualified Inspector.	NYS PE or RLA	N/A	Yes
SWPPP Preparer	Responsible for creating the SWPPP for review and approval. Works for Developer. May also serve as the Qualified Professional (Construction) or Qualified Inspector.	NYS PE, RLA or CPESC (E&SC Plan only)	Yes	N/A
Trained Contractor	Responsible for daily inspection, implementation and maintenance of ESC. Reports to Contractor and must be an employee of Contractor.	NYSDEC 4-hour ESC Class	N/A	N/A

3.4. DEP SWPPP Submittal and Review Process

Figure 3.2 details, from start to finish, the complete DEP SWPPP submittal, review, and approval process for a covered development project. The responsible party for each step in the process is designated by color, with decision points for approvals and other actions noted accordingly.

As part of the SWPPP approval and stormwater construction permitting process, all users will be required to register in the SWPTS to use the system. Users include the owner, applicant, developer, contractor, etc. Each responsible party will be required to provide requested information in the SWPTS to be able to submit an application and receive DEP approval.

An in-depth, step-by-step description of the process is provided in Section 3.5. DEP encourages SWPPP preparers, developers, and applicants to read Chapter 3 in its entirety to understand the entire submittal and review process along with the associated requirements and decision points. During development of the SWPPP, SWPPP preparers, developers, and applicants should also review Chapters 2 and 4 and make sure they understand what is required in order to develop a SWPPP that will obtain DEP approval.

Electronic Submissions

The SWPPP and all associated application information must be submitted electronically using the SWPTS. All required information except for the SWPPP document itself will be entered directly into the SWPTS using the online input forms. The complete SWPPP, including all drawings and associated materials, must be uploaded into the SWPTS as a pdf. If issues arise during the upload of the SWPPP document, contact NYCSWPTSAdmin@dep.nyc.gov to request direction on how to submit the application.

Contacting DEP Staff

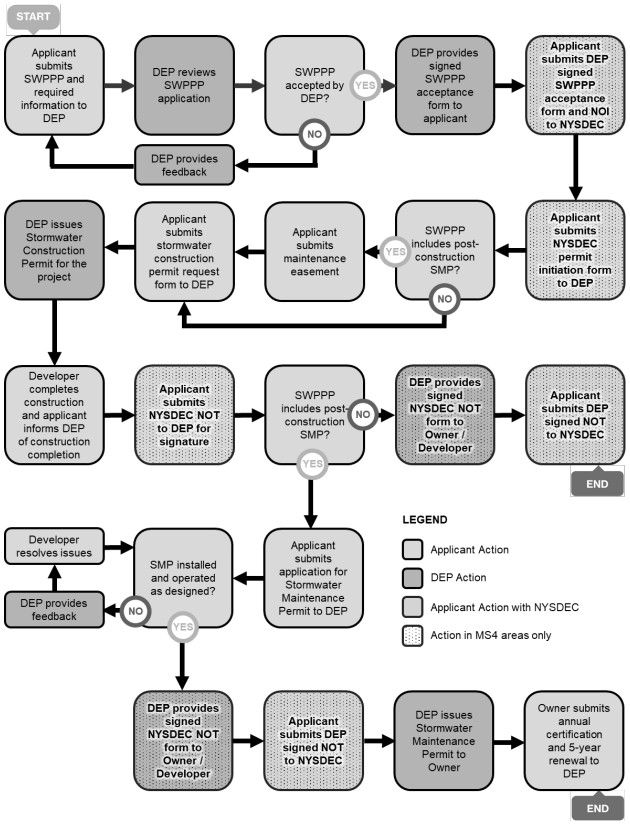
DEP encourages SWPPP preparers and applicants to contact the DEP SWPPP Review and Inspection Team for assistance at any point during development of the SWPPP and/or the submittal and review process. For additional information and answers to frequently asked questions, SWPPP preparers and applicants can:

- Visit the DEP SWPTS website at https://deppermits.microsoftcrmportals.com/
- Email the DEP SWPPP Review and Inspection Staff at stormwaterpermits@dep.nyc.gov

SWPPP preparers and applicants may request discussions with DEP to address site challenges and proposed innovative stormwater management approaches. Each project will be assessed on a case-by-case basis to determine if the concerns require an in-person meeting. All questions or requests for in-person meetings should be emailed to stormwaterpermits@dep.nyc.gov.

Parties requesting an in-person meeting will need to provide a project description, preliminary site plan, a description of the issues/concerns that need to be discussed and three (3) preferred dates and times to meet with DEP within two (2) weeks of the meeting request submittal. DEP staff will determine the final meeting date and time based on availability.

Figure 3.2 Detailed NYC Stormwater Permit Submission, Review, and Approval Process.



3.5. SWPPP Submission, Review and Approval Details

The following sections provide detailed information about the specific phases of the DEP SWPPP submittal and approval process shown in Figure 3.2.

SWPPP Submission Materials

To begin the DEP submittal and approval process, the applicant for the covered development project must:

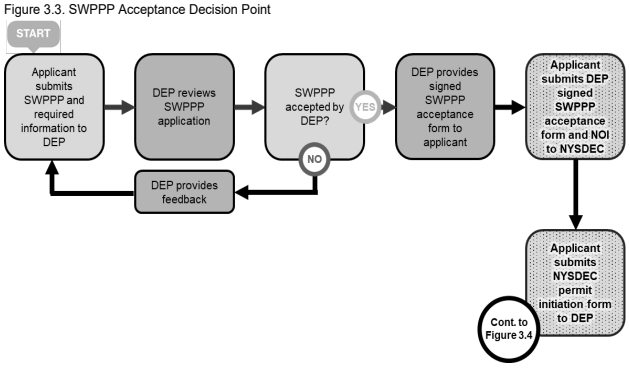
- Complete the online application in the SWPTS;
- Upload a complete SWPPP in the SWPTS; and
- Pay the associated permit fees.

SWPPP Acceptance

If DEP disapproves the submitted SWPPP application, as shown in Figure 3.3, it will provide the applicant with a notice identifying the deficiencies within the SWPPP that will need to be addressed in order to obtain DEP approval. A new application will then have to be submitted to DEP for review and approval.

If DEP approves the submitted SWPPP application, DEP will provide the applicant with a signed SWPPP Acceptance Form for the project. For projects in MS4 areas, the applicant then includes the signed SWPPP Acceptance Form with the NYSDEC Notice of Intent (NOI) when applying to obtain coverage for the proposed project under the CGP.

Figure 3.3. SWPPP Acceptance Decision Point



SWPPPs without Post- Construction SMP(s)
If the SWPPP does not require a post-construction SMP, the Permit Initiation Form may be submitted in the SWPTS without a stormwater maintenance easement, as shown in Figure 3.4.

DEP will issue a Stormwater Construction Permit for the project once all the required information in the Permit Request Form has been submitted and approved. Once the DEP Stormwater Construction Permit has been issued, construction may begin. DEP may conduct inspections at any time during the construction process.

After the completion of construction, the applicant will inform DEP of construction completion. For projects in MS4 areas, the applicant will submit the NYSDEC Notice of Termination (NOT) to DEP for the MS4 acceptance signature, as shown in Figure 3.5. DEP may inspect the project site and, if satisfied, will provide the signed NOT to the applicant. The applicant will then submit the signed NOT to NYSDEC.

3-11

Figure 3.4. Permit Initiation Form and Maintenance Easement Requirements

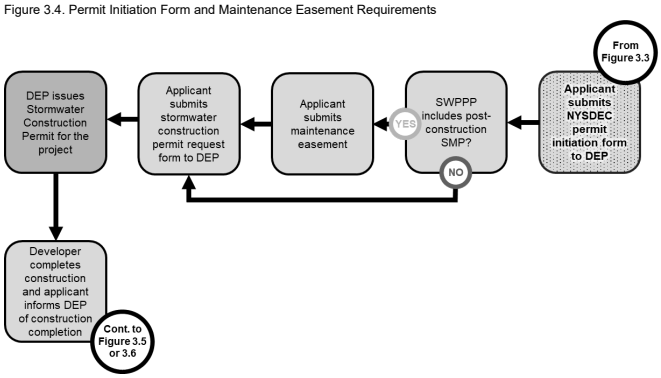
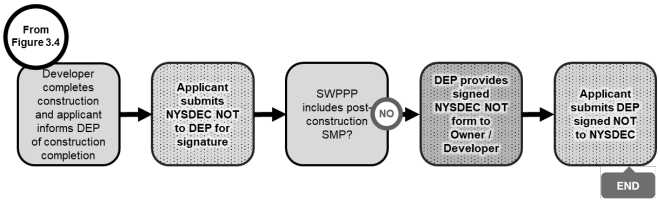


Figure 3.5. SWPPP Does Not Include Post-Construction SMP Decision Point



3-12

SWPPP with Post-Construction SMP(s)
If a SWPPP includes one or more post-construction SMPs, the applicant must obtain a maintenance easement. A copy of the maintenance easement and the information required on the Permit Initiation Form must be submitted via SWPTS as shown in Figure 3.4. DEP will issue a Stormwater Construction Permit for the project once all the required information in the Permit Request Form has been submitted and approved. Once the DEP Stormwater Construction Permit has been issued, construction may begin.

Once construction is completed, the applicant must also submit the application for a Stormwater Maintenance Permit to DEP as shown in Figure 3.6. The Stormwater Maintenance Permit application shall consist of the following:

- NOT;
- As-built plan;
- Operation and maintenance manual that designates the entity responsible for the long term maintenance;
- Fee specified in the DEP Stormwater Rule.

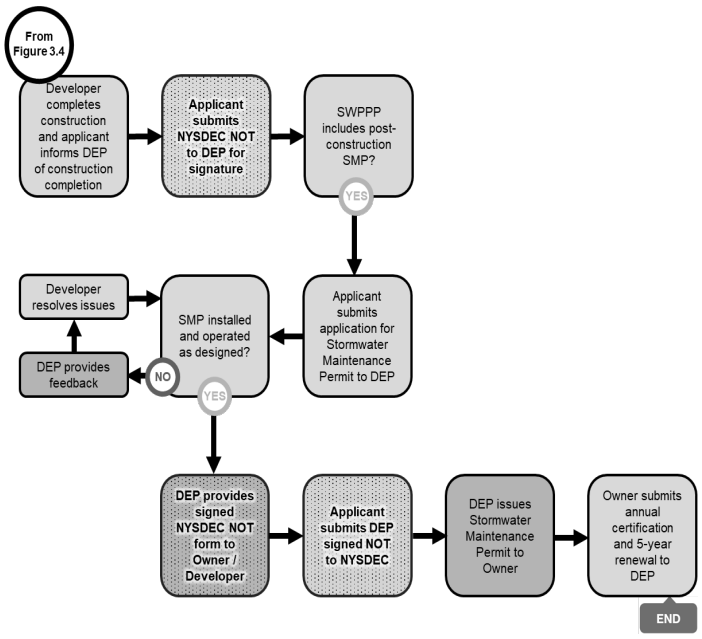
An electronic version of the NOT is available on the SWPTS. As-built plans and a final Operation and Maintenance Manual will need to be uploaded in a PDF or other acceptable format. The Operation and Maintenance plan should be finalized based on the installed SMP(s), reflecting any changes that were made during the construction period.

DEP may inspect the SMP(s) at any time. If the SMP is not installed or operating as designed, DEP will provide feedback and the applicant must resolve the issue(s). Once the SMP(s) is installed and operating as designed, DEP will provide the acceptance signature for the NOT and issue the Stormwater Maintenance Permit. For projects in MS4 areas, the applicant will then submit a signed NOT to NYSDEC.

The owner must submit an annual certification for the SMP as well as a 5-year permit renewal to DEP via the SWPTS. Requirements for inspection schedules as well as typical SMP operation and maintenance requirements are detailed in Chapter 5.

3-13

Figure 3.6. SWPPP Does Include Post-Construction SMP Decision Point



3-14

3.6. Expiration Policy

SWPPP Acceptances expire if a permit is not requested within 2 years of the plan approval date. A Stormwater Construction Permit will expire if the commencement of development activities does not take place within one year or is not completed by a date specified in the permit. Furthermore, a Stormwater Construction Permit will expire if the permitted work is suspended or abandoned for a continuous period of 12 months unless such permit expires earlier. Expired permits will require reapplication as detailed in the permit conditions.

3.7. Partial Shutdowns

If a covered development project requires temporary shutdown for less than 12 months, the developer must notify DEP a minimum of seven days before the shutdown and submit documentation showing that the site is stable and that all SMPs are operational. The developer will be responsible for having a qualified inspector visit the site and inspect it at least once every 30 days during the shutdown. In addition, all permits must be kept current during the suspension of development activity.

If a covered development project requires a planned shutdown with partial project completion for 12 months or longer, the owner or developer must submit a completed NOT to DEP for sign-off prior to submitting the NOT to NYSDEC. The department will review the completed NOT to ensure that the following conditions have been met:

- All soil disturbance has ceased;
- All areas disturbed as of the project shutdown date have achieved final stabilization;
- All temporary structural ESC measures have been removed; and
- Any post-construction SMPs required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

3-15

4. SMP SELECTION AND DESIGN

This chapter covers the following topics:

- Section 4.1 – Overview of SMP functions and surface types used for classification
- Section 4.2 – Selecting SMPs using the SMP hierarchy
- Section 4.3 – Methods for sizing SMPs to meet applicable stormwater management requirements
- Section 4.4-4.8 – General design criteria for SMPs by function
- Section 4.9 – Process for approval of other, innovative systems
- Section 4.10 – Specific design criteria for each SMP component
- Section 4.11 – Calculations for special cases

4.1. Practice Types

SMPs are systems that are designed to protect, restore, or mimic the natural water cycle within built environments by retaining, detaining, and/or treating stormwater runoff. In this manual, SMPs are categorized in two ways: first, by their primary function and second, by their surface type.

SMP Functions

Runoff that enters an SMP is typically managed via one or more of the following physical processes:

- Infiltration – water is captured and infiltrated into the underlying soils (sometimes referred to as exfiltration).
- Evapotranspiration (ET) – water is captured and evaporated or transpired back into the atmosphere.
- Reuse – water is captured and reused for purposes other than SMP irrigation (which can reduce water storage potential of other SMPs).
- Filtration – water passes through a filtration medium to remove various pollutants.
- Detention – water is temporarily stored and released at a lower flow rate.

SMPs may support more than one process, but there is usually one primary function for which the system was designed. For example, a bioretention system that is constructed on permeable soils is designed to manage runoff primarily by infiltration, since ET accounts for a smaller portion of managed runoff. However, a bioretention system with an outlet pipe is designed to manage runoff primarily by filtration, since most runoff will exit the practice and enter the sewer system once it has been filtered.

While one primary function is most common, some SMPs may be configured to support runoff management via two, equally contributing functions, e.g., detention systems that are also designed with components to filter runoff as it flows through the practice. These types of SMPs are referred to as dual function systems, which are described further in the Innovative Systems section (Section 4.9).

Among the five primary functions, infiltration, ET, and reuse SMPs are considered retention-based practices because they aim to eliminate or reduce the total volume of runoff leaving the site. The other two functions, filtration SMPs and some extended detention SMPs, are considered treatment-based practices because they aim to remove pollutants from runoff before it ultimately leaves the site. The distinction between retention-based practices and treatment-based practices is important when selecting an SMP to meet water quality goals, discussed further in Section 4.2.

In this manual, the primary SMP function, or dual functions for some systems, will be used to help categorize SMPs. This does not mean that secondary processes are to be neglected during the SMP design but allows for a straightforward means for grouping and crediting SMPs. As indicated in the earlier examples for bioretention systems, SMPs can take on different functions depending on how they are designed, and this framework provides flexibility for a wide range of potential configurations that may be necessary to accommodate various site constraints. An illustration of the physical process for each function type is shown in Figure 4.1, along with a brief description and example SMP.

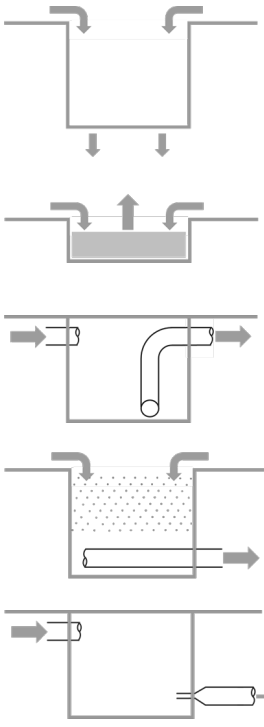
SMP Surface Types

In addition to primary function, SMPs can be further categorized by one of two surface types:

- Vegetated SMPs – practices with a planting media that supports vegetation.
- Non-vegetated SMPs – practices without vegetation, such as permeable hardscapes, permanent ponds, enclosed systems, or subsurface systems.

Vegetated practices can provide a number of added co-benefits beyond stormwater management, such as air filtration, reduction of heat island effects, ecological benefits, and amenity. Non-vegetated practices often lack most co-benefits but may be necessary for highly constrained sites. A major goal of the Unified Stormwater Rule, and therefore this manual, is to increase the use of vegetated practices in order to realize additional co-benefits for NYC residents.

Figure 4.1. SMP function diagrams.



Infiltration

Description: water is captured and infiltrated into the underlying soils, which is sometimes referred to as exfiltration.
Design: Relies on sufficient permeability rates of underlying soils. Practices do not use outlet pipes to drain water.
Example: Bioretention system, no outlet pipe

Evapotranspiration

Description: Water is captured and evaporated or transpired back into the atmosphere.
Design: Relies on ET occurring between rainfall events. Practices are usually shallow and have no or limited ability to infiltrate water.
Example: Green roof

Reuse

Description: Water is captured and reused for non-irrigation purposes.
Design: Relies on continuous reuse of water. Practices can be integrated into existing non-potable and non-contact water uses.
Example: Reuse in cooling tower

Filtration

Description: Water passes through a filtration media to remove various pollutants.
Design: Relies on steady flow of water through the filtration media. Practices have an outlet pipe to support filtration.
Example: Sand filter

Detention

Description: water is temporarily stored and released at a lower flow rate.
Notes: Relies on ability to control release rate. Practices have a controlled-flow device, such as an orifice.
Example: Detention tank

4.2. Selecting an appropriate system

Designers must select and design practices to meet all applicable stormwater management requirements outlined in Chapter 2. This subsection includes guidance on selecting practices to meet the water quality criterion (WQv), runoff reduction criterion (RRv), and no net increase criterion (NNI), this guidance follows an SMP hierarchy based on several guiding principles.

The ESC criteria should be met using best practices in accordance with the NYS Standards and Specifications for Erosion and Sediment Control (The Blue Book). The sewer operations criterion (Vv) does not require the use of the SMP hierarchy, although DEP encourages the use of vegetated infiltration practices, where feasible, because of their potential co-benefits.

The SMP hierarchy was created with two goals: first, to create a clear and consistent approach for the selection of SMPs throughout the City and second, to guide designers toward practices that are most effective at meeting the City's goals for stormwater management and co-benefits. The SMP hierarchy follows three logical steps:

- Step 1 (CSS & MS4) – use vegetated retention practices to meet requirements, or up to the maximum extent practicable.
- Step 2 (CSS & MS4) – use non-vegetated retention practices to meet requirements, or up to the maximum extent practicable.
- Step 3 (CSS) – meet any remaining requirements using either vegetated or non-vegetated detention practices.
- Step 3 (MS4) – meet any remaining requirements using either vegetated or non-vegetated treatment practices.

These steps reflect several principles that were discussed in Chapter 2. For example, the principle that improving water quality in CSS areas is largely achieved by limiting CSO volume and occurrence. In this case, retention practices are preferred, while detention practices are a secondary option. Alternatively, improving water quality in MS4 areas is largely achieved by managing pollutants in runoff. In this case, retention practices are preferred, while treatment practices, such as filtration systems and some extended detention systems, are a secondary option. Finally, the SMP hierarchy also reflects that vegetated practices are generally preferred over non-vegetated practices due to the valuable co-benefits the former can provide for NYC residents.

The SMP hierarchies for CSS areas and MS4 areas are shown in Figures 4.2 and 4.3, respectively. Each hierarchy shows five groups of SMPs based on their function and/or surface type, as previously defined in Section 4.1. The CSS hierarchy includes groups for retention systems (vegetated and non-vegetated), detention systems (vegetated and non-vegetated), and reuse systems. The MS4 hierarchy is similar, except detention systems are replaced with treatments systems. Within each group are a list of applicable practices. Since some SMPs can be configured for multiple functions, they may appear in more than one group.

These SMP groups are shown in a grid that is arranged by their order of preference, with more preferred practices at the top-left and least preferred practices at the bottom-right. Reuse systems, which are also recognized as retention systems, appear as a standalone group that is optional, but can be used at any time. This placement reflects that reuse applications are not practical for all sites, but are among the high-priority SMP types, when appropriate.

The priority level of each SMP group is indicated by tiers with different colors, where the darker shades of green (CSS) or blue (MS4) indicate higher tier SMPs. These priority levels reflect the three logic steps of the SMP hierarchy. Designers must assess and implement SMPs in higher tiers to the maximum extent practicable before moving to lower tier systems. In this case, the maximum extent practicable is defined as the greatest extent to which site constraints allow.

Figure 4.2. SMP hierarchy for CSS areas.

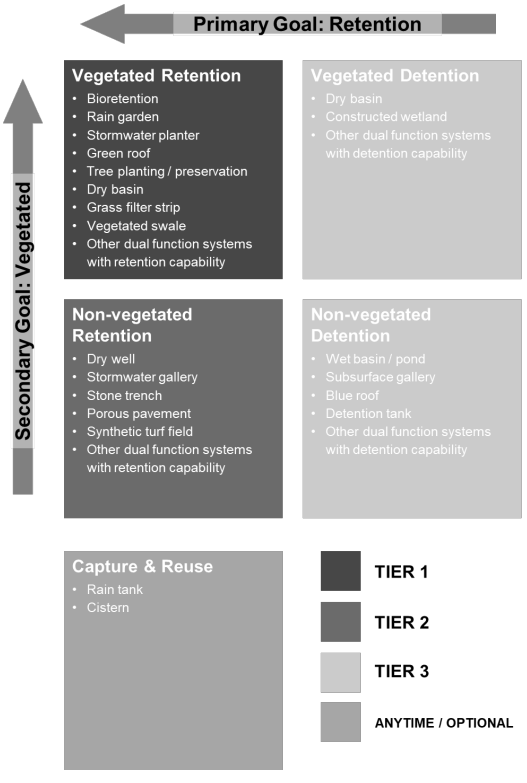
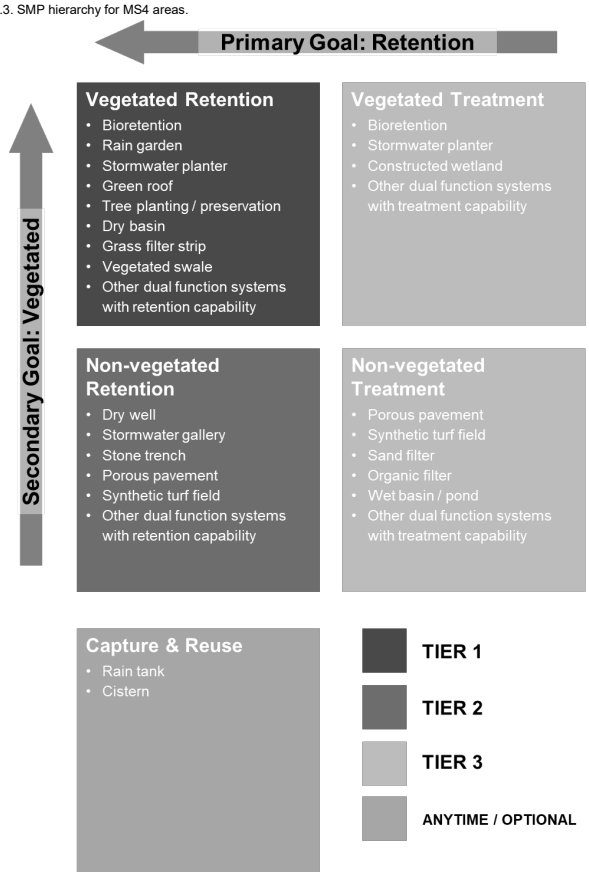


Figure 4.3. SMP hierarchy for MS4 areas.



There are five potential site constraints that may impact the feasibility of SMPs, defined as follows:

- Soil constraints –permeability tests indicate that soil infiltration rates are less than 0.5 in/hr, limiting the use of infiltration practices.
- Subsurface constraints – boring tests indicate that the bottom of practice would be less than three feet from the groundwater table or bedrock, limiting the use of most practices, except those enclosed in concrete with adequate anchoring, as determined by an engineer.
- Hotspot constraints – land use or soil conditions increase the risk of runoff contamination, limiting the use of infiltration practices, or those without liners. (see criteria below).
- Surface constraints – regulations require the use of paved surfaces, limiting the use of vegetated practices. As an example, regulations for parking and/or egress requirements.
- Space constraints – required setbacks from structures, utilities, property lines, existing trees, or other site features limits the use of practices at the ground level. General siting criteria for on-site projects can be found in Appendix C.

Keep in mind, that some constraints may be limited to one portion of the site, rather than impacting the entire site. For this reason, it is important that designers consider how constraints may vary across the site when demonstrating that SMPs are used to the maximum extent practicable. To assist designers in following the SMP hierarchy, an SMP hierarchy checklist was created which shows how each constraint impacts the feasibility of specific SMPs in CSS and MS4 areas (Appendix A).

Hotspot constraints may be caused by either land uses or soil conditions. Land uses that cause stormwater hotspots are listed in Table 4.3 of the NYS SWMDM. Soil conditions that cause stormwater hotspots are listed below, which may be demonstrated through environmental assessments or as part of a regulatory program (e.g., NYSDEC Spills and Remediation Programs) documentation:

- Presence of grossly contaminated soil or non-aqueous phase liquid (NAPL) as defined in NYSDEC DER-10
- Soil exceeds the groundwater protection objectives of NYSDEC 6 NYCRR 375
- Soil is characterized as hazardous waste as defined in 6 NYCRR 360 or 40 CRF 261
- Groundwater exceeds standards, guidance values and/or limits described in NYSDEC AWQS in 6 NYCRR 703 or TOGS1.1.1

The checklist includes one row for each SMP type, with fields that indicate the practices: tier, function type, and practice name, along with markers to show which constraints would impact that SMPs feasibility. For example, "X" markers in the checklist are used to indicate the site constraints that would prevent each practice from being used. Designers are required to use the SMP selection checklist to determine which practices should be used on a site-by-site basis. This can be done in three steps:

- Determine what, if any, site constraints are applicable for the site, or portions of a site
- Eliminate practices that are not feasible given the applicable site constraints
- Meet the water quality criterion by exhausting all remaining SMP opportunities from higher tiers, before moving to lower tiers

When SMPs are eliminated due to site constraints, the designer must provide the appropriate documentation that demonstrates each constraint (see Chapter 3). In addition, whenever a tier 2 or tier 3 SMP has been proposed, the designer must provide written justification for how higher tier practices have either been eliminated due to site constraints or used to the maximum extent practicable. All documentation for constraints and justification for use of lower tier practices are subject to review and approval by NYC DEP.

Once selected, SMPs must be designed in accordance with all applicable design criteria outlined in Sections 4.4-4.11.

4.3. SMP Sizing

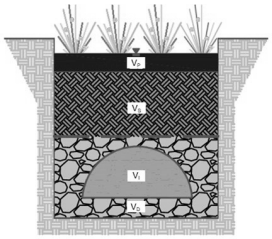
SMPs shall be sized so that the total volume of water that can be stored in the practice meets or exceeds the volume of runoff that must be managed to meet the stormwater management requirement. Procedures for computing the SMP storage volume are outlined in this subsection, along with how that volume is applied towards meeting the stormwater management requirements.

It is important to note that the following sizing methods are applicable to volume-based stormwater management requirements and SMPs. Designers seeking a deviation from the sizing methods or design criteria in this chapter must submit a stormwater model that demonstrates SMPs will meet the goals of each applicable stormwater criterion, subject to approval by DEP. Models must assess storage, routing, and drawdown for the design event(s) of interest. Acceptable stormwater models include HydroCAD and EPA SWMM.

Volume-based stormwater management requirements include water quality, runoff reduction, sewer operations, and NNI for Nitrogen removal. Other NNI requirements and the ESC requirement are criteria-based and should be met by following all relevant guidelines outlined in Chapter 2.

Volume-based SMPs include all practices except grass filter strips, vegetated swales, and tree preservation, which are criteria-based. As an example, the design criteria for grass filter strips and vegetated swales are intended to promote contact time between surface runoff and the vegetated surface for infiltration, rather than to use a storage element. These practices shall be designed to meet all relevant guidelines outlined in Sections 4.4-4.10.

The storage volume of a practice is the volume of water that can be stored at the surface or within the voids of the system itself. Internal voids can include those of any media (e.g. engineered soil or crushed stone), as well as voids of any internal structures (e.g. chambers or pipes). To be counted, the storage volume must fall within the active storage zone of the practice, which spans the distance from the lowest elevation from which water exits the storage zone up to the elevation of an overflow device that allows water to exit or bypass a practice once full.



During the design process, designers should also consider any other factors which may impact the size of the overall practice or specific elements. For example, the elevation of the overflow device will govern the top of the active storage zone, which may impact the depth of drainage media that may be counted towards SMP storage volume.

Surface Ponding

The volume of surface ponding can be calculated using several different methods, depending on the most appropriate method for the geometry of the ponding area. Prior to calculating the volume of surface ponding, designers should refer to the applicable design criteria for each SMP to identify whether a minimum volume of surface ponding is required. This requirement is intended to prevent bypass of the water quality event in cases where water must percolate through a planting or filtration media.

For ponding areas where the surface is relatively flat, the equation for the volume of a rectangular box shall be used:

EQ4.2:

$$V_P = A_{SMP} * D_P$$

where:
V_P = volume of surface ponding (cf)
A_{SMP} = area of the SMP (sf)
D_P = depth of ponding (ft)

For ponding areas where the surface has slopes that are relatively uniform, the equation for the volume of a truncated pyramid shall be used:

EQ4.3:

$$V_P = \frac{1}{3}\left(A_{P1} + \sqrt{A_{P1} * A_{P2}} + A_{P2}\right) * D_P$$

where:
V_P = volume of surface ponding (cf)
A_{P1} = area at the base of surface ponding zone (sf)
A_{P2} = area at the top of surface ponding zone (sf)
D_P = depth of ponding (ft)

For ponding areas with complex geometry, the designer shall create a stage-area curve that relates the depth of ponding to the area of ponding at regular intervals. The volume of each interval may then be calculated using the equation above by inputting the area at the top and bottom of the interval. The volume of surface ponding can then be calculated as the sum of all intervals.

Finally, in cases where there is no surface ponding, or the surface ponding area is above the elevation of an overflow device, the surface ponding volume is zero.

Soil Media

The volume of voids in the soil media layer is calculated as the total volume of soil times the porosity of soil:

EQ4.4:

$$V_S = A_{SMP} * D_S * n_S$$

where:
V_S = volume of voids in the soil media layer (cf)
A_{SMP} = area of the SMP (sf)
D_S = depth of soil media layer (ft)
n_S = available porosity of soil media (cf/cf)

Available porosity is defined as the percent of soil volume that is available for water storage at the onset of a rainfall event, on an average annual basis. The available porosity of soil media shall be set to 0.2 cf/cf. This value is less than the total porosity of a typical engineered soil used for SMPs, which reflects a reduction in storage capacity due to residual soil moisture.

The soil media storage equation assumes the sides of the practice are vertical, which means that the volume of soil may be calculated as the volume of a rectangular box. Where the sides of the practice are sloped, this method

For infiltration, the bottom of the active storage zone is simply the bottom of the practice. For ET systems, the bottom of the active storage zone is the bottom of the soil media layer. For reuse systems, the bottom of the active storage zone is the lowest elevation of usable water. For filtration and detention systems, the bottom of the active storage zone corresponds to the invert elevation of the outlet pipe.

The volume of the active storage zone can be calculated by adding up the volume of voids for each storage component. Therefore, a general formula for the calculation of storage volume is as follows:

EQ4.1:

$$V_{SMP} = V_P + V_S + V_I + V_D$$

where:
V_{SMP} = storage volume of SMP (cf)
V_P = volume of surface ponding (cf)
V_S = volume of voids in the soil media layer (cf)
V_I = volume of voids created by internal structures such as chambers or pipes (cf)
V_D = volume of voids in the drainage media (cf)

One benefit of this general formula is that it is applicable to all storage based SMPs, regardless of function type or geometry. As an example, Figure 4.11 shows each of the four storage components for a bioretention system that uses a subsurface chamber. Methods for calculating the storage volume of each term in the general formula will be discussed first, followed by a consolidated formula that may be used for common practices with simple geometry.

Figure 4.11. Illustration of storage areas for a bioretention system with surface ponding (V_P), soil media (V_S), internal structure (V_I), and drainage media (V_D).

should be adjusted to use the equation for the volume of a truncated pyramid.

Internal Structures
The volume of voids created by internal structures is calculated based on the type of structure. For modular structures, such as chambers, tanks, cisterns, crates, or other pre-cast units, the volume is calculated as the interior volume of one modular structure times the number of units:

EQ4.5:
$$V_I = V_M * N_M$$

where:
V_I = volume of voids created by internal structure (cf)
V_M = interior volume of one modular structure (cf)
N_M = number of modular structures (unit less)

For voids created by internal pipes, the volume is calculated as the interior area of the pipe times the total length of pipe:

EQ4.6:
$$V_I = A_P * L_P$$

where:
V_I = volume of voids created by internal structure (cf)
A_P = area of pipe (sf)
L_P = total length of pipe (ft)

Outlet and overflow pipes may not be counted towards the storage volume of a practice. In addition, any portion of structures above the elevation of an overflow device must be excluded from the calculated volume.

In cases where more than one type of modular system or more than one pipe size is used, the volume of voids may be calculated for each system and summed together to determine the total volume of voids.

Drainage Media
The volume of voids in the drainage media is calculated as the total volume of the drainage media, excluding the volume of any internal structures in this layer, multiplied by the porosity of drainage media:

EQ4.7:
$$V_D = (A_{SMP} * D_D - V_{I,d}) * n_D$$

where:
V_D = volume of voids in the drainage media (cf)
A_{SMP} = area of the SMP (sf)
D_D = depth of the drainage media (ft)
$V_{I,d}$ = volume of voids created by internal structures within the drainage media (cf)
n_D = porosity of drainage media (cf/cf)

The porosity of stone base and sand shall be set based on media composition, with a maximum value of 0.4 cf/cf, unless otherwise approved by DEP. If there are internal structures within the drainage media, then the volume of voids for those structures must be subtracted to avoid double counting. Since the active storage zone for ET practices is only the soil media layer, the volume of storage in drainage media is excluded for these systems.

Like the calculation for soil media, this equation assumes the sides of the practice are vertical, allowing us to calculate the volume of the drainage media as the volume of a rectangular box. Where the sides of the practice are sloped, this method should be adjusted to use the equation for the volume of a truncated pyramid.

If more than one type of drainage media is used, the volume of voids may be calculated for each layer and summed together to determine the total volume of voids. DEP may request that the volume occupied by walls of internal structures also be subtracted from total volume of the drainage layer. This would be limited to instances where the volume of walls is significant due to wall thickness or large number of structures, at the discretion of NYCDEP.

Meeting Requirements
As noted earlier, SMPs must be sized so that the total storage volume of the SMP meets or exceeds the volume of runoff that must be managed for the applicable stormwater management requirement. Rather than design separate systems to meet each stormwater management requirement individually, the USWR framework allows designers to apply each SMP towards meeting multiple objectives.

As an example, an infiltration system may be sized to store the water quality volume, but that storage may also help

reduce the peak rate of runoff for larger events towards meeting the sewer operations requirement. The percentage of storage volume that may be applied to each stormwater management requirement will depend on the function of the system, as shown in Table 4.1.

Table 4.1. Percent of SMP volume that may be applied to SW management criteria by SMP function.

	Percent of SMP Volume Applied to Requirement (F_A)		
SMP Function	**WQv**	**RRv**	**Vv**
Infiltration	100	100	50
Evapotranspiration	100	100	0
Reuse[A]	100	100	50
Filtration	100[B]	40[C]	0
Detention	100[D]	0	100

[A] Designers must demonstrate continuous and reliable capacity throughout the year (see Section 4.11)
[B] Applies to MS4 areas only
[C] Applies to practices with engineered soils only
[D] Applies to CSS areas and select detention practices with treatment abilities in MS4 areas

In all cases, the entire storage volume can be applied toward WQv because the practice will fully retain, filter, or detain the WQ event by design, as appropriate for CSS and MS4 areas.

The percentage of total volume that can be applied toward RRv reflects the portion of the runoff that may be retained by the practice. This is 100% for infiltration, ET, and reuse practices and 40% for bioretention used as filtration practices, as specified in the NYS SWMDM.

Detention practices that are designed to meet the Vv event will have 100% of their volume applied to meeting the Vv criterion. Any other practices that are designed to infiltrate or reuse the WQv event can apply up to 50% of their volume towards the Vv criterion as well, which accounts for several factors related to differences between the WQv and Vv events. To apply reuse volume towards stormwater management requirements, designers must demonstrate that the system will have continuous and reliable capacity throughout the year, approved at the discretion of BEPA/BWSO (see Section 4.11). The application of volumes for dual function systems are covered in Section 4.9 on Innovative Systems.

Generally, it is recommended that designers size practices to meet the WQv as a first step. Once the WQv requirement is met, designers can compute the volume that may be applied to other requirements to determine whether any additional practices are needed.

Note that when retention practices alone are used to meet the WQ requirement, this will typically result in meeting the RR and NNI for nitrogen requirements as well. Alternatively, in cases where only the sewer operations requirement is applicable to a site, designers may size practices to meet Vv as a first step.

The following equation can be used to compute the SMP volume that may be applied to each stormwater management requirement:

EQ4.8:
$$V_A = V_{SMP} * F_A$$

where:
V_A = storage volume that may be applied to relevant stormwater management requirement (cf)
V_{SMP} = storage volume of SMP (cf)
F_A = percentage of storage volume that may be applied to the stormwater management requirement (%)

Values for the percentage of storage volume that may be applied to the stormwater management requirement (F_A) are provided in Table 4.1. In total, the storage volume that may be applied to each criterion (V_A) must equal or exceed the required storage volume of each criterion.

SMPs must meet all design criteria outlined in the following sections for their volume to be applied towards the applicable stormwater management requirements. In addition, there are Special Cases that do not follow the general percentages listed in Table 4.1, which are marked as "SC" on the SMP selection checklist. An example sizing calculation for each practice function can be found in Appendix D, while an example design for an entire site can be found in Appendix E.

Simple Systems
When the geometry of the SMP is relatively simple, equations to calculate the volume of individual components can be substituted into Equation 4.1 to create a streamlined formula for sizing. In cases where the ponding surface is flat, the sides of the SMP are vertical, and voids created by internal structures are all located in the drainage layer, then the simplified formula becomes:

EQ4.9:
$$V_A = [A_{SMP}(D_P + D_S * n_S + D_D * n_D) + V_I(1 - n_D)] * F_A$$

where:
V_A = storage volume that may be applied to relevant stormwater management requirement (cf)
A_{SMP} = area of the SMP (sf)
D_P = depth of ponding (ft)
D_S = depth of soil media layer (ft)
n_S = porosity of soil media (cf/cf)
D_D = depth of the drainage media (ft)
n_D = porosity of drainage media (cf/cf)
V_I = volume of voids created by internal structures such as chambers or pipes (cf)
F_A = percentage of storage volume that may be applied to the relevant stormwater management requirement (%)

Looking at each parameter of Equation 4.9 in more detail leads to several additional simplifications. For example, the available porosity of soil media (n_S) is set to the specified value of 0.20 cf/cf. Similarly, the porosity of the drainage layer (n_D) shall be set based on media composition, with a maximum value of 0.40 cf/cf. In addition, the percentage of storage volume that may be applied towards the stormwater management requirement (F_A) will be referenced from Table 4.1 based on the SMP function and the applicable stormwater management requirement.

This leaves the area of the SMP (A_{SMP}), depth of ponding (D_P), depth of soil media (D_S), depth of drainage media (D_D), and the volume of internal structures (V_I) as design elements of the system. The area of the practice is bounded by the maximum allowable ratio between the SMP area and the contributing TDA area, as detailed in Sections 4.4-4.8. Similarly, the depths of various media are constrained by the maximum allowable drawdown time, which can be evaluated using the following methods.

Drawdown Time – Infiltration SMPs
The drawdown time for infiltration SMPs is calculated by dividing the volume of the practice by the average flow rate out of the system via infiltration. In this case, the flow rate via infiltration is field measured, which also relies on the principles of Darcy's law. Drawdown time is calculated as:

EQ4.11:
$$dt_{SMP} = \frac{V_{SMP}}{\left(\frac{i}{12}\right) * A_{INF}}$$

where:
dt_{SMP} = drawdown time of infiltration SMP (hr)
V_{INF} = volume of infiltration SMP (cf)
i = field measured infiltration rate (in/hr)
A_{INF} = area of infiltrating surface at the bottom of SMP (sf)

The denominator uses two terms to estimate the flow rate, which are the field measured infiltration rate and the area of infiltrating surface at the bottom of practice. As a factor of safety, the field measured infiltration rate used to calculate drawdown time shall be capped at 5 in/hr.

Designers shall confirm that the drawdown time of the infiltration SMP does not exceed 48 hours, where applicable.

Drawdown Time – ET SMPs
The soil media of ET systems releases water back to the atmosphere as evaporation and transpiration occur over time. Given the variable nature of ET throughout the year, ET systems are designed to avoid long periods of ponded water by using shallow ponding depths, small loading rations (practice-to-contributing area), and a means to drain excess water. For these reasons, there is no drawdown calculation for ET SMPs.

Drawdown Time – Filtration SMPs
The drawdown time for filtration SMPs is typically calculated by dividing the volume of the practice by the average flow rate through the filtration media. In this case, drawdown time can be calculated similar to surface ponding, which is based on the principles of Darcy's law. Drawdown time is calculated as:

Drawdown Time – Surface Ponding
The drawdown time for surface ponding is calculated by dividing the volume of ponding by the average flow rate through the surface media. In this case, the flow rate is calculated based on the principles of Darcy's law. Drawdown time is calculated as:

EQ4.10:
$$dt_P = \frac{V_P}{\left(\frac{K_S}{12}\right) * \left(1 + \frac{0.5D_P}{D_M}\right) * \left(\frac{A_{P1} + A_{P2}}{2}\right)}$$

where:
dt_P = drawdown time of surface ponding (hr)
V_P = volume of surface ponding (cf)
K_S = saturated hydraulic conductivity of media below the surface ponding area (in/hr)
D_P = maximum depth of ponding (ft)
D_M = depth of media below surface ponding area (ft)
A_{P1} = area at the base of surface ponding zone (sf)
A_{P2} = area at the top of surface ponding zone (sf)

Hydraulic conductivity shall be set based on media type, as follows:
- Engineered soil: 0.5 in/hr
- Sand filter media: 1.75 in/hr
- Peat/sand filter media: 1.0 in/hr

The denominator of the surface ponding drawdown time equation uses three terms to estimate the flow through rate which account for, from left to right, the hydraulic conductivity of the surface media, average hydraulic gradient through the surface media, and average area of surface ponding zone (area of percolation).

For infiltration SMPs, designers must confirm that the flow rate of infiltration through the bottom of practice is not more restrictive that the flow rate through surface media. This is done by comparing the denominator of surface ponding drawdown time with the denominator of infiltration drawdown time equation. The lesser of the two values should be used to compute surface drawdown time.

Designers shall confirm that the drawdown time of the surface ponding area does not exceed the maximum allowable for that the proposed practice (see Sections 4.4-4.8), which is commonly 12-hours.

$$dt_{SMP} = \frac{V_{SMP}}{\left(\frac{K_S}{12}\right) * \left(1 + \frac{0.5D_{pf}}{D_f}\right) * A_f}$$

where:
dt_{SMP} = drawdown time of filtration SMP (hr)
V_{SMP} = volume of filtration SMP (cf)
K_S = saturated hydraulic conductivity of filtration media (in/hr)
D_{pf} = maximum depth of ponding above filtration media (ft)
D_f = depth of filter media (ft)
A_f = area of filter bed (sf)

Hydraulic conductivity shall be set based on media type, as follows:
- Engineered soil: 0.5 in/hr
- Sand filter media: 1.75 in/hr
- Peat/sand filter media: 1.0 in/hr

The denominator uses three terms to estimate the flow rate which account for, from left to right, the hydraulic conductivity of the filtration media, average hydraulic gradient through the filtration media, and area of the filter bed (area of percolation).

If the flow rate through the filtration media is greater than the flow rate through any outlet pipes or controlled-flow devices, then the drawdown time is not governed by the filtration media and must be determined by the most flow restrictive component. Where a level outlet pipe or controlled-flow device restricts flow, the drawdown time may be calculated using the equation for detention SMPs.

Where sloped outlet pipes restrict flow, the Manning's equation may be used to estimate the outlet flow rate, which replaces the denominator in the drawdown time calculation.

If outlet pipes are connected to an internal pipe or network of pipes, designers must ensure that the perforations in the internal pipes are adequate to not restrict flow.

Designers shall confirm that the drawdown time of the filtration SMP does not exceed 48-hours, where applicable.

Drawdown Time – Reuse SMPs
The drawdown time for reuse SMPs is calculated by dividing the volume of the practice by the average flow rate out of the system via the water reuse application. In this case, drawdown time is simply calculated as:

EQ4.13:

$$dt_{SMP} = \frac{V_{SMP}}{Q_{RU}}$$

where:
dt_{SMP} = drawdown time of filtration SMP (hr)
V_{SMP} = volume of filtration SMP (cf)
Q_{RU} = flow rate of reuse application (cf/hr)

Designers shall confirm that the drawdown time of the reuse SMP does not exceed 48-hours, where applicable. In cases where the reuse application alone does not meet this requirement, controlled-flow devices can be used in tandem to achieve the desired drawdown time.

Drawdown Time – Detention SMPs
The drawdown time for detention SMPs is calculated by dividing the volume of the practice by the average flow rate out of the system via a controlled-flow device. In this case, the system can be treated as a tank with an orifice, where the flow rate is derived from the Bernoulli equation. Drawdown time is calculated as:

EQ4.14:

$$dt_{SMP} = \frac{V_{SMP}}{0.5 C_D A_o \sqrt{2gH}} * \frac{1}{3600}$$

where:
dt_{SMP} = drawdown time of filtration SMP (hr)
V_{SMP} = volume of filtration SMP (cf)
C_D = coefficient of discharge; 0.61 (flush), 0.52 (re-entrant), or 0.73 (long re-entrant)
A_o = area of the orifice (ft^2)
g = acceleration due to gravity, 32.2 (ft/s^2)
H = maximum hydraulic head above the centerline of the orifice (ft)

Designers shall confirm that the drawdown time of the detention SMP does not exceed the maximum permitted, which varies by practice type (Section 4.8).

4.4. Infiltration Systems

Infiltration is the process whereby water passes through a porous media, mainly in a downward direction, due to gravity. SMPs that primarily manage runoff via infiltration of water into underlying soils are classified as infiltration systems. Infiltration systems are also considered retention systems because their primary function reduces runoff.

There are several features that are common to all infiltration systems:

- Underlying soils have adequate hydrologic conductivity for infiltration
- Underlying soils are not constrained by high groundwater, bedrock, or contamination
- Have no liner or other impermeable material at the bottom (i.e. has a permeable bottom)
- Have no outlet pipe or have an outlet pipe that is permanently capped

An outlet pipe is any pipe that can drain water from the practice before it is full. Typically, this would be a pipe that connects the storage zone of the practice with a point of discharge, such as a sewer, site drainage system, or structure with a controlled-flow orifice. For infiltration systems, outlet pipes must be permanently capped, except during maintenance, to prevent water from exiting the system.

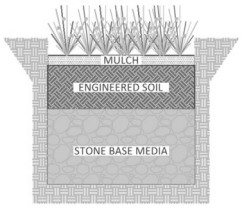
Components used for infiltration systems vary, but may include surfacing mulch for moisture retention, engineered soil used to support vegetation, surface area used for ponding, stone base used to store water, geotextiles, and internal structures or pipes used to help distribute or store water. The total volume of water that can be stored in the practice must meet or exceed the volume of runoff calculated for the stormwater management requirement (Section 2.3). Further details on SMP sizing can be found in Section 4.3.

Infiltration systems provide a range of stormwater management benefits, which include runoff reduction, peak flow mitigation, groundwater recharge, and treatment of pollutants from runoff. Vegetated systems may provide several added co-benefits such as heat island mitigation, ecologic function, community amenity, and removal of airborne pollutants.

The feasibility of infiltration systems can be limited by soil constraints, subsurface constraints, hotspot constraints, and space constraints. In addition, surface constraints may limit the use of vegetated infiltration practices. A description of each constraint may be found in Section 4.2. Readers should refer to the SMP Selection Hierarchy (Appendix A) for details on how various constraints impact the use of specific SMPs.

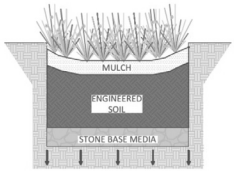
Infiltration SMPs
SMPs that can be configured to function as infiltration systems include bioretention, rain gardens, stormwater planters, tree plantings, dry basins, grass filter strips, vegetated swales, dry wells, synthetic turf fields, porous pavements, stone trenches, and stormwater galleries. In addition to these systems, other innovative systems may also qualify as infiltration practices, as described in Section 4.9. A brief description of each infiltration SMP is provided below, along with an example cross section. Please note that the cross sections are for illustrative purposes only and are not meant to show all required components. Further, systems described in this manual may differ from those used as part of the ROW green infrastructure program.

Bioretention - landscaped shallow depression that captures surface runoff. Typically used in dense urban areas. Similar to rain gardens, but components are designed to manage runoff from large areas. Commonly consists of a surface ponding area, mulch layer, engineered soil with vegetation, and stone base.

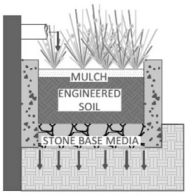


Rain garden - landscaped shallow depression that captures surface runoff. Typically used in residential applications. Similar to bioretention, but components are

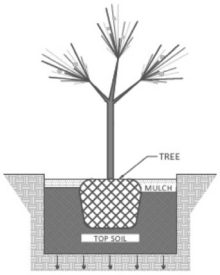
designed to manage runoff from small areas. Commonly consists of a surface ponding area, mulch layer, engineered soil with vegetation, and a shallow stone base to improve infiltration.



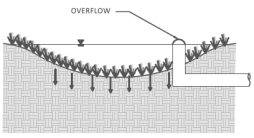
Stormwater planter - self-contained planter box with a permeable bottom. Commonly consists of a surface ponding area, mulch layer, engineered soil with vegetation, and stone base.



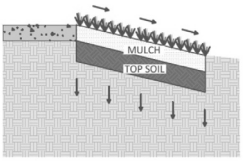
Tree planting (or preservation) - standalone trees (planted or preserved) that capture surface runoff. Commonly consists of a shallow surface ponding area and topsoil for tree planting. In the case of plantings, may also include a shallow drainage layer. This practice is counted towards a reduction of impervious area when calculating the runoff coefficient, rather than towards a required storage volume.



Dry basin - earthen depression that is typically planted with grasses and functions as one large surface ponding area. Usually constructed on naturally pervious soils that do not require the layering of engineered materials.

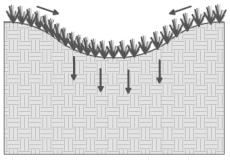


Grass filter strip - strip of grass that infiltrates sheet flow as it passes over its surface. Commonly consists of a shallow topsoil that is planted with short grasses

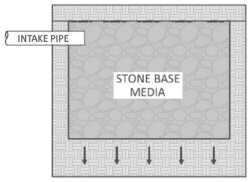


Vegetated swale - open, shallow channels with short vegetation along bottom and sides that infiltrates water as it is conveyed along swale. Commonly consists of a

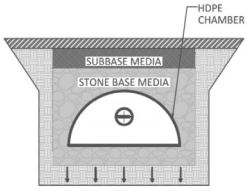
shallow topsoil that is planted with short grasses and may also have check dams to regulate flow within the channel.



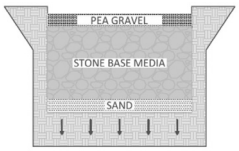
Dry well – subsurface shaft (circular) that is typically excavated or augured and then filled with a stone base or a prefabricated structure used to store water. When the depth of a dry well is greater than its diameter, which is common, an EPA injection well permit may be required (visit epa.gov/uic for more details).



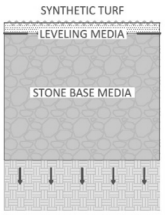
Stormwater gallery – subsurface area (typically rectangular) that is excavated and then filled with stone base, prefabricated structures, chambers, or pipes used to store water. Usually larger than a typical dry well system and, as a result, may treat larger drainage areas.



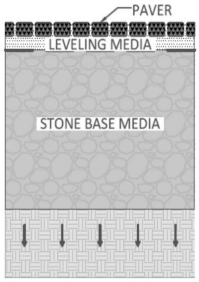
Stone trench – an excavated trench (typically linear) that is filled with stone base or internal pipes used to store water. Similar to a dry well, except the stone trench length is usually greater than its depth and it receives runoff via an exposed stone surface.



Synthetic turf field – synthetic turf material that allows runoff to percolate into underlying layers. Common underlying layers include a shock absorbing pad, leveling course, and a stone base. Due to their size, many synthetic turf fields also include internal pipes to help spread water evenly across the entire storage area.



Porous pavement – pavements that contain voids which allow runoff to percolate into underlying layers. The surface of these systems can either be entirely porous pavement or a grid of pavers and porous materials, such as grass or gravel. Common underlying layers include a leveling course and a stone base.



Design Requirements

A comparison of general design requirements for each infiltration system is shown in Table 4.5. Additional requirements, specific to each SMP component, are provided in Section 4.10. Designers must ensure that requirements for all applicable components are met via their design drawings, notes, and specifications. Example sizing calculations can be found in Appendix D.

Maintenance Requirements

Post-construction maintenance requirements for various systems are detailed in Chapter 5.

Table 4.5. General design requirements for infiltration SMPs.

Design Parameter[a]	Bioretention	Rain garden	Stormwater planter	Tree planting / preservation	Dry basin
MAX. loading ratio, practice-to-contributing area	1:20	1:5	1:20	1:4	1:40
MAX. contributing area	5 acre	1000 sf	15000 sf	400 sf	5 acre
MIN. infiltration rate of underlying soils	0.5 in/hr	0.5 in/hr	0.5 in/hr	0.5 in/hr	0.5 in/hr
Vertical separation from groundwater / bedrock[b]	3' MIN	3' MIN	3' MIN	-	3' MIN
Surface ponding depth	12" MAX[c]	12" MAX	12" MAX[c]	-	-
Media layers	Mulch Eng. Soil Stone base	Mulch Eng. Soil Stone base	Mulch Eng. Soil Stone base	Mulch Topsoil	Native soils or Topsoil
Surfacing media depth	2-3" TYP	2-3" TYP	2-3" TYP	Varies	-
Leveling media depth	-	-	-	-	-
Planting/filter media depth	2.5' MIN 4' MAX	1' MIN 2' MAX	1.5' MIN	Varies	-
Stone base depth	12" MIN	6" MIN 12" MAX	12" MIN	-	-
Slope of practice surface	1:3 MAX	1:3 MAX	No Slope	-	1:3 MAX
Slope of practice bottom	No Slope	No Slope	No Slope	-	3% MAX
MAX. Drawdown time	Surface = 24hr Total = 48hr	Surface = 24hr Total = 48hr	Surface = 24hr Total = 48hr	-	Surface = 48hr

[a] SMPs in MS4 areas shall follow any additional criteria set forth in the NYS SWMDM for all parameters or components that are not already defined in the NYC SWM

[b] Minimum vertical separation from the top of groundwater table in sole source aquifers is increased to 4 feet.

[c] Storage in surface ponding area above planting media must be 75% of WQv to prevent bypass. This requirement is waived for infiltration practices when a connection is made between the surface ponding area and drainage course to increase rate of storage.

Table 4.5. General design requirements for infiltration SMPs. (Cont.)

Design Parameter[d]	Grass filter strip	Vegetated swale	Dry well	Stormwater gallery	Stone trench	Porous pavement	Synthetic turf field
MAX. loading ratio, practice-to-contributing area	1:3 (Prv.) 1:1.25 (Imp.)	-	-	-	-	-	-
MAX. contributing area	10,000 sf	5 acre	1 acre	5 acre	5 acre	5 acre	5 acre
MIN. infiltration rate of underlying soils	0.5 in/hr	0.5 in/hr	0.5 in/hr	0.5 in/hr	0.5 in/hr	0.5 in/hr	0.5 in/hr
Vertical separation from groundwater / bedrock[e]	3' MIN	3' MIN	3' MIN	3' MIN	3' MIN	3' MIN	3' MIN
Surface ponding depth	-	4" MAX[f]	-	-	-	-	-
Media layers	Native soils or Topsoil	Native soils or Topsoil	Stone base	Stone base	Pea gravel Stone base Sand filter	Leveling media Subbase[g] Stone base	Leveling media Subbase[g] Stone base
Surfacing media depth	-	-	-	-	6" TYP	-	-
Leveling media depth	-	-	-	-	-	2-4" TYP	2-4" TYP
Planting/filter media depth	-	-	-	-	6" MIN	-	-
Stone base depth	-	-	12" MIN	12" MIN	12" MIN	12" MIN	12" MIN
Slope of practice surface	15% MAX 8% MAX (AVG.)	1:3 MAX[h]	-	-	-	5% MAX	-
Slope of practice bottom	-	0.5% MIN 4% MAX	No Slope	No Slope	No Slope	-	No Slope
MAX. Drawdown time	-	-	Total = 48hr	Total = 48hr	Total = 48hr	Total = 48hr	Total = 48hr

[d] SMPs in MS4 areas shall follow any additional criteria set forth in the NYS SWMDM for all parameters or components that are not already defined in the NYC SWM

[e] Minimum vertical separation from the top of groundwater table in sole source aquifers is increased to 4 feet.

[f] Maximum depth of water in the vegetated channel

[g] In cases where geosynthetics do not provide adequate separation and stability, subbase may be added between leveling course and stone base in accordance with manufactuer's recommendation

[h] Maximum cross slope of the vegetated channel

4.5. Evapotranspiration Systems

ET is the process of water being transferred from the land to the atmosphere via the combination of evaporation from land surfaces and transpiration from plants. SMPs that primarily manage runoff by capturing it and slowly releasing it back into the atmosphere over time via ET are classified as ET systems. ET systems are also considered retention systems because their primary function reduces runoff.

There are several features that are common to all ET systems:

- Limited or no ability to infiltrate water due to the composition of underlying soils or physical barriers.
- Receive only direct rainfall or surface runoff (i.e., surface loading only)
- Shallow depth practice composed of mostly soil media, which promotes the natural wicking of moisture to the surface for ET.
- Means of draining excess runoff through outlet pipes, weep holes, drainage course, or other method

An outlet pipe is any pipe that can drain water from the practice before it is full. Typically, this would be a pipe that connects the storage zone of the practice with a point of discharge, such as a sewer, site drainage system, or structure with a controlled-flow orifice. For ET systems, outlet pipes can be used as a means to drain excess runoff, which is required to prevent ponding over long periods

Components used for ET systems vary, but may include surfacing mulch for moisture retention, engineered soil used to support vegetation, surface area used for ponding, drainage media, and geotextiles. The total volume of water that can be stored in the practice must meet or exceed the volume of runoff calculated for the stormwater management requirement. Further details on SMP sizing can be found in Section 4.3.

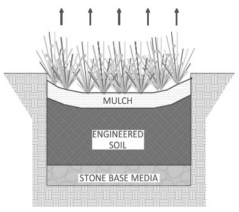
ET systems provide a range of stormwater management benefits, which include runoff reduction, peak flow mitigation, and treatment of pollutants from runoff. Vegetated systems may provide several added co-benefits such as heat island mitigation, ecologic function, community amenity, and removal of airborne pollutants.

The feasibility of ET systems can be limited by subsurface constraints and space constraints. In addition, surface constraints may limit the use of some vegetated ET practices. A description of each constraint may be found in Section 4.2. Readers should refer to the SMP Hierarchy Checklist (Appendix A) for details on how various constraints impact the use of specific SMPs.

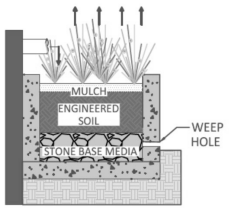
ET SMPs

SMPs that can be configured to function as ET systems include rain gardens, stormwater planters, tree plantings, and green roofs. In addition to these systems, other innovative systems may also qualify as ET practices, as described in Section 4.9. A brief description of each ET SMP is provided below, along with an example cross section. Please note that the cross sections are for illustrative purposes only and are not meant to show all required components. Further, systems described in this manual may differ from those used as part of the ROW green infrastructure program.

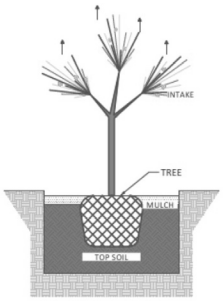
Rain garden - landscaped shallow depression that captures surface runoff. Typically used in residential applications. Similar to bioretention, but components are designed to manage runoff from small areas. Commonly consists of a surface ponding area, mulch layer, engineered soil with vegetation, and a shallow stone base for drainage.



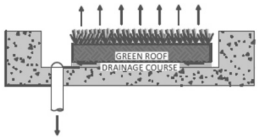
Stormwater planter - self-contained planter box with a concrete bottom. Commonly consists of a surface ponding area, mulch layer, engineered vegetation, and a stone base drainage layer. May also have weep holes to help drain excess water.



Tree planting (or preservation) – standalone trees (planted or preserved) that capture surface runoff. Commonly consists of a shallow surface ponding area and topsoil for tree planting. In the case of plantings, may also include a shallow drainage layer. This practice is counted towards a reduction of impervious area when calculating the runoff coefficient, rather than towards a required storage volume.



Green roof – series of built-up layers on a rooftop that supports vegetation. Commonly consists of a green roof media and drainage course. Some systems include other specialized layers for enhanced storage, filtration, or



Design Requirements

A comparison of general design requirements for each ET system is shown in Table 4.6. Additional requirements, specific to each SMP component, are provided in Section 4.10. Designers must ensure that requirements for all applicable components are met via their design drawings, notes, and specifications. Example sizing calculations can be found in Appendix D.

Maintenance Requirements

Post-construction maintenance requirements for various systems are detailed in Chapter 5.

Table 4.6. General design requirements for ET SMPs.

Design Parameter[a]	Rain garden	Stormwater planter	Tree planting / preservation	Green roof
MAX. loading ratio, practice-to-contributing area	1:5	1:5	1:4	1:1
MAX. contributing area	1000 sf	15000 sf	400 sf	-
MIN. infiltration rate of underlying soils	-	-	-	-
Vertical separation from groundwater / bedrock[b]	3' MIN	3' MIN	-	-
Surface ponding depth	3" MAX	3" MAX	-	-
Media layers	Mulch Eng. Soil Stone base[c]	Mulch Eng. Soil Stone base[c]	Mulch Topsoil	Green roof media Stone base[c]
Surfacing media depth	2-3" TYP	2-3" TYP	Varies	-
Leveling media depth	-	-	-	-
Planting/filter media depth	1' MIN 2' MAX	1.5' MIN	Varies	4" MIN[d]
Stone base depth	Varies	Varies	-	Varies
Slope of surface media	1:3 MAX	No Slope	-	Varies[e]
Slope of bottom of practice	No Slope	No Slope	-	Varies[e]
MAX. Drawdown time	-	-	-	-

[a] SMPs in MS4 areas shall follow any additional criteria set forth in the NYS SWMDM for all parameters or components that are not already defined in the NYC SWM

[b] Minimum vertical separation from the top of groundwater table in sole source aquifers is increased to 4 feet. Vertical separation requirements are waived for practices enclosed in concrete with adequate anchoring to withstand uplift pressures.

[c] Evapotranspiration practices must allow drainage of excess water via outlet pipe, weep hole, or other equivalent measure. Geosynthetics can be used as a drainage course instead of stone base, where appropriate, in accordance with manufacturer's specifications.

[d] Green roof media depth of 6-inches is preferred.

[e] Configuration of green roof systems varies widely, see manufacturer's specifications.

4.6. Reuse Systems

Reuse is the process of collecting rainfall or runoff and storing it for eventual reuse in other applications. SMPs that primarily manage runoff by capturing it and reusing it over time, in this case for non-potable and non-irrigation purposes, are classified as reuse systems. Reuse systems are also considered retention systems because their primary function reduces runoff.

There are several features that are common to all reuse systems:

- Enclosed containment area to hold runoff
- Connection with (or manual application to) a system that will reuse stormwater for non-potable and non-irrigation purposes
- Dewatering device

A dewatering device may be needed to empty the container for regular maintenance or cleaning. Common dewatering devices include a valve that releases water or a pump that discharges water. Components of reuse systems commonly include a watertight storage container, secure cover, screen for debris and mosquitoes, access hatch, and the dewatering device. The total volume that can be stored in the structure must meet or exceed the volume of runoff calculated for the stormwater management requirement. Further details on SMP sizing can be found in Section 4.3.

Reuse systems provide runoff reduction and peak flow mitigation through the capture of runoff. In addition, reuse systems help to reduce the demand on potable water.

The feasibility of reuse systems is usually based on the availability of a suitable reuse application, rather than the typical site or space constraints that limit other SMPs. Nonetheless, readers should still refer to the SMP Hierarchy Checklist (Appendix A) when assessing the suitability of various SMPs for the overall project.

Reuse SMPs

SMPs that can be configured to function as reuse systems include rain tanks and cisterns. In addition to these systems, other innovative systems may also qualify as reuse practices, as described in Section 4.9. A brief description of each reuse SMP is provided below, along with an example cross section. Please note that the cross sections are for illustrative purposes only and are not

notes, and specifications. Example sizing calculations can be found in Appendix D.

Maintenance Requirements

Post-construction maintenance requirements for various systems are detailed in Chapter 5.

4.7. Filtration Systems

Filtration is the process of passing a liquid through a porous medium to trap and separate solids from the liquid. SMPs that primarily manage runoff by filtering out pollutants are classified as filtration SMPs. Filtration SMPs are not considered retention SMPs because they often provide limited runoff reduction. As indicated in Appendix A, filtration practices may not be used towards meeting the water quality stormwater management requirement in CSS areas.

There are several features that are common to all filtration systems:

- Contains a filtration medium that runoff is passed through, which is deep enough to facilitate pollutant removal
- Have an outlet pipe that promotes the continuous filtration of runoff

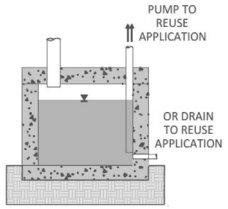
An outlet pipe is any pipe that drains water from the practice before it is full. In filtration systems, the outlet pipe is located beneath the filtration medium to continuously remove water from the system after it has been filtered. This outlet pipe would typically be a pipe that connects the drainage media of the practice with a point of discharge, such as a sewer, site drainage system, or structure with a controlled-flow orifice.

Components used for filtration systems vary but may include a filtration medium (such as engineered soil, sand, or sand/peat blend); temporary storage area above the filtration medium (can be surface or subsurface); stone base to promote drainage; geotextiles; and an outlet pipe. The total volume of water that can be stored in the practice must meet or exceed the volume of runoff calculated for the stormwater management requirement. Further details on SMP sizing can be found in Section 4.3.

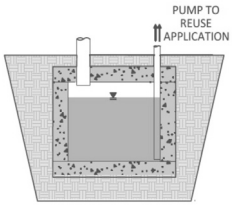
Filtration systems, mainly targeting the treatment of pollutants from runoff, are more limited in stormwater management benefits in comparison to other systems. However, some peak flow reduction may occur where temporary storage areas are used, and some runoff reduction may occur where engineered soils are used as filtration media. Vegetated systems may provide several added co-benefits such as heat island mitigation, ecologic function, community amenity, and removal of airborne pollutants.

meant to show all required components. Further, systems described in this manual may differ from those used as part of the ROW green infrastructure program.

Rain tank – container that is used to store runoff at or above grade. Typically connected to a system that will automatically and continuously reuse water over time.



Cistern – container that is used to store runoff below grade. Typically connected to a system that will automatically and continuously reuse water over time.



Design Requirements

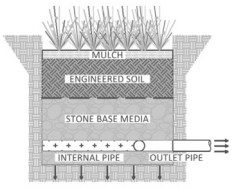
Rain tanks and cisterns are typically manufactured products, available in a wide range of potential materials, sizes, and geometries. As such, designers shall meet all manufacturer recommendations for the installation, use, and maintenance of the system. Additional requirements, specific to each SMP component, are provided in Section 4.10. Designers must ensure that requirements for all applicable components are met via their design drawings,

The feasibility of filtration systems can be limited by subsurface constraints and space constraints. In addition, surface constraints may limit the use of vegetated infiltration practices. A description of each constraint may be found in Section 4.2. Readers should refer to the SMP Hierarchy Checklist (Appendix A) for details on how various constraints impact the use of specific SMPs.

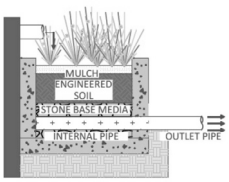
Filtration SMPs

SMPs that can be configured to function as filtration systems include bioretention, stormwater planters, porous pavements, synthetic turf fields, sand filters, and organic filters. In addition to these systems, other innovative systems may also qualify as filtration practices, as described in Section 4.9. A brief description of each filtration SMP is provided below, along with an example cross section. Please note that the cross sections are for illustrative purposes only and are not meant to show all required components. Further, systems described in this manual may differ from those used as part of the ROW green infrastructure program.

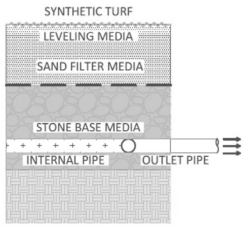
Bioretention - landscaped shallow depression that captures surface runoff. Typically used in dense urban areas. Similar to rain gardens, but components are designed to manage runoff from large areas. Commonly consists of a surface ponding area, mulch layer, engineered soil with vegetation, and stone base to promote drainage.



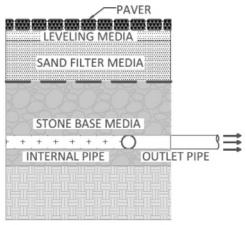
Stormwater planter - self-contained planter box with a permeable or lined bottom. Commonly consists of a surface ponding area, mulch layer, engineered soil with vegetation, and stone base.



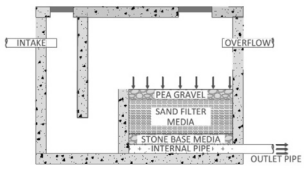
Synthetic turf field – synthetic turf material that allows runoff to percolate into underlying layers. Common underlying layers include a shock absorbing pad, leveling course, sand filter media, and a stone base. Due to their size, many synthetic turf fields also include internal pipes to help spread water evenly across the entire storage area.



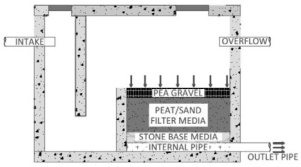
Porous pavement – pavements that contain voids which allow runoff to percolate into underlying layers. The surface of these systems can either be entirely porous pavement or a grid of pavers and porous materials, such as grass or gravel. Common underlying layers include a leveling course, sand filter media, and a stone base.



Sand filter – typically a prefabricated chamber that contains a filter bed of sand. The chamber also facilitates the temporary storage of water above the filer bed as it percolates through the sand filter.



Organic filter – typically a prefabricated chamber that contains a filter bed of organic media. The chamber also facilitates the temporary storage of water above the filter bed as it percolates through the organic media filter.



Design Requirements

A comparison of general design requirements for each filtration system is shown in Table 4.7. Additional

requirements, specific to each SMP component, are provided in Section 4.10. Designers must ensure that requirements for all applicable components are met via their design drawings, notes, and specifications. Example sizing calculations can be found in Appendix D.

Table 4.7. General design requirements for filtration SMPs.

Design Parameter[a]	Bioretention	Stormwater planter	Porous pavement	Synthetic turf field	Sand filter	Organic filter
MAX. loading ratio, practice-to-contributing area	1:20	1:20	1:60	1:60	1:60	1:30
MAX. contributing area	5 acre	15000 sf	5 acre	5 acre	10 acre	10 acre
MIN. infiltration rate of underlying soils	-	-	-	-	-	-
Vertical separation from groundwater / bedrock[b]	3' MIN	3' MIN	3' MIN	3' MIN	3' MIN	3' MIN
Surface ponding depth[c]	6" MIN 12" MAX	6" MIN 12" MAX	Varies	Varies	6" MIN	6" MIN
Media layers	Mulch Eng. Soil Stone base	Mulch Eng. Soil Stone base	Leveling media Subbase[d] Sand filter Stone base	Leveling media Subbase[d] Sand filter Stone base	Pea gravel[e] Sand filter Stone base	Pea gravel[e] Peat/sand filter Stone base
Surfacing media depth	2-3" TYP	2-3" TYP	-	-	Varies[e]	Varies[e]
Leveling media depth	-	-	2-4" TYP	2-4" TYP	-	-
Planting/filter media depth	2.5' MIN	1.5' MIN	1.5' MIN	1.5' MIN	1.5' MIN	1.5' MIN
Stone base depth	12" MIN	12" MIN	12" MIN	12" MIN	6" MIN	6" MIN
Slope of surface media	1:3 MAX	No Slope	5% MAX	-	-	-
Slope of bottom of practice	No Slope	No Slope	-	No Slope	-	-
MAX. Drawdown time	Surface = 24hr Total = 48hr	Surface = 24hr Total = 48hr	Total = 48hr	Total = 48hr	Total = 48hr	Total = 48hr

[a] SMPs in MS4 areas shall follow any additional criteria set forth in the NYS SWMDM for all parameters or components that are not already defined in the NYC SWM

[b] Minimum vertical separation from the top of groundwater table in sole source aquifers is increased to 4 feet. Vertical separation requirements are waived for practices enclosed in concrete with adequate anchoring to withstand uplift pressures.

[c] Storage in ponding area above filtration media must be 75% of WQv to prevent bypass. This requirement cannot be waived for filtration practices.

[d] In cases where geosynthetics do not provide adequate separation and stability, subbase may be added between leveling course and stone base in accordance with manufactuer's recommendation.

[e] Surfacing media type and depth for protection of filtration media varies. Other types of surfacing media can include debris screens and topsoil.

4.8. Detention Systems

Detention is the process of temporarily holding back stormwater so that it may be released in a controlled manner at a lower rate. SMPs that primarily manage runoff by detaining runoff to reduce the peak flow rate felt by downstream systems are classified as detention SMPs. Detention SMPs are not considered retention SMPs because they often provide limited runoff reduction.

There are several features that are common to all detention systems:

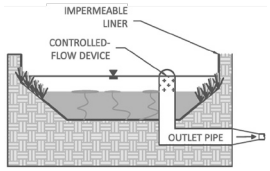
- Device which controls the flow rate of runoff that exits the practice, such as an orifice
- Temporary storage zone that can fill-up when the inflow rate is greater than the release rate
- Hydraulic connection between the controlled-flow device and temporary storage zone, usually via an outlet pipe

An outlet pipe is any pipe that drains water from the practice before it is full. In detention systems, the outlet pipe typically connects the drainage layer of the practice with a structure that contains a controlled-flow orifice.

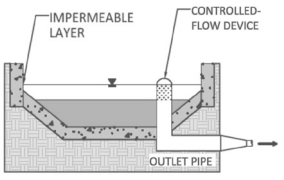
The temporary storage zone of detention systems is usually either a surface area for ponding, enclosed container, or subsurface stone base. Other common components can include engineered soil used to support vegetation, geotextiles, controlled-flow orifice, and internal structures or pipes used to help distribute or store water. The total volume of water that can be stored in the practice must meet or exceed the volume of runoff calculated for the stormwater management requirement. Further details on SMP sizing can be found in Section 4.3.

Detention systems, mainly targeting the reduction of peak flow rates, are more limited in stormwater management benefits compared to other systems. However, some runoff reduction may occur in systems where soil media are used. Vegetated systems may provide several added co-benefits such as heat island mitigation, ecologic function, community amenity, and removal of airborne pollutants.

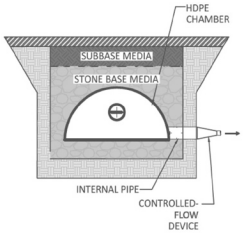
The feasibility of detention systems can be limited by subsurface constraints and space constraints. In addition, surface constraints may limit the use of vegetated detention practices. A description of each constraint may



Wet basins/ponds – a permanent pool of water used to treat stormwater, usually underlain by impervious soils or a liner. These systems allow for additional, temporary storage above the permanent pool.



Stormwater gallery – subsurface area (typically rectangular) that is excavated and then filled with stone base, prefabricated structures, chambers, or pipes used to store water. Usually larger than a typical dry well system and, as a result, may treat larger drainage areas.



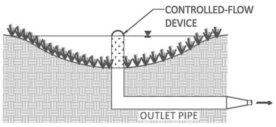
Blue roof – any rooftop that is outfit with a system that temporarily holds back water on the roof surface. Common

be found in Section 4.2. Readers should refer to the SMP Hierarchy Checklist (Appendix A) for details on how various constraints impact the use of specific SMPs. As indicated in Appendix A, only select detention practices with treatment abilities may be used towards meeting the water quality stormwater management requirement in MS4 areas.

Detention SMPs

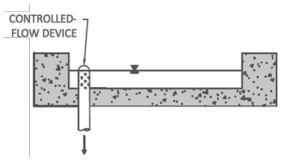
SMPs that can be configured to function as detention systems include dry basins, constructed wetlands, wet basins (or ponds), stormwater galleries, blue roofs, and detention tanks. In addition to these systems, other innovative systems may also qualify as detention practices, as described in Section 4.9. A brief description of each detention SMP is provided below, along with an example cross section. Please note that the cross sections are for illustrative purposes only and do not show all potential components. Further, systems described in this manual may differ from those used as part of the ROW green infrastructure program.

Dry basin - earthen depression that is typically planted with grasses and functions as one large surface ponding area. May be constructed on pervious or non-pervious soils when used as a detention system.

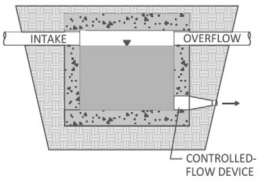


Constructed wetlands – an artificial wetland that is created using impervious soils or liners, within which vegetation and a permanent pool of water are used to treat stormwater. These systems allow for additional, temporary storage above the permanent pool.

systems include check-dams, modular storage units, or roof drain restriction devices.



Detention tank – enclosed tank with a device that controls the release rate of water. Common devices include a controlled-flow orifice or pump.



Design Requirements

A comparison of general design requirements for each detention system is shown in Table 4.8. Additional requirements, specific to each SMP component, are provided in Section 4.10. Designers must ensure that requirements for all applicable components are met via their design drawings, notes, and specifications. It is essential that designers configure the detention system to maintain the appropriate maximum release rate for either CSS or MS4 areas, as specified in Equation 2.5. Example sizing calculations can be found in Appendix D.

Table 4.8. Basic design requirements for detention SMPs.

Design Parameter	Dry basin	Constructed wetland[a]	Wet basin/pond[a]	Stormwater gallery	Blue roof	Detention tank
MAX. (MIN.) loading ratio, practice-to-contributing area	1:40	(1:100)	(1:100)	-	-	-
MAX. (MIN.) contributing area	5 acre	(25 acre)	(25 acre)	5 acre	-	-
MIN. infiltration rate of underlying soils	-	-	-	-	-	-
Vertical separation from groundwater / bedrock[b]	3' MIN	3' MIN	3' MIN	3' MIN	-	3' MIN
Has a permanent pool?	No	Yes	Yes	No	No	No
Slope of surface media	1:3 MAX	1:3 MAX	1:3 MAX	-	-	-
Slope of bottom of practice	3% MAX	3% MAX	3% MAX	No Slope	-	-
MAX. Drawdown time	Temp. Storage Area = 48hr	Temp. Storage Area = 48hr	Temp. Storage Area = 48hr	Temp. Storage Area = 48hr	Temp. Storage Area = 24hr	Temp. Storage Area = 72hr

[a] SMPs in MS4 areas shall follow any additional criteria set forth in the NYS SWMDM for all parameters or components that are not already defined in the NYC SWM

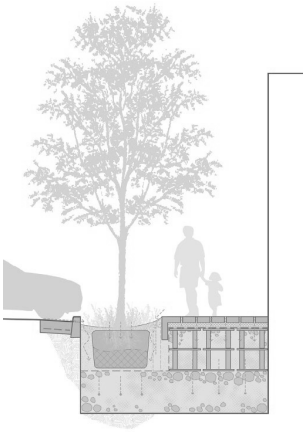
[b] Minimum vertical separation from the top of groundwater table in sole source aquifers is increased to 4 feet. Vertical separation requirements are waived for practices enclosed in concrete with adequate anchoring to withstand uplift pressures.

4-32

Hybrid Systems

Hybrid systems refer to cases where two or more SMPs of the same function are integrated as one practice. Typically, hybrid systems involve the use of two infiltration systems that share a single storage zone. For example, a bioretention and porous pavement system that are located adjacent to one another and drain into a shared stone base (Figure 4.12).

Figure 4.12. Illustration of a hybrid system that incorporates bioretention and porous pavement features (image courtesy of SCAPE).

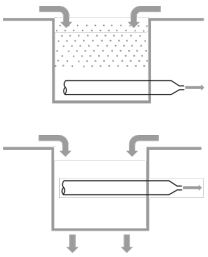


If each SMP of the hybrid system meets all applicable design criteria, then no special approvals are required for their use. When this is not the case, hybrid systems must gain approval through the same processes identified for proprietary systems. While most hybrid systems are anticipated to be infiltration systems, other types may be feasible at the discretion of NYC DEP.

Dual Function Systems

Dual function systems refer to cases where one SMP is configured to support runoff management via two, equally contributing functions. The two most common types of dual function systems is one with filtration/detention systems and infiltration/detention systems, as illustrated in Figure 4.13.

Figure 4.13. Illustration of the two most common dual function systems.



While these are the most common types, other dual function systems may be possible. A brief description and examples of the two common dual function systems are presented in the following paragraphs.

Filtration/Detention Systems

Dual function systems for filtration/detention are designed to allow water to pass through a filtration media, which then drains to a controlled-flow device for slow release. These systems rely on both the steady flow of water and the ability to control the release rate.

Any of the standard filtration practice may be designed with a controlled-flow device to facilitate detention. No special approvals are required when the SMP meets all of the design criteria for filtration systems and has a controlled-flow device with a maximum release rate of 0.1 cfs/acre. In cases where one or both of these conditions are not met, dual function filtration/detention systems must gain approval through the same processes identified for proprietary systems.

If a release rate of 0.1 cfs/acre would require an orifice less than one-inch, a one-inch orifice may be accepted, at the discretion of NYC DEP, when another detention

4-34

4.9. Innovative Systems

SMP technologies are constantly evolving as innovations are made in their components and configurations. As such, new and innovative systems may not conform to the standard practices or common functions outlined in the previous sections. NYC DEP supports the use of innovative practices through several pathways for the approval of proprietary, hybrid, and dual function technologies. This section outlines the approval process for these systems.

Proprietary Systems

Proprietary systems encompass a broad range of manufactured SMPs that are made available by commercial vendors. These systems can vary widely in terms of components and intended function. Some examples of common proprietary systems include:

- Hydrodynamic separators – flow-through structures that use the dynamics of moving water to separate and deposit pollutants such as sediment and floatables. Typically, this system involves creating a centrifugal flow and/or movement through a series of baffles.
- Alternative media filters – systems that filter runoff using an alternative medium, such as fabrics, activated carbon, perlite, zeolite, or other blended media.
- Modular infiltration systems – prefabricated structures with proprietary components that facilitate the storage and infiltration of runoff.
- Enhanced green roofs – green roofs that manage stormwater using proprietary media other than soils, such as retention fabrics, detention meshes, and modular storage components.

This list of common proprietary systems is not meant to be exhaustive and, in fact, new systems will continue to become available over time. In general, the use of proprietary systems must be approved when one or more of the following are true:

- The system does not meet the design criteria of standard practices outlined in this chapter
- The system function does not correspond to the standard functions outlined in this chapter
- The system seeks a variance in the methods used for determining storage capacity

For application in MS4 areas, proprietary systems must be evaluated and approved via one of the processes outlined in the NYS SWMDM. These processes include the US EPA Environmental Technology Verification Program (ETV), the state of Washington Technology Assessment Protocol – Ecology (TAPE), or the Technology Acceptance Reciprocity Partnership Protocol (TARP). Proprietary systems that are verified or certified by the ETV, TAPE, or TARP process as meeting the treatment criteria detailed in the NYS SWMDM are approved for use in MS4 areas.

Proprietary systems that are approved via the NYS SWMDM processes may also be used in CSS areas. In addition, NYC DEP may also evaluate and approve proprietary systems for application in CSS areas on a case-by-case basis. For approval from NYC DEP, designers must demonstrate that the proprietary system will either achieve the desired level of infiltration, ET, reuse, or detention; or result in an equivalent reduction of CSO volume. Depending on the type of proprietary system, this may involve showing that:

- Infiltration and ET systems have an active storage zone that is sufficient to fully capture the water quality event and recharge that capacity in a timely manner.
- ET systems with alternative storage methods (e.g., non-soil storage) will achieve sufficient ET either by wicking to the green roof media layer or by direct evaporation.
- Reuse systems do not rely on water uses that would impair another systems stormwater management capability.
- Detention systems are able to maintain a maximum release rate of 0.1 cfs/acre for the sewer operations event.

Approved technologies must be sized to manage runoff from contributing areas for the appropriate design event. Storage-based practices may be sized in accordance with the storage volume methods of Section 4.3. Designers are responsible for meeting all design criteria, guidelines, and recommendations provided by the manufacturer for that system, including, but not limited to, structural integrity, components, configuration, installation, operation, and maintenance. In addition, designers must ensure that any requirements related to setbacks, subsurface conditions, inflow/outflow rates, bypass, overflow, accessibility, maintenance, or safety issues are addressed.

4-33

system is located downstream. If the flow rate through the controlled-flow device is more restrictive than the filtration media, designers must use the controlled-flow rate to calculate drawdown time.

With regards to storage volume, the active storage zone for both filtration and detention practices are the same. The bottom of the active storage zone is the invert elevation of the outlet pipe, while the top is the elevation at which water may overflow or bypass the system. Therefore, the volume of the practice used for both functions is the same.

Filtration/detention practices may apply 100% of their volume towards the water quality criterion (WQv) and 50% towards the sewer operations criterion (Vv). Finally, if the filtration / detention system uses an engineered soil media filter, 40% of the volume may be applied towards the runoff reduction criterion (RRv).

Infiltration / Detention Systems

Dual function systems for infiltration/detention are designed with an outlet pipe that is raised above the bottom of the practice and drains water to a controlled-flow device. This means that water below the outlet pipe is captured and infiltrated, while water above the invert of the outlet pipe is detained.

Any standard infiltration practice with a stone base may be designed with a controlled-flow device to facilitate detention, except for rain gardens. No special approvals are required when the SMP meets all of the design criteria for infiltration systems and also has a controlled-flow device with a maximum release rate of 0.1 cfs/acre. In cases where one or both of these conditions are not met, dual function filtration/detention systems must gain approval through the same processes identified for proprietary systems.

If a release rate of 0.1 cfs/acre would require an orifice less than one-inch, a one-inch orifice may be accepted, at the discretion of NYC DEP, when another detention system is located downstream.

The calculation of drawdown time and application of volumes is more complex for infiltration / detention systems since their storage volumes are defined differently. The volume that functions as infiltration is only the volume below the invert elevation of the outlet pipe, whereas the volume that functions as detention is the volume above the invert elevation of the outlet pipe up to the elevation that either overflow or bypass occurs. With that in mind, two drawdown times must be computed. One for the drawdown time of the infiltration volume and another for the drawdown time of the detention volume.

Of the volume that functions as infiltration, 100% may be applied towards the WQv and RRv, while 50% may be applied towards the Vv. Of the volume that functions as detention, 100% may be applied towards the WQv in CSS areas and 50% may be applied to the Vv. However, if the practice does not have any planting or filtration media (e.g., stormwater gallery), then 100% of the volume that functions as detention may be applied toward the Vv. The storage volumes for each function of infiltration/detention systems must be clearly identified in section view as part of permit applications.

4-35

4.10. SMP Components

SMPs are designed as systems with several components that work together to ensure the functionality of the practice. This section provides guidance and requirements for the design of each common SMP component. Designers must ensure that requirements for all applicable components are met via their design drawings, notes, and specifications. The designer may propose systems with components that are not mentioned here, subject to approval by NYC DEP.

Pre-treatment

Pre-treatment refers to systems that help remove sediment, floatable debris, hydrocarbons, and/or other contaminants commonly found in stormwater runoff before they enter an SMP.

All inlets that ultimately drain to a subsurface practice must have pre-treatment systems that help to remove sediments and floatables. This requirement helps protect the SMP against the reduction of storage capacity, clogging of internal pipes, and/or loss of infiltration that sedimentation can cause over time. Designers should refer to the inlet component subsection for more details.

Beyond the required pre-treatment systems for inlets, designers shall consider other measures in cases where sedimentation risks are increased due to land uses, topography, or high permeability of underlying soils (greater than 2 in/hr). In these cases, additional pre-treatment measures, such as a forebays, vegetated swales, filter strips or hydrodynamic separators may be required, at the discretion of NYC DEP.

Pretreatment may be of particular importance for industrial maintenance facilities where pollutants of concern include, salt, oils, and grease. In addition to the measures described above, pre-treatment devices such as media filters and sorbents have been shown to be effective at removing oils and grease (CWP 2007, Pitt et al. 1999). Salt, however, is highly soluble and is not readily removed by structural management practices, including media filters. Pollution prevention, such as covering salt storage areas or placing impermeable barriers around salt piles is the most effective method of reducing salt transport via stormwater runoff (WDNR 1994, MPCA 2000).

Ponding Area

Ponding areas are used to temporarily store runoff at the surface of an SMP. Most SMPs with ponding areas allow depths of up to 12-inches, except for ET SMPs which allow up to 3-inches, as well as a few specific practices that temporarily store all their volume at the surface (e.g., dry basins). Ponding areas must drawdown within 24-hours to mitigate the risk of mosquito breeding, except for dry basins which are allowed 48-hours to drawdown. Drawdown time calculations are provided in Section 4.3.

Most practices that filter water through a planting or filtration media must be able to temporarily hold 75% of the WQv above the filter media to avoid bypass of the WQ event (see design criteria). This is typically done in the ponding area but may also be achieved by an equalization structure. For infiltration practices, this requirement is waived when a hydraulic connection is made between the ponding area and stone base, such as a riser pipe or stone gabion. Designers must consider measures to reduce the sedimentation risks of hydraulic connections, such as raising the connection above the lowest ponding elevation, providing screens, or other alternatives.

A minimum 3 inches of freeboard (i.e., depth between maximum surface ponding and adjacent grade) is required for all ponding areas. Overflow devices shall be used to control the maximum surface ponding depth. Typical overflows consist of a riser pipe and domed grate.

In cases where the surface of an SMP is not level, the ponding depths may vary across the practice, but the minimum and maximum allowable values must be followed. When graded slopes are used to create ponding areas, a maximum side slope of 1V:3H shall be used.

Other considerations for the design of the ponding depth may include adjacent land use, site constraints, and the potential need for public safety measures. Specifically, in cases where ponding area design may present public hazards, designers shall consider signage, barriers, and/or other safety measures to mitigate such hazards.

Permanent Pool

Unlike ponding areas, a permanent pool is a surface area where water is permanently held. Typically, permanent pools are underlain by an impermeable soil or liner to prevent them from draining. Wetlands and wet ponds have

permanent pools that help to treat runoff through sedimentation and biological processes.

SMPs with permanent pools require a 25-foot buffer area between the point of maximum water surface elevation and any site features. Trees in the buffer area should be preserved during construction. Warning signs must be posted around SMPs with permanent ponds, which prohibit swimming, wading, and skating; warn of possible contamination or pollution of pond water; and indicate the maximum depth of the pond. In addition, designers shall also consider barriers and/or other safety measures to mitigate public hazards.

The perimeter of all permanent pools with depths of 4ft or more must have an aquatic bench and a safety bench. In these cases, the boundary of the permanent pool will have four distinct zones, each with its own slope requirement:

- Aquatic bench – extends from the edge of the normal water level, 15ft inwards towards the basin floor. Maximum slope of 1V:10H.
- Pool slope – extends from the aquatic bench to the basin floor. Maximum slope of 1V:2H.
- Safety bench – extends from the edge of the normal water level, 15ft outwards towards the edge of the practice. Maximum slope of 1V:15H.
- Toe slope – extends from the safety bench to the edge of the practice. Maximum slope of 1V:3H.

Each permanent pool must have an outlet pipe that, when activated, can drain the pond within 24 hours. In addition, the outlet pipe shall have an elbow or protected intake to prevent sediment deposition within the pipe.

Vegetation

Establishing vegetation is essential to the functionality of a vegetated practice. Plants should be chosen based on their hardiness, soil and light conditions, root structure, and ability to adapt to wet and dry conditions. The vegetative cover and root systems should promote infiltration within the engineered soil, provide an aesthetic benefit, and help prevent erosion, particularly on surface side slopes.

In cases where runoff enters a practice via a vegetated surface, the entrance velocity of runoff may not exceed erosive velocities. If the grading of adjacent areas cannot be modified to prevent erosive velocities, or the practice receives surface water from a rooftop drain pipe, energy dissipation measures must be used to limit erosion (see energy dissipation components).

Given that landscaping is critical to the performance of vegetated SMPs, a landscaping plan must be provided for these systems. Guidance on the selection and planting of SMP vegetation can be found in the Native Species Planting Guide for New York City, which is available online at the NYC DPR publications webpage (www.nycgovparks.org/greening/natural-resources-group/publication). In general, considerations for the development of landscaping plans include:

- Vegetation should be selected that are capable of withstanding frequent cycles of inundation and drought.
- Native plant species should be specified over non-native species.
- The prevalence of wet, dry, sunny, or shady zones within the SMP should be considered as part of the landscaping plans.
- Where trees are proposed, an understory of shrubs and herbaceous materials should be provided.
- Woody vegetation should not be specified at inflow locations.
- For on-site facilities, a tree spacing of approximately 10 feet on-center is recommended.
- The recommended spacing for shrubs is 5 feet on-center for large container sizes (5gal or more), 3 feet on center in standard applications, and 1.5 foot on-center for small rain gardens.
- The recommended spacing for herbaceous vegetation is 2 feet on-center for grasses and 1.5 feet for perennials.

Media

Most SMPs consist of a series of built-up media layers that work together to manage stormwater. A wide range of media types have been developed for SMPs, which have an equally wide range of naming conventions and compositions. Table 4.9 includes standard names and compositions for ten media types, which are to be used for SMP design. A general description for each media type is as follows:

- Mulch – used on the surface of soils for moisture retention and nutrients

- Pea gravel – used on the surface of filters or other media to reduce direct contact or scour
- Engineered soil – default soils to be used for planting areas, except for special cases
- Topsoil – specialized soils for standalone tree plantings or soil amendments that have more fine and nutrient content
- Green roof media – specialized soils for green roofs that are lightweight and fast draining
- Sand filter media – sand media that is intended to filter percolating water
- Peat/sand filter media – peat/sand media blend that is intended to filter percolating water
- Stone base media – default media to be used for storage and/or drainage layers
- Leveling media – used under porous pavements and synthetic turf fields to increase contact area and allow leveling
- Subbase media – may be used as a transition between the leveling media and stone base media for added separation and stability

The design criteria tables in Sections 4.4-4.8 indicate which media are appropriate for each practice type, along with their required depths. Guidance on the composition for each media type are provided in Table 4.9. Practices that are not constructed in accordance with these media guidelines may be rejected, at the discretion of NYC DEP.

Wherever trees are used, practices must have at least 2.5 feet depth of soil media, which would be topsoil for standalone tree plantings and engineered soil for other practices. All other vegetation requires at least 1 foot depth of soil media, with a depth of 2 feet being preferred.

The installation of stone base should be done in lifts of 6-8 inches, with care taken not to over-compact the subgrade or stone base layers. Over-compaction can result in lower than anticipated storage potential and a reduction in infiltration rates. Any practice that uses a subsurface stone base must include an observation well or other means of observing the subsurface water level (see the Observation Well component subsection).

Table 4.9. Composition guidance for the ten SMP media types.

Media Name	Composition	Additional Guidance
Mulch (Surfacing Media)	Shredded hardwood	Aged 6-months minimum
Pea gravel (Surfacing Media)	ASTM D 448 No. 6	Clean and free of fines Rounded bank run gravel
Engineered soil, CSS areas	By weight: Gravel (> 2.0mm) 0-8% Sand (0.05-2mm) 80-85%, of which: Course Sand (0.5-1mm) 0-5% Medium Sand (0.25-0.5mm) 55-75% Fine Sand (0.1-0.25mm) 20-40% Silt (0.002-0.05mm) 5-10% Clay (<0.002mm) 3-8% Organic Matter 3-6%	pH 5.0-7.0 Kjeldahl N - 0.06 - 0.25% (NO-3 < 20ppm) Phosphorous - 80 - 100 lbs/acre Potasium - 100 - 300 lbs/acre Acid-producing Soil Test pH > 4.5 Free of refuce, hard clods, woody vegetation, stiff clay, construction debris (of any kind), boulders, stones greater than 1-1/2 inch, chemicals, or other deleterious material toxic to any vegetation used on this project
Engineered soil, MS4 areas	By volume: Sand (0.05-2mm) 35-60% Silt (0.002-0.05mm) 30-55% Clay (<0.002mm) 10-25% Organic Matter 1.5-4%	pH 5.2-7.0 Phosphorous > 75 lbs/acre Potasium > 85 lbs/acre Magnesium > 35 lbs/acre Free of stones, stumps, roots, or other woody material over 1" in diameter. Brush or seeds from noxious weeks.
Topsoil media	By weight: Gravel (> 2.0mm) < 20% Sand (0.05-2mm) 65-70% Silt (0.002-0.05mm) 10-30% Clay (<0.002mm) < 10% Organic Matter 5-9%	pH 6.0-7.5
Green roof media	By weight: Silt (0.002-0.05mm) ≤ 10% Clay (<0.002mm) ≤ 2% Organic Matter ≤ 8%	pH 6.0-8.5 Maximum water holding capacity 35-65%
Sand filter media	Clean AASHTO M-6 or ASTM C-33 concrete sand	Sand substitutes such as diabase and graystone #10 are not acceptable. No calcium carbonated or dolomitic sand substitutions are acceptable. "Rock dust" cannot be substituted for sand.
Peat/Sand filter media	By volume: 50% Reed-sedge hemic peat 50% Clean AASHTO M-6 or ASTM C-33 concrete sand	Sand guidance: see above Peat guidance: Ash Content <15% pH 4.9-5.2 Loose bulk density 0.12-0.15 g/cc Shredded, uncompacted, uniform, and clean
Stone base media	ASTM No. 57 Stone	Clean and free of fines Maximum wash loss of 0.5% Maximum abrasion of 10% for 100 revolutions and 50% for 500 revolutions
Leveling media	ASTM No. 89 Stone	
Subbase media	ASTM No. 2 Stone	Clean and free of fines

Subgrade (Underlying Soils)
Subgrade refers to the native soils that are underneath the base of an SMP. Prior to the installation of SMPs, the subgrade must be evaluated in accordance with the NYS SWMDM procedures (Appendix D: Infiltration Testing Requirements). Only subgrades with an infiltration rate of 0.5 in/hr or more are suitable for infiltration practices. Alternatively, when the permeability rate is 2.0 in/hr or greater, additional pre-treatment measures may be needed to reduce the risk of contaminant transport.

Wherever possible, SMPs should be designed with a permeable bottom between the SMP base and the subgrade to help facilitate infiltration, even in cases where the practice is not considered an infiltration practice (i.e., permeability rates are low). However, SMPs may not have a permeable bottom in the following cases:

- land uses may result in contaminated runoff,
- geotechnical tests indicate that native soils may be contaminated, or
- water table or bedrock are within three feet of the bottom of the practice

After SMP excavation, particular care should be taken not to compact the subgrade prior to placement of the stone base or other components. In cases where compaction could not be avoided, the subgrade shall be restored via tilling or aerating prior to placement of the stone base or other components.

In addition, the subgrade surface should be scarified prior to the placement of any infiltration practices. In cases where erosion of the subgrade has resulted in an accumulation of fine materials at the proposed base of an SMP, remove these materials to a depth of 6-inches and replace with engineered soil.

It is recommended that the stone base and other components are placed immediately after subgrade preparation to prevent the accumulation of debris or sediment.

Internal Structures
Internal structures refer to any interior container that is used to store water, typically located within the drainage layer of the SMP. Internal structures include modular systems, such as chambers, tanks, cisterns, crates, or other pre-cast units, as well as storage pipes.

In the case of modular systems, designers must follow all manufacturer guidelines for their design and installation. This may include, but is not limited to, guidelines for setbacks, spacing, cover, base depth, hydraulic connections, and maintenance access. In the case of storage pipes, refer to the internal pipe component subsection.

Geotextile
Geotextile fabrics should be used along the sides and top of the drainage layer, where the drainage layer interfaces with native soils, engineered soils, and filtration media. Geotextile fabrics should not be used at the base of practices, as the fabric is more likely to become clogged and impede infiltration. In addition, geotextile fabrics should not be used around perforated pipes, when they are within the drainage layer of an SMP, to help reduce the potential for clogging.

Non-woven geotextile fabrics are the most appropriate type for allowing and sustaining infiltration. It is critical that the geotextile fabric does not impede flow rates, and designers shall specify materials accordingly. Heat-bonded nonwoven fabrics are not recommended, because they tend to clog very quickly. Designers should review manufacturer's recommendations to avoid placement that would void the warranty.

Adjacent strips of geotextile filter fabric shall overlap a minimum of 16 inches and shall be secured at least 4 feet outside of bed until all bare soils contiguous to beds are stabilized and vegetated.

Geomembranes
SMPs must be completely lined with a geomembrane in the following cases:

- land uses may result in contaminated runoff, or
- geotechnical tests indicate that native soils may be contaminated

Geomembranes may also be used along the sides of practices to reduce the risk of water intrusion when SMPs cannot meet setback requirements from structures, at the discretion of NYC DEP. In this case, the impervious liner shall extend from the top of the freeboard to 12 inches beneath the bottom of the practice and shall cover the full width of the excavation.

All geomembranes shall be made of high-density polyethylene. The geomembrane liner shall be sufficiently anchored along the upper edge to prevent slipping and shall not extend to the surface where it would be visible. Specific material requirements for geomembranes include the following:

- ASTM D751 (30 mm thickness)
- ASTM D412 (tensile strength 1,100 lb, elongation 200%)
- ASTM D624 (tear resistance 150 lb/in)

Inlets
An inlet is any structure that captures water which eventually drains to an SMP. They are usually located at the low points of a site. Common types of inlets include yard drains, catch basins, and manholes with a slotted frame. All inlets must include where appropriate:

- A minimum 1-foot sump to allow for sediment collection and removal
- Hood or baffle to allow for containment of floatable debris
- ADA (Americans with Disabilities Act) compliant grates, if placed over pedestrian surfaces
- H-20 loading grates, if placed in locations with vehicular traffic

To prevent flooding, inlets shall include a means of bypassing the practice once it is full. This is often a bypass pipe that connects to a drainage system downstream of the practice. The invert of the bypass shall match or exceed the maximum storage elevation of the SMP. In cases where a bypass pipe is not feasible, designers must show that flow rates to the inlet will not cause surcharge within 6-inches of the inlet surface when the practice is full.

Pre-treatment components, such as the sump and the hood or baffle, are particularly important for reducing the amount of sediment and debris that are conveyed to the SMP. This requirement helps protect the SMP against the reduction of storage capacity, clogging of internal pipes, and loss of infiltration that sediment and debris can cause over time.

Hoods and baffles are typically installed around the pipe that exits the inlet to prevent floatable debris from being conveyed downstream. The hood or baffle must extend at least four inches below the exiting pipe's invert and must project away from the pipe opening enough not to restrict flow. In the case of proprietary hoods and baffles, all manufacturers' guidelines must be followed.

Additional pre-treatment measures, such as filter bags and baskets, can help to further reduce sediment and floatable debris that are conveyed to the SMP. While these measures are typically optional, they may be required in areas where risk of sedimentation and floatable debris is high.

Filter bags and baskets are inserts that are situated under the inlet grate to capture floatable debris and sediments as water enters the inlet. Filter bags are typically made of permeable fabrics, while baskets are usually made of more rigid materials with openings. The level of pre-treatment provided by filter bags and baskets is related to the size of openings in the materials; where smaller openings will capture more sediments but require more frequent maintenance to prevent clogging. The size of openings should be set to capture the most sediment and debris possible without resulting in a flow restriction when the bag or basket is partially full. Designers should also consider the likely frequency of maintenance when setting the size of openings.

Energy Dissipation
Energy dissipation and/or armoring measures are required when the velocity of runoff entering an SMP may result in erosion.

Energy dissipation is often achieved by some form of level spreader which reduces the velocity of runoff by creating sheet flow across a larger surface area. Other, proprietary, energy dissipation methods usually involve sending water through a matrix where eddies and friction work to slow the velocity of water. Common types of armoring, to protect against erosive velocities, include inlet aprons of hard materials and crushed stone ballasts or channels.

Manholes
Manholes are structures that serve as junction points of the drainage system, used where pipes change elevation, change direction, or at each 300ft interval of pipe to allow access and maintenance. Whenever feasible, manholes should be designed so that they do not require confined space entry but can easily be accessed by a vactor truck attachment. Generally, manholes:

- Shall be a minimum of 4 feet in diameter when there are two or more inlet pipes
- Shall not have more than three pipe connections at the same elevation; additional connections shall be separated by at least 1 foot vertically
- Shall be located at least 3 feet above the groundwater table, or be properly anchored, to prevent potential groundwater infiltration into the system
- Require a minimum concrete leg of 6 inches between the manhole block-outs for adjacent pipes.

Observation Wells
Observation wells must be installed in all practices with a subsurface stone base. As an alternative, inspection ports may be installed in cases where chambers are used. Other suitable alternatives may also be considered that allow observation of the subsurface water level. The observation well or inspection port is key to monitoring the water levels in the practice and determining the need for maintenance. One observation well or other means of observation is required for each 5,000 sf of SMP area.

Observation wells shall consist of a minimum four-inch diameter polyvinyl chloride (PVC) pipe, extending from the surface of the practice to the bottom of the drainage layer, with perforations along the entire drainage layer. The observation well must be anchored in place, which is commonly done using a concrete collar. The top of the observation well must be capped with a lockable top lid. In locations with pedestrian access, the cap of the observation well must be flush with the surface to avoid a tripping hazard.

Pipes
Given the wide range of pipe functions and naming conventions, the Unified Stormwater Rule defines four types of pipes for clarity, as follows:

- Conveyance pipes – umbrella term used to describe yard drains, bypass pipes, overflow pipes, and intake pipes
- Internal pipes – perforated pipes inside the practice that can be used to evenly distribute or drain water in the stone base
- Cleanout pipes – pipes that provide a connection between the surface (vertical) and internal pipes (horizontal) to allow for regular maintenance
- Outlet pipes – any pipe that can drain water from the practice before it is full, which typically connects the active storage zone of the practice with a point of discharge

Specific requirements for each type of pipe are described in the subsections below. It is important to note that a pipe connecting the on-site drainage system to the City sewer is called a site connection. While the Unified Stormwater Rule includes stormwater management requirements for obtaining site/house connection permits, this manual does not prescribe the design of site connection pipes themselves, which is regulated separately by BWSO.

Any pipes used to convey stormwater inside of buildings must be designed in accordance with the latest NYC DOB Plumbing Codes for Storm Drainage systems. Any pipes used to convey stormwater outside of buildings, except for site connections, must be designed for a minimum 3 in/hr rainfall intensity for the associated drainage area, or as required by the NYC DOB Plumbing Code in special cases where pipes convey both primary and secondary rooftop drains. Designers may also consider larger events, as appropriate, to provide additional drainage capacity.

Conveyance Pipes
A bypass or overflow device shall be provided to safely convey runoff away from all practices once they are full, sized in accordance with the above guidance. In addition, conveyance pipes shall:

- Have 6-inch or greater diameter and use materials that can be joined to existing site infrastructure, consistent with NYC Plumbing Code.
- Have a minimum slope of 0.5% and a maximum slope of 10%.
- Have a minimum full-flow velocity of 3.5 feet per second.

Internal Pipes
Typically, internal pipes have no slope and rely on conveyance pipes and outlet pipes to convey water into and out of the practice, respectively. In larger systems, a grid of connected internal pipes can be used to form an internal pipe network. Internal pipes shall:

- Have 8-inch or greater diameter and be made of high-density polyethylene (HDPE) meeting the requirements of ASTM D3350
- Be perforated with perforations meeting AASHTO Class II specifications
- Have cleanouts that may be used to access every 75 feet of straight pipe runs
- Have endcaps at the ends of all segments that do not connect to a cleanout
- Use 1/8 (45 degree) elbows for bends (does not apply to pipe networks). For example, 90-degree bends should be made using two 1/8 (45 degree) elbows and separated by at least 1 foot of straight pipe
- Have a minimum of 6 inches of stone on all sides.

The contractor should follow the engineering design documents and manufacturer's installation instructions when installing perforated pipes. The spacing between parallel pipes should be at least 12 inches for pipes with internal diameters less than 24 inches, and at least equal to half of the internal pipe diameter for pipes larger than 24 inches.

Cleanouts
At least one cleanout must be provided when internal pipes are used. In cases where cleanouts are installed in engineered soils, the top of the cleanout must be anchored in place, which is commonly done using a concrete collar. The top of the cleanout well must be capped with a lockable top lid. In locations with pedestrian access, the cap of the cleanout must be flush with the surface to avoid a tripping hazard. In addition, cleanouts shall:

- Be 8-inch diameter or greater high-density polyethylene (HDPE) meeting the requirements of ASTM D3350
- Use 1/8 (45 degree) elbows for transition from vertical to horizontal
- Have caps placed above the freeboard elevation in areas with surface ponding and permanent pools.
- Be placed within 75 feet of and in-line with each outlet pipe
- Be placed at the end of any standalone internal pipe used for distribution
- Be placed at the ends of an internal pipe network along primary pathways
- Be placed outside of any play fields or high traffic areas
- Give consideration to site constraints and maintenance equipment access

Outlet pipes
Outlet pipes shall be installed in all filtration practices, as well as detention practices that are not self-contained, unless directed otherwise by DEP. In cases where outlet pipes are used in infiltration practices for maintenance purposes, the outlet pipe must have a permanent cap that is only removed when maintenance is being performed. ET practices must have a means of draining excess runoff, using either outlet pipes, weep holes, drainage course, or other method. In addition, outlet pipes shall:

- Be 6-inch diameter or greater HDPE meeting the requirements of ASTM D2729
- Have a minimum slope of 0.5% and a maximum slope of 10%.
- Use 1/8 (45 degree) elbows for bends. For example, 90 degree bends should be made using two 1/8 (45 degree) elbows and separated by at least one foot of straight pipe. Designers should make every effort to avoid using bends in outlet pipes.
- Be accessible on both ends, either by a cleanout or drainage structure (e.g., outlet control structure)
- Avoid having an open connection to surface features when conveyed to a controlled-release device to prevent entry of sedimentation and trash
- Have base and embedding material, as appropriate, to prevent pipe damage

Outlet Control Structures
An outlet control structure (OCS) is any structure that houses a controlled-flow device or weir that regulates drainage from a practice. These structures serve as an access point for maintenance and typically include other measures to manage sediments or allow overflow once the practice is full.

OCSs are required for all detention practices except for blue roofs, where the controlled-flow device is already accessible from the roof surface. Note that detention tanks are themselves an OCS and do not require a separate facility. OCSs may also be used for infiltration practices, as an access point for maintenance, when the outlet pipe is

capped or a weir is provided to prevent water from draining the practice before it is full.

Several OCS configurations are acceptable if the following requirements are met:

- Connected to the SMP via an outlet pipe (does not apply for detention tanks)
- Provides an overflow for discharge of captured runoff in excess of the design volume
- Provides a controlled-flow device for the slow release of water (applies to detention systems only)
- Provide, for the collection of debris, a 12-inch minimum sump below the invert of the outlet pipe or controlled-flow orifice, whichever is lower
- Allows access to the controlled-flow device and sump for regular maintenance
- Discharge only to an on-site drainage structure, such as a manhole or inlet, rather than directly to a City sewer (does not apply to detention tanks)

Controlled-Flow Orifice

A controlled-flow orifice is a small opening used to regulate drainage from a practice. Detention practices must have a controlled-flow device, which includes controlled-flow orifices. Controlled-flow orifices shall:

- Be sized to drain the practice in accordance with the appropriate maximum release rate for the contributing area (see Chapter 2).
- Be easily accessible and have appropriate protection to prevent clogging
- Drain the practice within the required maximum drawdown time (see design criteria tables in Section 4.4-4.8)
- Be set at or above the invert elevation of connection to the on-site drainage system (minimum 3-inch drop preferred)

Detention practices with controlled-release orifices may be used to manage the water quality volume in CSS areas when higher tier practices have been exhausted and the maximum release rate complies with the sewer operations requirement in Chapter 2 (i.e., 0.1 cfs/acre). The maximum release rate of the controlled-flow orifice should be calculated as follows:

EQ4.15:

$$Q_O = C_D * A_o * \sqrt{2gH}$$

where:
Q_O = maximum release rate of orifice (cfs)
C_D = coefficient of discharge; 0.61 (flush), 0.52 (re-entrant), or 0.73 (long re-entrant)
A_O = area of orifice (ft^2)
g = acceleration due to gravity, 32.2 (ft/s^2)
H = maximum hydraulic head above the centerline of the orifice (ft)

Controlled-flow orifice size should never be smaller than 1-inch diameter for practices. Practices with orifice sizes less than 2-inches shall include pre-treatment measures to prevent clogging.

Controlled-flow orifices within outlet control structures should provide flexibility to modify SMPs in the future with minimal changes to the practice. Adjustments to the system can be made to account for actual performance by either opening or closing the orifice.

Controlled-Flow Pumps

A controlled-flow pump is a small pump used to regulate drainage from a practice, which are typically reserved for cases where site elevations prevent the use of a controlled-flow orifice that drains by gravity. These circumstances can include, but are not limited to:

- Sites that drain to shallow sewers, where roof detention is insufficient or infeasible.
- Sites that require deeper practices, where the outlet would be too low for gravity drainage

Such systems must still maintain the required maximum release rates outlined in Chapter 2 using a controlled-flow pump system. Controlled-flow pump systems require the following components, which must be shown on a section view of the proposed system:

- A detention facility where water may be stored, with dimensions.
- At least one pump and one backup pump. If other pumps are to be used as “primary pumps,” such as when pumps are to be used in parallel, a backup pump is required for each primary pump.
- An intake, outlet (a “force main”), and an overflow, shown on a section view, with dimensions.

The dimensions provided on the section view must be to scale and match the proposed configuration specified in the pump analysis calculations.

Design methods for controlled-flow orifices differ from controlled-flow pumps. For example, the design goal of a controlled-flow orifice is to ensure that the release rate does not exceed maximum rate for the facility, at the time when the volume is being provided. However, for controlled-flow pumps, the design goal is to ensure that the average release rate does not exceed the maximum rate for the facility, at the time when the volume is being provided.

The analysis to determine if the controlled-flow pump meets the release rate criterion is substantially more complex than the analysis that must be done for a controlled-flow orifice. For this reason, a controlled-flow pump workbook is available in Appendix F, which includes a template for calculations and a design example. In addition, the following paragraphs include details on the calculation methods and criteria for using controlled-flow pumps.

The average pump rate for the system is determined by taking the maximum and minimum pump rates for the system and averaging these. The maximum and minimum rates are determined by finding the operation point for each rate, respectively. The operation point is defined as the point where the system head curve intersects with the pump curve. There will be two system curves, one corresponding to the maximum rate, and the other corresponding to the minimum rate, and each will have a corresponding amount of head loss.

There are a number of methodologies that are used to generate a system head curve for a particular type of pump system, but the one that DEP uses for analysis is the “equivalent length.” So regardless of the methodology that the applicant uses, DEP requires the following inputs to do an analysis of equivalent length:

1. The fittings that are proposed, specified by the number of each type of fitting. Each fitting has an equivalent length and should be shown diagrammatically on the section view. See Appendix F for more information about the types of fittings that can cause head loss.
2. The elevation of water where the pump system is designed to turn on. This is typically near the top of the tank.
3. The elevation of water where the pump system is designed to turn off. This is typically near the bottom of the tank.
4. The elevation at which the proposed force main will discharge by gravity only (where it is no longer under pressure). The nature of this elevation requires that it be above the sewer.
5. The required detention volume, in cubic feet (cf) calculated for the system. The required detention volume for singular detention systems can be computed using equations in Chapter 2, while the required detention volume of systems in series can be computed using equations in Section 4.11.
6. The area of the detention tank, in square feet (sf), which in conjunction with item (5), will determine the elevation of the maximum storage volume.
7. The force main pipe diameter, in inches (in), minimum of 2-inches and provided in half-inch increments.
8. The force main length, in feet (ft), not including any equivalent lengths provided in item (1)
9. The proposed maximum pump rate that the pump will operate at, in gallons per minute (GPM). This should be the operation point for when the pressure head is the lowest.
10. The proposed minimum pump rate at which the pump will operate, in gallons per minute (GPM). This should be the operation point for when the pressure head is the highest.
11. The proposed Hazen-Williams coefficient, typically 130 for new wrought or cast Iron, steel, ductile iron, or vitrified clay pipes.

The above inputs will allow for the following outputs to be calculated:

1. The minimum static lift, in feet (ft).
2. The maximum static lift, in feet (ft).
3. The provided storage depth, in feet (ft).
4. The minimum head loss, in feet (ft).
5. The maximum head loss, in feet (ft).
6. The maximum pump rate, in cubic feet-per-second (cfs).
7. The minimum pump rate, in cubic feet-per-second (cfs).
8. The maximum pump rate, in cubic feet-per-second (cfs), which is the average of item (6) and (7).

The process of finding the actual pump behavior requires testing a proposed maximum and minimum pump rate (items 9 and 10 in the inputs), against the minimum and maximum head losses (items 4 and 5 in the outputs), iterating until each operation point is found. Once each operation point is found, their average is used as the actual release rate of the pump system. If this is lower than the maximum release rate, then the pump system is acceptable.

4.11. Special Cases

There are several special cases (SC) where the methods for sizing and applying SMP volume, as outlined in Section 4.3, do not apply. These cases are marked as “SC” on the SMP Hierarchy Checklist (Appendix A). There are three general types of special cases:

- Criteria-based practices used to meet water quality goals, where storage volume is either not provided or cannot be computed
- Reuse systems used to meet sewer operations goals, where the amount of volume that may be applied varies by system operation
- Detention systems in series, where the upstream detention system modifies the volume to be managed in the downstream system

The following subsections include methods for determining how these special case systems may be applied to meet stormwater management requirements.

Criteria-Based Practices

Criteria-based practices include grass filter strips, vegetated swales, and standalone trees (planted or preserved). These are special cases because either the SMP has no storage volume or, in the case of tree preservation, it often cannot be computed due to unknown conditions. Criteria-based practices must meet all special design criteria to facilitate the desired stormwater management requirement. When all criteria are met, these systems reduce a set percentage of the WQv that falls on the contributing area.

Grass filter strips can manage 100% of the WQv that falls on the contributing area when the following supplementary design criteria are met:

- Minimum width of 50 feet for slopes of 0% to 8%, 75 feet for slopes of 8% to 12% and 100 feet for slopes of 12% to 15%.
- Maximum contributing length (i.e., length of flow path to the grass filter strip) shall be 150 feet for pervious surfaces and 75 feet for impervious surfaces.
- For a combination of impervious cover (IC) and pervious cover (PC), use the following to determine the maximum length of each contributing area:
  - 150 – IC = contributing length of PC (maximum IC = 75, maximum PC =150)

- Maximum slope of the first ten feet of filter is less than 2%
- Average contributing slope is 3% maximum unless a flow spreader is used

Vegetated swales can manage 20% of the water quality volume that falls on the contributing area when the following supplementary design criteria are met:

- Receive WQv flow rates from the contributing area that are 3 cfs or less
- Convey the peak discharge for water volume flow (3 cfs or less):
  - at a velocity of < 1.0 fps, and
  - at a flow depth of 4 inches or less
- Provide sufficient length (minimum 100 ft) to retain the computed treatment volume for 10 minutes in a swale that receives runoff as a point discharge at the inlet, or an average of 5 minutes of retention time for a swale receiving sheet drainage or multiple point discharges along its length
- Have a trapezoidal or parabolic shape, with a bottom width minimum of 2’ and no greater than 6’
- Provide 4 inches of topsoil
- Apply recommended seed mixes (or sod) per the table from NYS SWMDM below.

Table 5.9

Mixtures	Rate per Acre (pounds)	Rate per 1,000 square feet (pounds)
A.Perennial ryegrass	30	0.68
Tall fescue or smooth bromegrass	20	0.45
Redtop	2	0.05
OR		
B.Kentucky bluegrass[1]	25	0.60
Creeping red fescue	20	0.50
Perennial ryegrass	10	0.20

[1] Use this mixture in areas which are mowed frequently. Common white clover may be added if desired and seeded at 8 pounds/acre (0.2 pound/1,000 square feet).

Calculations for peak runoff rates, design flows, and retention times should be done in accordance with small storm hydrology methods (NYS SWMDM Appendix B), conventional hydrology methods (NYS SWMDM Chapter 8), or Manning’s equations for open channel flow, as appropriate. For hydraulic calculations, variable n values should be used corresponding to flow depths, from 0.15 down to 0.03 (NYS SWMDM Appendix L).

Tree planting and preservation refers to standalone trees, rather than trees planted as part of larger bioretention practices. A standalone tree (planted or preserved) may be

counted as a reduction in impervious area when calculating the runoff coefficient (Rv) in the WQv equation. The amount of impervious reduction that may be applied is based on the size of the tree, which reflects the increased stormwater management benefits of a larger canopy and root system.

Standalone trees may reduce the impervious area used to calculate Rv by half the tree canopy area, up to 100 sf. This means that trees with canopies of 16-foot diameter or less will count half their canopy area, while larger canopies will be capped at 100 sf reduction. In order for standalone trees to apply this reduction, the following supplementary design criteria must be met:

- New trees planted must be planted within 10 feet of ground-level, directly connected impervious areas.
- New deciduous trees must be at least 2-inch caliper and new evergreen trees must be at least 6 feet tall to be eligible for the reduction.
- For new trees, the average slope for the contributing area, including the area under the canopy must not be greater than 5%.

Reuse Systems

Reuse systems may be eligible toward meeting the sewer operations volume requirement, when designers can demonstrate that reuse application will be automated and continuous throughout the year. In this case, designers must submit documents that indicate the intended reuse application, the anticipated reuse for each month of the year, and the systems and logic that will automate the reuse process. Eligible reuse systems will be able to apply 50% of their total volume towards the sewer operations volume requirement, subject to approval by NYC DEP BWSO.

Detention Systems in Series

Common examples of detention systems in series include a blue roof system with a downstream detention tank, or where two detention systems are used on separate floors of a building due to space constraints. These are special cases because the volume and release rates of the detention systems may vary, requiring alternative calculations.

For example, where the downstream system is designed to maintain the 0.1 cfs/acre maximum release rate, the upstream system may be designed with a release rate up to 2 cfs/acre. In this case, the upstream system would require less volume to maintain the release rate compared to the sewer operations volume calculation. In addition, the downstream system may also require less volume, if the upstream system provides meaningful flow reductions.

The volume required for the upstream detention system is a function of its maximum release rate, which can be computed using the following two equations:

EQ4.16:

$$V_U = \left[\frac{0.19 * C_W * A_U}{(t_U + 15)} - 40Q_{DRR}\right] * t_U$$

where:

V_U = required detention volume of the upstream detention system (cf)
C_W: weighted runoff coefficient relating peak rate of rainfall and runoff
A_U = site area tributary to the upstream detention system (ft^2)
t_U = duration of sewer operations event where the upstream detention system is filling (min)
Q_{DRR} = maximum release rate of the upstream detention system (cfs)

EQ4.17:

$$t_U = 0.27 * \sqrt{\frac{C_W * A_U}{Q_{DRR}}} - 15$$

where:
t_U = duration of sewer operations event where the upstream detention system is filling (min)
C_W: weighted runoff coefficient relating peak rate of rainfall and runoff
A_U = site area tributary to the upstream detention system (ft^2)
Q_{DRR} = maximum release rate of the upstream detention system (cfs)

The actual storage volume of the upstream system, determined using methods of Section 4.3, must be equal to or greater than the required storage volume calculated above. In cases where this is not feasible, the maximum release rate of the upstream system must be increased

until the required storage volume is equal to or less than actual storage volume.

The upstream detention system will reduce the peak flow rate for its tributary area which will, in turn, reduce the effective runoff coefficient for that area. The effective runoff coefficient for the tributary area of the upstream system may be calculated as:

EQ4.18:

$$C_{EU} = 311 * Q_{DRR} * \frac{(t_U + 15)}{A_U}$$

where:
C_{EU} = effective runoff coefficient for the area tributary to the upstream detention system
Q_{DRR} = maximum release rate of the upstream detention system (cfs)
t_U = duration of sewer operations event where the upstream detention system is filling (min)
A_U = site area tributary to the upstream detention system (ft^2)

The effective runoff coefficient for the area tributary to the upstream detention system (C_{EU}) may then be used to calculate the area weighted runoff coefficient of the downstream detention system. Note, that unless the area tributary to the upstream and downstream systems is the same, designers may not use C_{EU} directly as the weighted runoff coefficient for the downstream system. Instead, designers must consider the runoff coefficients of all other areas that may be tributary to the downstream detention system, weighted by area.

The weighted runoff coefficient of the downstream detention system is then used to calculate the required volume for that system, using the sizing methods in Section 4.3. A detention in series workbook is available in Appendix G, which includes a template for calculations and design examples to assist designers.

4-49

5. POST-CONSTRUCTION STORMWATER MANAGEMENT REQUIREMENTS

SMPs that are constructed as part of a covered development project must be regularly maintained and inspected in accordance with this Chapter to ensure continued performance as designed. This chapter outlines the requirements for:

- SMP Maintenance Procedures (Section 5.1);
- SMP Operation and Maintenance Plan Requirements (Section 5.2); and
- SMP Inspection, Reporting, and Re-certification Requirements (Section 5.3).

Non-structural best management practices (BMPs) used to meet NNI requirements in the NYC MS4 area must also be continuously maintained.

Maintenance of SMPs and BMPs is the responsibility of the property owner and is required per the issued Stormwater Maintenance Permit. The Stormwater Maintenance Permit requires ongoing maintenance and periodic inspections to assess the condition and functionality of each SMP and BMP and to assess any adjustments to maintenance frequencies and tasks that may be needed to maintain performance over time. Furthermore, owners must provide an annual certification that SMPs and BMPs have been inspected and properly maintained. Every fifth year, a certification from a registered qualified professional must be provided with the maintenance permit renewal. Owners are subject to random DEP inspections and must renew their Stormwater Maintenance Permit(s) every five years.

DEP recommends that the maintenance and inspection procedures outlined in this Chapter are also followed for SMPs constructed as part of non-covered development projects.

5.1. Maintenance Procedures

Maintenance procedures contained in this section consist of recommended tasks and associated frequencies for routine maintenance activities, as well as general guidance on common problems. While maintenance procedures generally apply to SMPs, the continued implementation of BMPs may also require maintenance practices.

Maintenance comprises those activities that occur on a set frequency or that are otherwise periodically required for SMP upkeep. These activities include tasks such as weeding, watering, sediment, and trash removal for bio-retention SMPs that can often be accomplished during pre-set routine maintenance cycles.

Occasionally, SMPs require non-scheduled maintenance to address performance issues that may arise and cannot be adequately addressed through pre-set maintenance activities. These activities may include replanting, erosion control, and structural repairs and may require specialized equipment and/or skilled expertise to properly implement. The alteration or modification of an approved SMP or of the approved operation and maintenance of SMPs will require prior review and approval of DEP.

Routine Maintenance

Routine maintenance consists of tasks that are performed on a set schedule or undertaken periodically based on the results of the annual inspections. Routine tasks are intended to maintain system performance under normal operating conditions, assuming SMPs have been appropriately sited, designed, and constructed.

Routine maintenance tasks and suggested frequencies are specified by SMP type in Tables 5.2 to 5.14. To help streamline, readers can refer to Table 5.1 for an overview of the applicable maintenance table for each SMP.

Suggested frequencies are guidelines based on normal operating conditions. Generally, frequencies for many tasks will need to increase for high sediment loading and highly exposed SMPs (i.e., SMPs sited adjacent to commercial driveways, parking lots, or other areas with heavy vehicular traffic that receive direct runoff from these surfaces) and may be decreased for lower sediment loading and/or less exposed SMPs (i.e., SMPs sited adjacent to areas of low or no vehicular traffic and receive primarily roof runoff). Frequencies should be adjusted over time based on the results of ongoing and annual SMP inspections.

5-1

Table 5.1. Overview of the applicable maintenance table for each SMP type.

Vegetated	
Bioretention	Table 5.2
Rain garden	Table 5.2
Stormwater planter	Table 5.2
Tree planting	Table 5.3
Tree preservation	Table 5.3
Green roof	Table 5.4
Grass filter strip	Table 5.5
Vegetated swale	Table 5.5
Dry basin	Table 5.5
Constructed wetland	Table 5.6
Non-vegetated	
Rain tank	Table 5.7
Cistern	Table 5.7
Dry well	Table 5.8
Subsurface gallery	Table 5.8
Stone trench	Table 5.9
Synthetic turf field	Table 5.10
Porous pavement	Table 5.11
Sand filter	Table 5.12
Organic filter	Table 5.12
Wet basin / pond	Table 5.13
Blue roof	Table 5.14
Detention tank	Table 5.7

5-2

Table 5.2. Routine Maintenance Tasks and Frequencies for Bioretention, Rain Gardens and Stormwater Planters

Task	Description	Frequency
Watering	Watering of new plantings during the first two years of establishment	During extended dry periods of no significant precipitation within 7 days, or as needed based on plant condition
Weeding	Removal of non-native or undesirable vegetation	Quarterly at minimum during the growing season or more frequently based on ongoing inspections
Mulching	Mulching of planting beds	Once annually for the first two growing seasons or until beds have filled in
Vegetation Management	Cutting and trimming of detrital herbaceous vegetation from the previous growing season to four to six inches above the ground	Annually in late winter or early spring prior to break in dormancy
Sediment Removal	Removal of accumulated sediment and debris from practice areas	Twice per year or more frequently if needed based on ongoing inspections (note: leaves and other natural materials can be left in place if they do not impede conveyance)
Pipe Cleaning	Hydraulic cleaning of inflow, outflow and underdrain piping	As warranted based on video pipe inspections conducted every three years
Inlet Filter Cleaning	Emptying of inlet filter bags and/or baskets	Minimum quarterly or more frequently based on ongoing inspections
Inlet Cleaning	Vacuum cleaning of accumulated sediment and debris within inlets sumps and hoods	Minimum annually or more frequently if debris accumulation is rapid based on ongoing and annual inspections
Outlet Cleaning	Removal of accumulated sediment and debris from risers (vacuum cleaning), trash racks, and spillways and clearing sediment from orifices and outlet control structures to prevent clogging	Annually at minimum or more frequently based on ongoing and annual inspections
Erosion Control	Stabilization of eroded soil areas with vegetative or mechanical means	As warranted based on ongoing inspections

5-3

Table 5.3. Routine Maintenance Tasks and Frequencies for Trees

Task	Description	Frequency
Watering	Watering of new plantings during the first two years of establishment	During extended dry periods of no significant precipitation within 7 days, or as needed based on plant condition
Weeding	Removal of non-native or undesirable vegetation	Quarterly at minimum during the growing season or more frequently based on ongoing inspections
Mulching	Mulching around root flare to suppress weeds and regulate temperature	Minimum annually or as needed based on ongoing inspections
Pruning (Small)	Removal of dead, damaged or diseased wood under 2" diameter	As observed throughout the year
Pruning (Large)	Removal of dead branches over 2" in diameter or selective removal for proper form	During the dormant season as warranted
Sediment Removal	Removal of accumulated sediment and debris from practice areas	Twice per year or more frequently if needed based on ongoing inspections (note: leaves and other natural materials can be left in place if they do not impede conveyance)

5-4

Table 5.4. Routine Maintenance Tasks and Frequencies for Green Roofs

Task	Description	Frequency
Watering	Watering of new plantings during the first two years of establishment	During extended dry periods of no significant precipitation within 7 days, or as needed based on plant condition
Weeding	Removal of non-native or undesirable vegetation	Quarterly at minimum during the growing season or more frequently based on ongoing inspections
Vegetation Management	Removal of detrital herbaceous vegetation from the previous growing season	Annually or as needed depending on the type of green roof vegetation
Fertilization	Use of slow-release fertilization capsules to supply plant nutrients; may only be done in the first year of establishment	As necessary based on visual observation of plant health or soil fertility testing
Outlet Cleaning	Removal of sediment from drain outlets including rooftop drains, gutters, downspouts and secondary overflows	Twice a year or as needed based on ongoing inspections
Erosion Control	Stabilization of eroded soil areas via vegetative or mechanical means	During the growing season for plant materials and as warranted for mechanical methods based on annual and ongoing inspections

5-5

Table 5.5. Routine Maintenance Tasks and Frequencies for Grass Filter Strips, Vegetated Swales and Dry Basins

Task	Description	Frequency
Watering	Watering of new plantings during the first two years of establishment	During extended dry periods of no significant precipitation within 7 days, or as needed based on plant condition
Weeding	Removal of non-native or undesirable vegetation	Quarterly at minimum during the growing season or more frequently based on ongoing inspections
Mowing/Trimming	Mowing and/or trimming of detrital herbaceous material to four to six inches above the ground	Annually for non-turf grass type vegetation or more frequently for turf grasses during period of active growth (all clippings should be removed)
Vegetation Management	Dethatching and soil conditioning for turf grasses	Annually or as warranted based on ongoing inspections
Sediment Removal	Removal of accumulated sediment and debris from practice areas	Twice per year or more frequently if needed based on ongoing inspections (note: leaves and other natural materials can be left in place if they do not impede conveyance)
Pipe Cleaning	Hydraulic cleaning of inflow, outflow and underdrain piping	As warranted based on video pipe inspections conducted every three years
Inlet Filter Cleaning	Emptying of inlet filter bags and baskets	Minimum quarterly or more frequently if debris accumulation is rapid based on ongoing inspections
Inlet Cleaning	Vacuum cleaning of accumulated sediment and debris within inlets sumps and hoods	Minimum annually or more frequently if debris accumulation is rapid based on annual and ongoing inspections
Outlet Cleaning	Removal of accumulated sediment and debris from risers (vacuum cleaning), trash racks, and spillways and clearing sediment from orifices and outlet control structures to prevent clogging	Annually at minimum or more frequently based on ongoing and annual inspections
Erosion Control	Stabilization of eroded soil areas with vegetative or mechanical means	During the growing season for plant materials and as warranted based on ongoing inspections

5-6

Table 5.6. Routine Maintenance Tasks and Frequencies for Constructed Wetlands

Task	Description	Frequency
Watering	Watering of new plantings during first two years of establishment	During extended dry periods of no significant precipitation within 7 days, or as needed based on plant condition
Weeding	Removal of non-native or undesirable vegetation	Quarterly at minimum during the growing season or more frequently based on ongoing inspections
Woody Vegetation Removal	Removal of woody vegetation from berms and embankments	Annually during the dormant season when present
Sediment Removal	Removal of accumulated sediment and debris from forebay and open water areas	Every 5 years or when 50% of capacity has been lost
Pipe Cleaning	Hydraulic cleaning of inflow and outflow and underdrain piping	As warranted based on video pipe inspections conducted every three years
Inlet Filter Cleaning	Emptying of inlet filter bags and/or baskets	Minimum quarterly or more frequently if debris accumulation is rapid based on ongoing inspections
Inlet Cleaning	Vacuum cleaning of accumulated sediment and debris within inlets sumps and hoods	Minimum annually or more frequently if debris accumulation is rapid based on ongoing and annual inspections
Outlet Cleaning	Removal of accumulated sediment and debris from risers (vacuum cleaning), trash racks, and spillways and clearing sediment from orifices and outlet control structures to prevent clogging	Annually at minimum or more frequently based on ongoing and annual inspections
Erosion Control	Stabilization of eroded soil areas via vegetative or mechanical means	During the growing season for plant materials and as warranted for mechanical methods based on annual and ongoing inspections

5-7

Table 5.7. Routine Maintenance Tasks and Frequencies for Rain Barrels, Cisterns and Detention Tanks

Task	Description	Frequency
Sediment Removal	Vacuum cleaning of accumulated sediment from primary storage tank(s)	As warranted based on annual inspections
Intake Cleaning	Cleaning of sediment from intake screen, hose and/or pipe	Quarterly at a minimum or as warranted based on ongoing inspections
Pipe Cleaning	Hydraulic cleaning of inflow and outflow piping	As warranted based on video pipe inspections conducted every three years
Outlet Cleaning	Cleaning of gutters, downspouts and first flush chambers	Twice a year or more frequently based in ongoing and annual inspections
Inlet Cleaning	Vacuum cleaning of accumulated sediment within inlet hoods and sumps	Minimum annually or more frequently if debris accumulation is rapid based on ongoing and annual inspections

5-8

Table 5.8. Routine Maintenance Tasks and Frequencies for Dry Wells and Subsurface Galleries

Task	Description	Frequency
Pipe Cleaning	Hydraulic cleaning of inflow, distribution and outflow piping	As warranted based on video pipe inspections conducted every three years
Sediment Removal	Vacuum cleaning of accumulated sediment and debris within internal structures	As warranted based on video inspections of subsurface galleries conducted every three years
Inlet Filter Cleaning	Emptying of inlet filter bags and/or baskets	Minimum quarterly or more frequently if debris accumulation is rapid based on ongoing inspections
Inlet Cleaning	Vacuum cleaning of accumulated sediment and debris within inlets sumps and hoods	Minimum annually or more frequently if debris accumulation is rapid based on ongoing and annual inspections
Outlet Cleaning	Removal of accumulated sediment and debris from risers (vacuum cleaning), trash racks, and spillways and clearing sediment from orifices and outlet control structures to prevent clogging	Annually at minimum or more frequently based on ongoing and annual inspections

5-9

Table 5.9. Routine Maintenance Tasks and Frequencies for Stone Trenches

Task	Description	Frequency
Sediment Removal	Removal of accumulated sediment from permeable surface	Twice per year or more frequently for high loading systems based on ongoing and annual inspections
Pipe Cleaning	Hydraulic cleaning of inflow, outflow and underdrain piping	As warranted based on video pipe inspections conducted every three years
Inlet Filter Cleaning	Emptying of inlet filter bags and/or baskets	Minimum quarterly or more frequently if debris accumulation is rapid based on ongoing inspections
Inlet Cleaning	Vacuum cleaning of accumulated sediment and debris within inlets sumps and hoods	Minimum annually or more frequently if debris accumulation is rapid based on ongoing and annual inspections
Outlet Cleaning	Removal of accumulated sediment and debris from risers (vacuum cleaning), trash racks, and spillways and clearing sediment from orifices and outlet control structures to prevent clogging	Annually at minimum or more frequently based on ongoing and annual inspections

5-10

Table 5.10. Routine Maintenance Tasks and Frequencies for Synthetic Turf

Task	Description	Frequency
Weeding	Removal of any vegetation from synthetic turf area	Year-round as observed during on ongoing inspections
Raking	Raking of the synthetic turf to keep grass fibers upright and to loosen and evenly distribute the infill layer	As needed based on manufacturer's/ installer's specifications
Sediment Removal	Vacuuming or removal of small, loose debris using a blower	Twice per year or more frequently based on level of use
Pipe Cleaning	Hydraulic cleaning of inflow, outflow and underdrain piping	As warranted based on video pipe inspections conducted every three years
Inlet Filter Cleaning	Emptying of inlet filter bags and/or baskets	Minimum quarterly or more frequently if debris accumulation is rapid based on ongoing inspections
Inlet Cleaning	Vacuum cleaning of accumulated sediment and debris within inlets sumps and hoods	Minimum annually or more frequently if debris accumulation is rapid based on ongoing and annual inspections
Outlet Cleaning	Removal of accumulated sediment and debris from risers (vacuum cleaning), trash racks, and spillways and clearing sediment from orifices and outlet control structures to prevent clogging	Annually at minimum or more frequently based on ongoing and annual inspections

5-11

Table 5.11. Routine Maintenance Tasks and Frequencies for Porous Pavements

Task	Description	Frequency
Sediment Removal	Vacuuming of porous asphalt or concrete surfaces with regenerative air sweeper or commercial vacuum sweeper (pavement washing systems and compressed air units are not recommended)	Twice per year or more frequently based on ongoing and annual inspections
Weeding	Removal of non-native or undesirable vegetation from vegetated pavement systems	Quarterly at minimum during the growing season or as warranted based on ongoing inspections
Mowing	Mowing of vegetative material to four to six inches above the ground	As needed based on rate of vegetative growth during the growing season (all clippings should be removed)
Pipe Cleaning	Hydraulic cleaning of inflow, outflow and underdrain piping	As warranted based on video pipe inspections conducted every three years
Inlet Filter Cleaning	Emptying of inlet filter bags and/or baskets	Minimum quarterly or more frequently if debris accumulation is rapid based on ongoing inspections
Inlet Cleaning	Vacuum cleaning of accumulated sediment and debris within inlets sumps and hoods	Minimum annually or more frequently if debris accumulation is rapid based on ongoing and annual inspections

5-12

Table 5.12. Routine Maintenance Tasks and Frequencies for Sand and Organic Filters

Task	Description	Frequency
Media Raking	Raking of sand or organic filter media to remove trash and debris from control openings	As warranted based on annual inspections
Surface Media Replacement	Removal, cultivation, and replenishment of sand or organic filter media to sufficient depths to achieve unclogged media	As warranted based on annual inspections
Sediment Removal	Vacuum cleaning of accumulated sediment from filter bed within sedimentation chambers	Annually or when the sediment accumulation within the sedimentation chamber reaches a depth of 6 inches
Pipe Cleaning	Hydraulic cleaning of inflow and outflow piping from subsurface systems	As warranted based on video pipe inspections conducted every three years
Inlet Filter Cleaning	Emptying of inlet filter bags and/or baskets	Minimum quarterly or more frequently if debris accumulation is rapid based on ongoing inspections
Inlet Cleaning	Vacuum cleaning of accumulated sediment and debris within inlets sumps and hoods	Minimum annually or more frequently if debris accumulation is rapid based on ongoing and annual inspections
Outlet Cleaning	Removal of accumulated sediment and debris from risers (vacuum cleaning), trash racks, and spillways and clearing sediment from orifices and outlet control structures to prevent clogging	Annually at minimum or more frequently based on ongoing and annual inspections

5-13

Table 5.13. Routine Maintenance Tasks and Frequencies for Wet Basins and Ponds

Task	Description	Frequency
Weeding	Removal of non-native or undesirable vegetation from vegetated pavement systems	Quarterly at minimum during the growing season or as warranted based on ongoing inspections
Mowing/Trimming	Mowing and/or trimming of detritial herbaceous material to four to six inches above the ground	Annually for non-turf grass type vegetation or more frequently for turf grasses during period of active growth (all clippings should be removed)
Woody Vegetation Removal	Removal of woody vegetation from berms and embankments	Annually during the dormant season when present
Sediment Removal	Removal of accumulated sediment and debris from forebay, basin and open water areas	Every five years or when 50% of capacity has been reached
Pipe Cleaning	Hydraulic cleaning of inflow and outflow piping	As warranted based on video pipe inspections conducted every three years
Inlet Filter Cleaning	Emptying of inlet filter bags and/or baskets	Minimum quarterly or more frequently if debris accumulation is rapid based on ongoing inspections
Inlet Cleaning	Vacuum cleaning of accumulated sediment and debris within inlets sumps and hoods	Minimum annually or more frequently if debris accumulation is rapid based on ongoing and annual inspections
Outlet Cleaning	Removal of accumulated sediment and debris from risers (vacuum cleaning), trash racks, and spillways and clearing sediment from orifices and outlet control structures to prevent clogging	Annually at a minimum or more frequently based on ongoing and annual inspections
Signage Maintenance	Damage repair and clearing of visual obstructions to keep posted signage in good and legible conditions	As warranted based on ongoing inspections

5-14

Table 5.14. Routine Maintenance Tasks and Frequencies for Blue Roofs

Task	Description	Frequency
Sediment and Debris Removal	Removal of sediment and debris from roof storage area(s), behind check and/or slotted dams; and from drain outlets including roof drains, gutters, downspouts, secondary overflows and drain screens	Monthly during the first year after installation to determine maintenance frequency, and minimum twice per year based on ongoing inspections or as needed
Ice Removal	Break-up and removal of ice formations around outlet and overflow structures	As warranted based on inspections during wintertime
Repair Leaks	Repair of roofing materials for damages and leaks	As warranted based on ongoing inspections

5-15

Additional Maintenance Activities

Additional maintenance activities include those activities intended to repair or remediate SMPs that are not functioning properly. Additional maintenance activities are usually identified during the course of an annual inspection or during informal visual assessments. Additional maintenance activities that result in a modification to the stormwater management practice require review and approval of the department.

The need for additional maintenance activities may indicate an underlying performance issue that may require additional investigation and analysis, particularly if the performance issues are recurring. The assistance of a qualified professional will likely be required in order to perform diagnostic activities needed to properly remediate recurrent problems. Examples of some common problems addressed via additional maintenance activities are provided below.

Erosion Problems

Erosion issues are common at the system inflow points for vegetated SMPs such as areas downslope of curb cuts conveying flow into a stormwater planter system. Erosion problems can typically be remedied by either replanting the area with an extended term erosion blanket or turf reinforcement matting or by adding structural measures such as rip-rap or river stone.

Poorly Performing Plantings

Vegetation health is integral to any vegetated SMP, such as bioretention systems and green roofs. Poorly performing plantings may be an indication of one or more underlying problems, particularly if plantings fare poorly in the same location within the SMP on a recurring basis. Poor plant performance commonly results from improper plant selection and can be effectively addressed by replanting with an adjusted plant palette that is more appropriate for the soil and moisture conditions in the area.

Plantings can also be negatively affected by various other external factors including erosion, sedimentation, poor soil conditions, disease, shade, road salt, and foot traffic compaction. A landscape or horticultural qualified professional can help diagnose areas and causes of poor plant performance and recommend a combination of adjusted plantings and/or soil amendments, among other remedies.

Differential Settlement

Differential settlement occurs where portions of the ground surface become depressed relative to surrounding areas. Some minor settlement is common after construction, but more severe settlement could indicate the presence of soft soils or improperly compacted subgrade. Monitoring areas of settlement once they are identified is critical for assessing the need for excavation and repair.

Diagnostic activities to assess the soil and subsurface conditions in areas of settlement include ground penetrating radar scans or other geophysical methods, soil borings, and dye testing. Potential remedial activities could include excavation of poorly compacted underlying soils and replacement with suitable compactable backfill. Major settlement issues often require a qualified professional to perform an evaluation and determine the correct solution.

Sedimentation and Clogging

Routine maintenance activities involve removal of sediment from SMPs, particularly inlet areas and forebays. However, in some cases, rates of sedimentation may be excessive and may lead to performance issues such as clogging and planting failure. In these situations, it is important to assess the contributing drainage area to identify any areas of bare soil, active construction, or other activities that may be the source of high rates of sediment delivery to the SMP. Cessation of these activities or the implementation of temporary or permanent erosion control measures can help to lower rates of sediment delivery and reduce the frequency of sediment removal from the SMP.

Remediation of severe sedimentation and clogging conditions may require a qualified professional to identify where the removal and replacement of some or all storage/filtration media is required. Adequate pre-treatment and routine maintenance can help to extend SMP service life and reduce the frequency of storage/filtration media replacement.

Structural Defects

Structural defects can cause a wide array of performance issues and most commonly include broken or cracked hydraulic control structures and/ or piping and damaged concrete edging or metal edge restraints around structures such as stormwater planters. Areas of surface wear on porous pavement also fall into this category. Depending on

5-16

the issue, inspection by a qualified structural professional may be warranted to determine if and how a structure can be safety repaired.

5.2. Operations and Maintenance Plan

All permitted SMPs that are constructed as part of a covered development project must have an operations and maintenance (O&M) plan that sets forth a specific plan for operation and maintenance of each permitted SMP. Submission and approval of the O&M plan is a pre-requisite to Stormwater Maintenance Permit issuance.

At minimum, the O&M plan must contain the following:

- List of SMPs to be maintained;
- Copy of the as-built plans showing locations and elevations of SMPs;
- Location map depicting SMPs to be maintained;
- Contact information for responsible party;
- Information regarding whether the maintenance will be performed by the responsible party and/or contracted to an outside party;
- Table of maintenance tasks and frequencies for each SMP type;
- Inspection form with list of maintenance checks and fields for recording observations;
- Schedule of proposed self-inspections; and
- Copy of the Stormwater Maintenance Permit issued by DEP.

In addition, if the permitted project is subject to NNI requirements for pollutants of concern, the O&M plan must contain a list of BMPs to address the applicable pollutant of concern sources. The list should also be included as an inspection form or checklist to be submitted as annual certification that BMPs have been implemented and maintained. See Table 2.6 for an example list of BMPs for pathogen removal by land use.

5.3. Inspection, Reporting, and Recertification Requirements

Property Owner Inspections

Property owners are responsible for conducting periodic inspections of SMPs to ensure that the systems are working properly, to reassess routine maintenance frequency, and to identify additional maintenance work required to address any condition or performance deficits. Routine maintenance and frequency recommendations presented in Tables 5.2 through 5.14 for specific types of practices present general guidelines for when inspections should occur.

Table 5.15 provides types and frequencies of inspections as a guideline for developing an ongoing SMP inspection program. Property owners are also responsible for maintaining BMPs to continue to meet the NNI requirements for pollutants of concern.

In addition to the inspection tasks outlined in Table 5.15, the property owner or maintenance personnel should perform periodic, quick visual assessments of SMP function when performing routine maintenance. For example, observation wells should be checked for standing water during dry periods, which may be an indication that the system is not functioning properly. Similarly, green and blue roof membranes can be checked for leaks and defects.

Some proprietary practices such as green and blue roof may have recommended frequencies for inspections per manufacturer's or installer's specifications that should be followed.

Inspection forms

All inspections must be logged and recorded on an inspection form. The owner must keep and maintain copies of all inspection records and tests for five years after performance of such inspections or tests.

Annual Certification

Property owners are responsible for providing an Annual Certification attesting that any permitted SMPs and BMPs have been properly inspected and maintained. The Annual Certification must be submitted via the SWPTS.

Table 5.15. Routine Inspection Frequency Summary Table

Type of Inspection	Purpose	Applicable Components or SMPs	Suggested Frequency
Video pipe inspection	To identify accumulated sediment and defects in piping systems	Inflow, outflow and underdrain piping	Every three years

5-17

Video subsurface internal storage inspection	To identify accumulated sediment and defects in internal storage and detention structures	Subsurface internal structures	Every three years
Annual vegetation inspection	To assess the health and condition of vegetation	Vegetated SMPs	Annually during the growing season
Annual structural inspection	To identify areas of differential settlement or structural concern	Structural components including concrete structures, piping, fencing	Annually
Drawdown test	To assess the drawdown time of the practice	Infiltration practices	As needed, based on changes in permeability of infiltrating surface

DEP Inspections
As the permitting agency, DEP reserves the right to perform periodic inspections of permitted SMPs. DEP inspectors will typically perform a visual assessment of key components to check for issues such as poor plant cover, erosion, sedimentation, clogging, or structural damage. DEP inspectors may also ask to see inspection and maintenance records, which must be kept up-to-date and available on premises. DEP inspections may be more frequent immediately following construction to ensure that property owners are effectively transitioning to an active O&M phase.

Deficiencies
If DEP inspections reveal deficiencies in the SMPs, DEP will issue a deficiency notice and the property owner must initiate a remedial action plan to address any noted deficiencies. Annual certification and permit renewal will depend on the resolution of any outstanding deficiencies. Deficiencies that are not resolved in a timely manner as determined by DEP may result in Notices of Violation and, ultimately, fines.

Permit Renewal
DEP rules require that Stormwater Maintenance Permits be renewed every 5 years. Permit renewal requires a certification from a qualified professional, depending on the type of professional that signed and sealed the original construction drawings. Permit renewal applications must be filed on the SWPTS.

6. RIGHT-OF-WAY STORMWATER MANAGEMENT REQUIREMENTS

Guidance included in this Chapter is applicable only to Right-of-Way (ROW) projects triggering applicability in either the Combined Sewer (CSS) areas or Municipal Separate Storm Sewer (MS4) areas. All other projects shall refer to Chapters 2-5 for relevant information. This chapter covers the following topics:

- Section 6.1 – Overview of criteria for applicability of stormwater construction permit
- Section 6.2 – Stormwater Pollution Prevention Plan (SWPPP) requirements based on development activity type and other factors
- Section 6.3 – Technical requirements for meeting stormwater management objectives
- Section 6.4 – Guidance for selecting, siting, and sizing of Post-Construction (PC) Stormwater Management Practices (SMPs)
- Section 6.5 – Geotechnical requirements for ROW SMPs
- Section 6.6 – Additional resources for SWPPP application development

6.1. Permit Applicability

A ROW project must apply for a stormwater construction permit, which includes a SWPPP, when the project meets one or more of the following criteria:

- Disturbs 20,000 sf or more of soil; OR
- Creates 5,000 sf or more new impervious area; OR
- Is a covered maintenance activity

Disturbed area is the area of soil disturbed by development activities such as building, demolition, renovation, replacement, restoration, rehabilitation, or alteration of any structure or road; or land clearing, land grading, excavation, filling or stockpiling.

Activities that do not disturb soils, such as surface markings of paved areas are not considered in the estimation of the extent of the disturbed area.

It is important to note that linear utility work that results in soil disturbance counts toward the overall soil disturbance threshold. In cases where linear utility work, or any other development activity, is carried out in phases, the project may be considered a common plan of development for which the total disturbed area across all phases results in the need for a stormwater construction permit.

[callout box]
All soil disturbances that are part of a common plan development must be considered toward the soil disturbance threshold and the need for a stormwater construction permit.
[/end callout box]

An impervious surface is any surface that cannot effectively infiltrate rainfall. Such surfaces generally include rooftops, pavements, sidewalks, and driveways. In addition, pervious hardscapes such as gravel roadways and gravel sidewalks are also considered impervious surfaces unless a geotechnical investigation indicates that the permeability rate of underlying soils is sufficient for reducing runoff. More specifically, underlying soils must have a permeability rate of at least 0.5 in/hr.

The increase (or decrease) in impervious area is calculated as the difference in total impervious area from pre- to post-development. The pre-development case must represent the least amount of impervious surface for the disturbed area within the last 5 years prior to development. When possible, photos, plans, and/or satellite images should be used to determine the appropriate pre-development impervious area,

Covered maintenance activity is defined as roadway maintenance that involves 20,000 sf or more. Roadway maintenance activities occur in the ROW and include milling and filling of existing asphalt pavements ("milling and paving"), replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six inches of subbase material; or long-term use of equipment storage areas at or near highway maintenance facilities.

6.2. SWPPP Requirements

For projects that have been determined to require a stormwater construction permit and a SWPPP, the next step is to determine what stormwater management measures must be included in the SWPPP. The following guidance can be used to make that determination.

ROW projects that require a stormwater construction permit, but disturb less than one acre of soil, including

covered maintenance activities, will require a SWPPP with only erosion and sediment controls (ESC).

ROW projects that require a stormwater construction permit and disturb one acre of soil or more will have varying SWPPP requirements based on the type of development activity. More specifically, covered development projects listed in Table 2.2 (Chapter 2) will require a SWPPP with only ESC; while all other covered development projects will require both ESC and PC SMPs.

For ease of reference, common activities related to ROW work and their associated requirements are included in the table below.

Table 6.1: ROW Project Scenarios and SWPPP Requirements.

Project Scenarios	Type of SWPPP Required
1. Private utility move-outs – coordinated with city agency to support agency work	ESC
2. Water/sewer mains trench work only	ESC
3. Road reconstruction**	ESC and PC SMPs
4. Road reconstruction with water/sewer mains work**	ESC and PC SMPs
5. Roadway maintenance	ESC

**PC SMPs are required only when the project disturbs one acre or more of soil

Project Scenario Definitions:

- Private Utility Move-out – Installation of underground utilities, such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains.
- Water/Sewer Mains Trench Work Only – Installation or rehabilitation of water/sewer mains where soils are disturbed only within the trench width required for utility work.
- Road Reconstruction – Full depth roadway replacement from curb to curb that results in exposure of subbase or disturbance of soils.
- Road Reconstruction with Water/Sewer Mains Work – Full-depth roadway replacement that occurs in conjunction with the installation or rehabilitation of water/sewer mains, which results in exposure of subbase or disturbance of soils outside of trench width required for utility work.
- Roadway Maintenance – includes milling and filling of existing asphalt pavements ("milling and paving"), replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six inches of subbase material; or long-term use of equipment storage areas at or near highway maintenance facilities.

Projects that include development activities across multiple blocks or locations may use control measures appropriate for each area. For example, using ESC and PC SMPs in areas with roadway reconstruction, while using ESC only in areas with water/sewer main trench work.

For projects that require a SWPPP with ESC, the ESC measures shall be designed in accordance with the NYS Standards and Specifications for Erosion and Sediment Control (The Blue Book), dated November 2016, or its successor (https://www.dec.ny.gov/chemical/29066.html).

For projects that require a SWPPP with PC SMPs, see sections 6.3 and 6.4 for technical requirements and design guidance on PC SMPs, respectively.

In addition to identifying required ESC and PC SMPs, practitioners must determine whether No Net Increase (NNI) criteria are applicable to the project. The NNI requirement is applicable in the ROW when all four of the following conditions are met:

- Disturbed area is 1 acre or more
- Project is located in an MS4 area
- Project discharges to an impaired waterbody, and
- Project results in an increase in impervious area

When NNI is applicable, designers shall refer to Chapter 2 for specific criteria.

The remaining sections in this chapter provide guidance on ROW projects that require PC SMPs.

6.3. Technical Requirements

Projects without new impervious area
ROW projects that do not cause an increase in impervious area have the following options for meeting water quality goals:

- Option 1 - Reduce the existing *impervious area* by a minimum of 25% of the total disturbed, *impervious area*. The Soil Restoration criteria in Section 5.1.5 of the NYSDEC SMMDM must be applied to all newly created pervious areas; or
- Option 2 - Manage a minimum of 25% of the WQv from the disturbed, *impervious area* by the application of PC SMPs; or
- Option 3 - Apply a combination of 1 and 2 above that provides a weighted average of at least two of the above methods.

In addition, if there is an existing PC SMP located on the site that captures and treats runoff from the *impervious area* being disturbed, then the condition and size of the PC SMP shall be evaluated by the designer. If the PC SMP is able to manage the appropriate WQv as-is, then use of that practice may be continued. Otherwise, designers need to consider additional practices or changes to the existing practice to meet the requirements above. Additional details on each option are provided in the following sections.

Option 1 – Reduce impervious area
As a first step, designers must seek to reduce existing impervious area by a minimum of 25% of the total disturbed, impervious area. The designer must demonstrate that impervious area reduction was thoroughly analyzed and implemented to the maximum extent practicable before proceeding to Option 2. Agencies should include this analysis in the planning stage. DEP will review submitted supporting documentation in making its determination about whether an impervious area reduction is infeasible.

Impervious area can be reduced by replacing existing impervious surfaces with pervious surfaces. Some specific examples include:

- Vegetated medians – a vegetated area that separates opposing or merging lanes of traffic.
- Curb strip – a strip of grass, plants, or trees, located between a roadway curb and a sidewalk.
- Street trees – a tree that is growing in the city ROW between the sidewalk and the curb.

Street trees should be designed in accordance with all applicable criteria from the NYC DPR tree planting standards (www.nycgovparks.org/trees/street-tree-planting) and Section 5.3.4 of the NYS SWMDM. Note that vegetated medians may be used either as a means to reduce impervious cover, if configured as a simple greenspace, or as a PC SMP, if designed with the standard practices identified in Section 6.4. If reducing impervious area by 25% is not feasible, then PC SMPs are required to meet water quality goals.

Option 2 – Capture and treat the WQv
The water quality requirement aims to manage runoff from small, frequent storm events that can significantly impact the quality of receiving waters.

In MS4 areas, runoff from these events tends to contain higher pollutant levels. Therefore, retention and treatment of small storm runoff in MS4 areas help to remove those pollutants and, in turn, improve water quality.

In CSS areas, these events trigger the majority of CSO events. Therefore, retention and detention of small storm runoff in CSS areas helps to reduce CSOs and, in turn, improves water quality.

The water quality criteria are met by managing runoff from an appropriate small storm design event. NYSDEC defines this design event as the 90th percentile rain event. In New York City, the 90th percentile rain event is 1.5 inches of rainfall (Figure 4.1 of the NYS SWMDM).

The volume of runoff from the 90th percentile rain event, which is the target to be managed by PC SMPs, is also referred to as the water quality volume (WQ_V). The following equation can be used to calculate 25% of the WQ_V, which needs to be managed by PC SMPs:

EQ6.1:

$$WQ_V = \frac{1.5"}{12} * A * 0.95 * 0.25$$

where:
WQ_V: water quality volume (cf)
A: disturbed, impervious drainage area (sf)

[callout box]
This equation is only applicable to ROW projects. All other projects should refer to guidance in Chapters 2-5.
[/end callout box]

The SWPPP must show how the WQv is managed at the practice and site level, i.e., the disturbed, impervious drainage area, runoff coefficient, and WQv must be determined for each individual practice, and, in total, the practices must manage the WQv across the entire project.

ROW projects have a limited number of PC SMPs that may be used to manage the WQv due to several unique challenges of working in the ROW. For more information on suitable PC SMPs for ROW projects refer to Section 6.4. Guidance on delineating the disturbed, impervious drainage area is also provided in Section 6.4.

Finally, designers must also ensure that runoff from any additional contributing areas, beyond the disturbed, impervious drainage area itself, can safely bypass the PC SMP without adversely impacting the practice or surrounding areas. A note should be included on the SWPPP to indicate that safe bypass of runoff was considered and that any water in excess of WQv will continue along the gutter to catch basins, as intended.

Option 3 – Combination Approach
This option proposes a combination of impervious cover (IC) reduction and PC SMPs that results in an equivalent management of stormwater runoff compared to either method individually. The total combination is calculated using the following equation:

EQ6.2:
$25\% = \%\ IC\ reduction + \%\ WQv\ managed\ by\ PC\ SMPs$

Below are examples of how the water quality goals can be met using the combined method in each disturbed drainage area:

- 5% IC reduction, 20% WQv with PC SMPs
- 10% IC reduction, 15% WQv with PC SMPs
- 15% IC reduction, 10% WQv with PC SMPs
- 20% IC reduction, 5% WQv with PC SMPs

Note that areas where impervious surfaces have been changed to pervious can be counted EITHER towards the IC reduction to reduce the percent of WQv that needs to be treated, OR to reduce the runoff coefficient (Rv) when calculating WQv. New pervious areas cannot be counted twice as both a percent IC reduction and a reduction of Rv.

Projects with new impervious area
ROW projects that cause an increase in impervious area must manage 100% of the WQv from the newly created impervious areas. The remaining disturbed areas may be managed using one of the three options above.

Projects that cannot meet technical requirements
After following the guidance in this Chapter, projects that cannot meet the above technical requirements must schedule a consultation with DEP before proceeding with the SWPPP application. As part of the meeting, DEP and the designers will review opportunities and other potential considerations for meeting water quality objectives.

6.4. ROW SMP Selection, Siting, and Sizing

Designers must ensure that proposed PC SMPs meet the WQv requirements detailed in Section 6.3. This section provides guidance on the selection, siting, and sizing of PC SMPs for ROW projects to meet this objective.

SMP Selection
ROW projects have a limited number of PC SMPs that may be used to manage the WQv due to several unique challenges of working in the ROW.

Table 6.2 Applicable ROW PC SMPs

SMP Function	SMP Types (in order of preferred hierarchy)
Infiltration	ROW Precast Porous Concrete Panels[5] ROW Bioswales with Type D inlet ROW Infiltration Basins ROW Bioswales

[5] As of the release of this version of the guidance NYC DOT is evaluating porous technologies for use in bike lanes. Future versions of this guidance document may include additional porous technologies to facilitate implementation.

All of these practices are considered infiltration practices, because they capture and infiltrate runoff into the underlying soils (sometimes referred to as exfiltration). Infiltration practices may only be used in areas where geotechnical tests indicate that soils are adequate for infiltration.

Designers should refer to the latest DEP Standard Designs and Guidelines for Green Infrastructure Practices for the layout and configuration of each system (https://www1.nyc.gov/site/dep/water/green-infrastructure.page).

In accordance with these standards, porous concrete panel systems should be designed to look continuous across the entire length of the block. In places where valves or other street features prevent the use of pre-cast panels, poured-in-place concrete (non-porous) may be used to achieve a continuous concrete system. Refer to the casting detail in the green infrastructure standard designs for the required dimensions of poured-in-place concrete around valves and other castings to prevent cracking.

Note that the PC SMPs listed in Table 6.2 above are ordered in a preferred practice hierarchy. Designers should evaluate the feasibility of PC SMPs in the order in which they are listed. However, each location must be assessed for its unique siting constraints in order to select the appropriate SMP. When feasible, designers may consider placing these standard practices in the ROW median. Finally, designers should evaluate adjacent publicly-owned properties for SMP implementation if necessary.

SMP Siting
There are five site constraints that may limit the feasibility of PC SMPs:

- Soil constraints –permeability tests indicate that soil is not suitable for infiltration. See Appendix H for more information on soil permeability.
- Subsurface constraints – boring tests indicate that the bottom of the practice would be too close to groundwater table or bedrock for proper function.
- Hotspot constraints – land use or soil conditions increase the risk of runoff contamination, limiting the use of infiltration practices (see criteria below).
- Surface constraints – regulations require the use of paved surfaces, which limit the use of vegetated practices, e.g., regulations on parking and/or egress requirements.
- Space constraints – required setbacks from structures, utilities, property lines, existing trees, or other site features limit the use of practices at the ground level.

Keep in mind, that some constraints may not impact the entire site, but may be limited to one portion of the site. In such cases, it is important that, when demonstrating that SMPs are used to the maximum extent practicable, designers consider how constraints may vary across the site.

Hotspot constraints may be caused by either land uses or soil conditions. Land uses that cause stormwater hotspots may be found in Table 4.3 of the NYS SWMDM. Listed below are soil conditions that cause stormwater hotspots, which may be demonstrated through environmental assessments or as part of regulatory program (e.g. NYSDEC Spills and Remediation Programs) documentation:

- Presence of grossly contaminated soil or non-aqueous phase liquid (NAPL) as defined in NYSDEC DER-10
- Soil exceeds the groundwater protection objectives of NYSDEC 6 NYCRR 375
- Soil is characterized as hazardous waste as defined in 6 NYCRR 360 or 40 CRF 261
- Groundwater exceeds standards, guidance values and/or limits described in NYSDEC AWQS in 6 NYCRR 703 or TOGS1.1.1

The latest siting criteria for ROW projects can be found online at the DEP green infrastructure webpage (www1.nyc.gov/site/dep/water/green-infrastructure.page). Note that the siting criteria in Appendix C are meant for on-site projects and do not include all ROW siting criteria. The ROW siting criteria may be used to determine where SMPs cannot be placed within the ROW project area, due to space constraints: for example, the required clearances between PC SMPs and street furnishings such as utility poles, street signs, and parking meters.

SMP Sizing
PC SMPs must be sized to manage the appropriate WQv from the disturbed, impervious drainage area, as described in Section 6.3. The SWPPP must show 1) how the WQv is managed at the practice and project level: the disturbed drainage area, runoff coefficient, and WQv must be determined for each individual practice; and 2) that, in total, the practices manage the WQv across all areas that require PC SMPs.

For ROW projects, designers can determine the disturbed, impervious drainage area and appropriate SMP size in five steps, using the following guidance.

Step 1. Gather Data
The delineation of disturbed, impervious drainage areas will require the following data:

- Surface elevation data for the project area to determine roadway flow directions
- Locations of any existing or proposed catch basins in the project area to determine drainage points
- Locations of property lines around the ROW project area to delineate drainage areas
- Information on existing surface cover types

In cases where a topographic survey has been conducted for the project area, these data should be used to identify runoff flow directions and cover types.

When topographic survey is unavailable, digital elevation maps and property lines may be downloaded from the NYC Open Data online portal (https://opendata.cityofnewyork.us/). In addition, catch basin data can be requested from DEP BWSO using a Request for Records form, which can be found online (https://www1.nyc.gov/site/dep/about/request-records.page).

Please note that practitioners should account for any catch basins that will be added or removed as part of the proposed project.

Step 2. Evaluate Roadway Flow Directions
Using the surface elevation data, practitioners should identify the direction of runoff flow along each roadway within the project area. When using digital elevation maps, it is recommended that contours are generated to assist with this analysis. Spot elevations should be consulted for any flat or difficult to evaluate areas.

In cases where one portion of the roadway flows in a different direction from the other, the location of any high points should be marked and a flow direction for each portion of the roadway should be assigned. An example of the roadway flow direction analysis is shown in Figure 6.1 below.

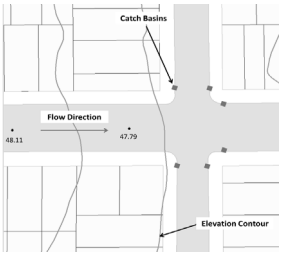


Figure 6.1. Example roadway flow direction analysis.

Step 3: Delineate the disturbed, impervious drainage area of each catch basin
To delineate the disturbed drainage area of each catch basin, first draw the boundary of the disturbed area. Then add lines that reflect the hydraulic boundaries between separate drainage areas. Hydraulic boundaries can include the crown of the roadway, catch basins, and high points. See the following paragraphs for example delineations.

Figure 6.2 shows delineations after drawing the boundary of the disturbed area and adding separation lines for the crown of roadway and catch basins. When catch basins are located at the corner of an intersection, draw a boundary that connects the center of the intersection, with the corner of the disturbed area boundary. When catch basins are located mid-block, draw a boundary perpendicular to the street centerline at the location of the catch basin.

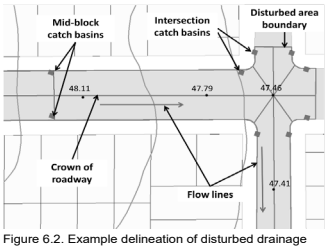


Figure 6.2. Example delineation of disturbed drainage areas with separation lines for the crown of roadway and catch basins.

Figure 6.3 shows updated delineations when separation lines are added for high points along the roadway. Similar to mid-block catch basins, the boundary for a high point is drawn perpendicular to the street centerline.

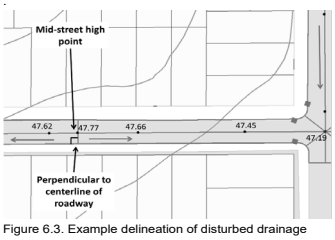


Figure 6.3. Example delineation of disturbed drainage areas with added separation lines at high points.

Perform this process until the disturbed drainage areas for each catch basin within the project area have been identified. Once completed, then identify the portion of each disturbed drainage area that is impervious using available information on existing surface types. The resulting disturbed, impervious drainage areas can be used to determine the required WQv within the applicable project area.

For more information on how to submit stormwater construction permit applications, refer to Chapter 3.

A ROW SMP Data Tracking Form is required for SWPPPs that include both ESC and PC SMPs. See Appendix H for this form and associated guidance.

PC SMPs in ROW areas will require an O&M plan as part of the stormwater construction permit; refer to Chapter 5 for individual SMP maintenance requirements.

Step 4: Delineate the disturbed, impervious drainage area of each SMP
Once the disturbed, impervious drainage areas of catch basins are known, these areas can be further delineated into drainage areas for each SMP. To do this, designers should draw another boundary perpendicular to the street centerline at the inlet location of each individual practice, as shown in the figure below.

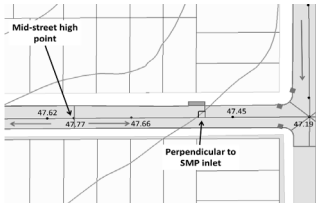


Figure 6.4. Example boundaries at inlets of PC SMPs.

The resulting areas can be used to calculate the WQv that must be managed by each practice.

Step 5: Size PC SMPs to manage the WQv
PC SMPs must be sized to manage the associated WQv from their disturbed, impervious drainage area. In addition, PC SMPs must be sited in a way that manages the total WQv across the entire ROW project.

Note that when two or more PC SMPs are located in the same catch basin drainage area, the downstream PC SMPs may be used to manage any WQv that could not be managed by upstream practices.

Designers should refer to Chapter 4 for guidance on determining the storage volume for each PC SMP and for sizing accordingly to meet the WQv requirement.

6.5. Geotechnical Requirements

Guidance on geotechnical investigations for ROW projects is provided in Appendix H. Note that on-site projects must refer to Appendix D of the NYSDEC SWMDM for geotechnical requirements.

6.6. Additional Resources

APPENDIX A

Stormwater Management Practice
Hierarchy Checklist

SMP HIERARCHY CHECKLIST - CSS AREAS

			Percent of SMP volume applied[a]			Site constraints that limit SMP feasibility[b]				
Tier[c]	Function Type[d]	Practice Type[e]	WQv	RRv	Vv	Soil	Subsurface	Hotspot	Surfaces	Space
Tier 1	Infiltration (Vegetated)	Bioretention	100	100	50	×	×	×	×	×
		Rain garden	100	100	50	×	×	×	×	×
		Stormwater planter	100	100	50	×	×	×	×	×
		Tree planting / preservation	SC	SC	0					
		Dry basin	100	100	50	×	×	×	×	×
		Grass filter strip	SC	SC	0	×	×	×	×	×
		Vegetated swale	SC	SC	0	×	×	×	×	×
	Evapotranspiration[f]	Rain garden	100	100	0		×		×	×
		Stormwater planter	100	100	0				×	
		Tree planting / preservation	SC	SC	0					
		Green roof	100	100	0					
Tier 2	Infiltration (Non-vegetated)	Dry well	100	100	50	×	×	×		×
		Stormwater gallery	100	100	50	×	×	×		×
		Stone trench	100	100	50	×	×	×	×	×
		Porous pavement	100	100	50	×	×	×		×
		Synthetic turf field	100	100	50	×	×	×	×	×
Anytime / Optional	Reuse	Rain tank	100	100	SC					
		Cistern	100	100	SC					
Tier 3	Detention[g,h,i]	Dry basin	100	0	100		×		×	×
		Constructed wetland	100	0	100		×		×	×
		Wet basin / pond	100	0	100		×		×	×
		Stormwater gallery	100	0	100		×			×
		Blue roof	100	0	100					
		Detention tank	100	0	100					

[a]Values marked "SC" are special cases for criteria-based practices, see Section 4.11 for details on criteria and application.
[b]An "X" marker indicates the site constraints that would prevent each practice from being used, contingent on the appropriate documention for that constraint.
[c]All practices of higher tiers must be used to the maximum extent possible or eliminated due to site constraints, before moving to lower tier practices
[d]Details on the design criteria and applied volumes for dual function systems are available in Section 4.9 on Innovative Systems.
[e]Other practice types not shown here may be proposed, subject to DEP approval, see Section 4.9 on Innovative Systems.
[f]Where permeablity rates of the site are 0.5 in/hr or greater, rain gardens, stormwater planters, and tree planting/preservation must be designed as infiltration practices
[g]High groundwater (subsurface constraint) limits the use of most practices, except those enclosed in concrete with adequate anchoring, as determined by an engineer
[h]Detention practices may be used to manage WQv in CSS areas when the release rate complies with the sewer operations requirement (i.e., 0.1 cfs/acre)
[i]Detention practices in series (e.g., blue roof to detention tank) require special calculations to account for changes in required detention volumes

SMP HIERARCHY CHECKLIST - MS4 AREAS

			Percent of SMP volume applied[a]			Site constraints that limit SMP feasibility[b]				
Tier[c]	Function Type[d]	Practice Type[e]	WQv	RRv	Vv	Soil	Subsurface	Hotspot	Surfaces	Space
Tier 1	Infiltration (Vegetated)	Bioretention	100	100	50	×	×	×	×	×
		Rain garden	100	100	50	×	×	×	×	×
		Stormwater planter	100	100	50	×	×	×	×	×
		Tree planting / preservation	SC	SC	0					
		Dry basin	100	100	50	×	×	×	×	×
		Grass filter strip	SC	SC	0	×	×	×	×	×
		Vegetated swale	SC	SC	0	×	×	×	×	×
	Evapotranspiration[f]	Rain garden	100	100	0		×		×	×
		Stormwater planter	100	100	0				×	
		Tree planting / preservation	SC	SC	0					
		Green roof	100	100	0					
Tier 2	Infiltration (Non-vegetated)	Dry well	100	100	50	×	×	×		×
		Stormwater gallery	100	100	50	×	×	×		×
		Stone trench	100	100	50	×	×	×	×	×
		Porous pavement	100	100	50	×	×	×		×
		Synthetic turf field	100	100	50	×	×	×	×	×
Anytime / Optional	Reuse	Rain tank	100	100	SC					
		Cistern	100	100	SC					
Tier 3	Filtration[g]	Bioretention	100	40	0		×		×	×
		Stormwater planter	100	40	0		×		×	×
		Porous pavement	100	0	0		×			×
		Synthetic turf field	100	0	0		×		×	×
		Sand filter	100	0	0		×		×	
		Organic filter	100	0	0		×		×	
	Detention[g,h]	Constructed wetland	100	0	100		×		×	×
		Wet basin / pond	100	0	100		×		×	×
Other	Detention[g,i,j]	Dry basin	0	0	100		×		×	×
		Stormwater gallery	0	0	100		×			×
		Blue roof	0	0	100					
		Detention tank	0	0	100					

[a]Values marked "SC" are special cases for criteria-based practices, see Section 4.11 for details on criteria and application.
[b]An "X" marker indicates the site constraints that would prevent each practice from being used, contingent on the appropriate documention for that constraint.
[c]All practices of higher tiers must be used to the maximum extent possible or eliminated due to site constraints, before moving to lower tier practices
[d]Details on the design criteria and applied volumes for dual function systems are available in Section 4.9 on Innovative Systems.
[e]Other practice types not shown here may be proposed, subject to DEP approval, see Section 4.9 on Innovative Systems.
[f]Where permeablity rates of the site are 0.5 in/hr or greater, rain gardens, stormwater planters, and tree planting/preservation must be designed as infiltration practices
[g]High groundwater (subsurface constraint) limits the use of most practices, except those enclosed in concrete with adequate anchoring, as determined by an engineer
[h]Select detention practices with treatment abilities may be used to manage WQv in MS4 areas when all design criteria are met
[i]Remaining detention practices may only be used to meet sewer operations criteria, included here for completeness
[j]Detention in series (e.g., blue roof to detention tank) require special calculations to account for changes in required detention volumes

APPENDIX B

Nitrogen No-Net-Increase Calculator Guide

NYC MS4 No-Net-Increase Calculator for Nitrogen

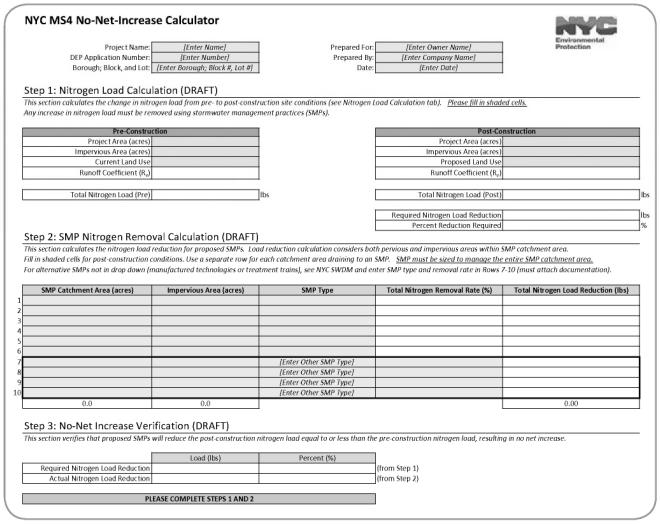
Non-negligible land use changes can increase the amount of nitrogen within stormwater runoff. This increase can be calculated by comparing the existing site conditions before a project has begun (pre-construction) and after a project is completed (post-construction). The simplified procedures for using DEP's interactive tool, the NYC MS4 No-Net-Increase Calculator for Nitrogen, are described below.

DEP developed the NYC MS4 No-Net-Increase Calculator for Nitrogen to aid applicants in demonstrating NNI of nitrogen resulting from a project subject to NNI requirements. The calculator compares existing site conditions (pre-construction) to post-construction conditions and outputs the net change in nitrogen loads based on the calculated WQv.

Overview of Calculator

The NYC MS4 No-Net-Increase Calculator for Nitrogen input and output page is shown in Figure 3-4. The online version of the calculator is located on the DEP MS4 web page (https://www1.nyc.gov/assets/dep/downloads/pdf/water/stormwater/ms4/nni-calculator.xlsx).

Figure 3-4. NYC MS4 No-Net-Increase Calculator for Nitrogen



NYC MS4 No-Net-Increase Calculator

Project Name: [Enter Name]
DEP Application Number: [Enter Number]
Borough; Block, and Lot: [Enter Borough; Block #, Lot #]
Prepared For: [Enter Owner Name]
Prepared By: [Enter Company Name]
Date: [Enter Date]

Step 1: Nitrogen Load Calculation (DRAFT)

This section calculates the change in nitrogen load from pre- to post-construction site conditions (see Nitrogen Load Calculation tab). Please fill in shaded cells. Any increase in nitrogen load must be removed using stormwater management practices (SMPs).

Pre-Construction	
Project Area (acres)	
Impervious Area (acres)	
Current Land Use	
Runoff Coefficient (R_v)	
Total Nitrogen Load (Pre)	lbs

Post-Construction	
Project Area (acres)	
Impervious Area (acres)	
Proposed Land Use	
Runoff Coefficient (R_v)	
Total Nitrogen Load (Post)	lbs
Required Nitrogen Load Reduction	lbs
Percent Reduction Required	%

Step 2: SMP Nitrogen Removal Calculation (DRAFT)

This section calculates the nitrogen load reduction for proposed SMPs. Load reduction calculation considers both pervious and impervious areas within SMP catchment area. Fill in shaded cells for post-construction conditions. Use a separate row for each catchment area draining to an SMP. SMP must be sized to manage the entire SMP catchment area. For alternative SMPs not in drop down (manufactured technologies or treatment trains), see NYC SWDM and enter SMP type and removal rate in Rows 7-10 (must attach documentation).

	SMP Catchment Area (acres)	Impervious Area (acres)	SMP Type	Total Nitrogen Removal Rate (%)	Total Nitrogen Load Reduction (lbs)
1					
2					
3					
4					
5					
6					
7			[Enter Other SMP Type]		
8			[Enter Other SMP Type]		
9			[Enter Other SMP Type]		
10			[Enter Other SMP Type]		
	0.0	0.0			0.00

Step 3: No-Net Increase Verification (DRAFT)

This section verifies that proposed SMPs will reduce the post-construction nitrogen load equal to or less than the pre-construction nitrogen load, resulting in no net increase.

	Load (lbs)	Percent (%)	
Required Nitrogen Load Reduction			(from Step 1)
Actual Nitrogen Load Reduction			(from Step 2)

PLEASE COMPLETE STEPS 1 AND 2

The TN load change is calculated by subtracting the pre-construction TN load from the post-construction TN load, using the equation below. The TN load for pre- and post-construction conditions is determined by multiplying the water quality volume (WQv) for the project area by the event mean concentration (EMC) for TN for its associated land use type, as per Table 3-1. The WQv is found using the formula from Chapter 4 of the NYS SWMDM, with a minimum value for the volumetric runoff coefficient Rv of 0.2.

WQv (post) * EMCTN (post) – WQv (pre) * EMCTN (pre) = TN load change

If the post-construction load is greater than the pre-construction load, the calculated value for the net increase serves as the basis for the stormwater management recommendations and should be included in the SWPPP. Any resulting net TN load increase must be removed using appropriately selected and designed SMPs, detailed in Table 3-2.

Accounting for Pervious and Impervious Area Conditions

Increasing pervious surface area onsite may help to avoid NNI requirements all together (see definition of "Negligible Land Use Change"). DEP encourages developers to increase pervious areas in the post-construction site condition during site planning, to the greatest extent possible. DEP considers green roofs, porous pavement, vegetated SMPs, or other landscaped pervious areas for the purpose of calculating WQv and required nitrogen load reduction in Step 1. In addition, TN removal in stormwater runoff from impervious and pervious surfaces managed by various SMPs is determined in Step 2 of the calculator as shown in Table 3-2.

Event Mean Concentrations of TN

Table 3-1 shows median values for TN EMCs for common land uses in NYC, related zoning districts, and similar or applicable land uses included in the NYSDEC Notice of Intent (NOI) form. The values in Table 3-1 were derived by comparing estimated EMCs for various land use types across 10 national studies. The NYC MS4 No-Net-Increase Calculator for Nitrogen uses the values from this table as land use loading coefficients when computing TN loadings for the project area.

Table 3-1. Median EMCs for TN

NYC Land Use	NYC Zoning Districts	Similar or Applicable Land Uses From NOI	EMC for TN (mg/L)
Commercial	C1-C8	Institutional/School, Municipal	2.08
Industrial/Manufacturing	M1-M3	Linear Utility, Well Drilling Activity (Oil, Gas, etc.), Road/ Highway, Parking Lot	2.10
Vacant/Open Space	NA	Forest, Pasture/Open Land, Cultivated Land, Recreational/ Sports Field, Bike Path/Trail, Clearing/Grading, Demolition/No Redevelopment	1.50
Lower-Density Residential	R1-R5	Single Family Home/Subdivision	2.10
Moderate- and Higher-Density Residential	R6-R10	Town Home Residential, Multifamily Residential	2.41

Note: mg/L = milligrams per liter.

User Inputs

For the NYC MS4 No-Net-Increase Calculator for Nitrogen, the SWPPP preparer will be responsible for inputting the following information:

- Total project area (acres)
- Pre-construction conditions for the total project area
  - Impervious area (acres)
  - Current land use type (from dropdown menu)
- Post-construction conditions for the total project area
  - Impervious area (acres)
  - Proposed land use type (from dropdown menu)

Calculator Outputs

Post-construction TN load will depend on land use changes and the EMCs for these land use types, as well as impervious cover changes. The calculator will compare the pre- and post-construction conditions and output the resulting net changes in TN load, as a quantity in pounds (lbs) and percentage (%).

DEP recommends reducing the post-construction impervious area to the greatest extent feasible, to mitigate stormwater runoff increases and net increases in TN load. As a next step toward compliance with NNI requirements, SMPs described in Table 3-2, must be implemented in the SWPPP to remove all net increases in TN load from the covered development project.

Post-construction conditions at a 1.7-acre site in the Jamaica Bay watershed.

SMPs for Nitrogen Removal

For projects subject to NNI requirements which drain to nitrogen-impaired receiving waterbodies, SWPPP preparers must implement SMPs to mitigate any net increases in nitrogen due to non-negligible land use changes. Table 3-2 is a list of pollutant removal rates by SMP. DEP derived these values by comparing SMP TN removal rate data from a number of different national research reports, regional design documents, and state and municipal manuals. The third column refers to the appropriate guidance in the NYS SWMDM for each SMP. However, SWPPP preparers should refer to all applicable sections in Chapters 5, 6, and 7 of the NYS SWMDM for SMP design and selection information.

Table 3-2. TN Removal by SMP

SMP	TN Removal Rate	NYS SWMDM Section
Rainwater Reuse System	100%	Section 5.3.10
Rain Garden	100%	Section 5.3.7
Bioretention	100%	Section 6.4
Porous Pavement	100%	Section 5.3.11
Infiltration Trench	100%	Section 6.3
Turf Field	40%	N/A
Sand Filter (Filtration)	40%	Section 6.4
Bioretention with Underdrain	40%	Section 6.4
Porous Pavement with Underdrain	40%	Section 5.3.11
Green Roof	35%	Section 5.3.8
Constructed Wetlands	35%	Section 6.2
Ponds	30%	Section 6.2

SMPs should be selected based on site conditions such as infiltration feasibility, available space, land use, soil suitability, site slope, depth to groundwater, and O&M requirements. The catchment areas draining to individual SMPs (or SMPs in series, as described below) need to be delineated accurately and included in the calculator to assess the overall pollutant load reduction for the entire project area.

The NYC MS4 No-Net-Increase Calculator for Nitrogen allows applicants to assign the TN removal rates in Table 3-2 to each SMP catchment area based on the selection and design of corresponding SMPs. The calculator estimates the total removal efficiencies across all SMP catchment areas and compares the TN removed by the SMPs to the net TN increase due to the development activity. The total post-construction TN load for the project area must be less than or equal to the total pre-construction TN loads. All NNI calculations for TN must be included and documented in the SWPPP. An example NYC MS4 No-Net-Increase Calculator for Nitrogen calculation is provided in Attachment 2.

Treatment Trains and Manufactured Technologies for Nitrogen Removal

SWPPP preparers may use alternative technologies not listed in Table 3-2 to achieve TN NNI requirements. SWPPPs that propose alternative technologies must include supporting documentation to verify TN removal efficiencies.

DEP will rely on the approval processes referenced in Chapter 3 of the NYS SWMDM, including the requirement that the alternative technology must be approved by a third party verification program (https://www.dec.ny.gov/chemical/29089.html).

For alternative technologies, including proprietary water quality treatment devices that are not included in or do not meet the standards of the NYS SWMDM, supporting documentation of TN removal rates must follow the approach currently employed by NYSDEC to verify technology effectiveness. Specifically, applicants must provide evidence of third party verification from Washington State's Technology Assistance Protocol - Ecology (TAPE) Program or the multi-state Technology Acceptance Reciprocity Partnership (TARP) Program for TN removal rates applied for each proposed alternative technology in the calculator.

SWPPP preparers may also elect to implement multiple SMPs in series, referred to as a treatment train, to treat runoff from the same SMP catchment area and achieve NNI requirements for the project area. This can be an effective way to achieve NNI requirements for sites where a single SMP for each catchment area cannot achieve the required TN load reduction, or for space-constrained sites.

For example, rooftop runoff can be treated with a green roof and outflow from the green roof can then be discharged to a sand filter or other approved treatment technology at ground level. With this post-construction condition, TN load is effectively reduced first through the green roof and remaining load is reduced further by the sand filter. In order for a treatment train to be effective, the SMPs utilized must be different types of technologies (i.e. placing two sand filters in a row is not considered a treatment train). Figure 3-5 represents a schematic of a treatment train with three different SMPs implemented in series.

SWPPP preparers should use the calculation below to identify the TN removal rate of an SMP treatment train for a specific SMP catchment area:

$$Rr = [1 - ((1 - rr1)*(1 - rr2)*(1 - rr3))] * 100$$

Where:

Rr = overall removal rate (%)

rr1, 2, 3 = removal rates for SMP1, SMP2, and SMP3, respectively (%)

The TN load of the inflow is first treated by SMP1 with a TN removal efficiency of rr1 (removal rate for SMP1), and the remainder pollutant load is then treated by SMP2 with a removal efficiency of rr2 (removal rate for SMP2), and so on.

The calculation for each SMP catchment area with a proposed treatment train needs to be provided as supporting documentation with the SWPPP. Removal rates in Table 3-2 should be used for each SMP proposed in series or, if an alternative technology is proposed, the guidance below should be used. The overall removal rate (Rr) calculated should be entered into the NYC MS4 No-Net-Increase Calculator as the TN removal rate for an SMP treatment train to demonstrate that NNI requirements are met.

Figure 3-5. SMP Treatment Train Schematic

NYC MS4 No-Net-Increase Calculator for Nitrogen - Example

In this example, proposed redevelopment activities will increase the impervious area on a 4.0-acre site in the Flushing Bay watershed by 0.5 acres, which will trigger NNI requirements, Figure 1.

Figure 1 - Four-acre site in Flushing Bay watershed with proposed increase in impervious surfaces that must meet NNI requirements.

The NYC MS4 No-Net-Increase Calculator input table for the project site in Figure 1 is presented in Figure 2.

Figure 2 – NYC MS4 No-Net-Increase Calculator for the Four-acre site in Flushing Bay watershed with proposed increase in impervious surfaces that must meet NNI requirements.

NYC MS4 No-Net-Increase Calculator

NYC Environmental Protection

Project Name:	Four-Acre Example	Prepared For:	[Enter Owner Name]
DEP Application Number:	[Enter Number]	Prepared By:	[Enter Company Name]
Borough, Block, and Lot:	[Enter BBL]	Date:	[Enter Date]

Step 1: Nitrogen Load Calculation (DRAFT)

This section calculates the change in nitrogen load from pre- to post-construction site conditions (see Nitrogen Load Calculation tab). Please fill in shaded cells.
Any increase in nitrogen load must be removed using stormwater management practices (SMPs).

Pre-Construction	
Project Area (acres)	4.00
Impervious Area (acres)	2.50
Current Land Use	Commercial
Runoff Coefficient (R_v)	0.61
Total Nitrogen Load (Pre)	1.73 lbs

Post-Construction	
Project Area (acres)	4.00
Impervious Area (acres)	3.00
Proposed Land Use	Commercial
Runoff Coefficient (R_v)	0.73
Total Nitrogen Load (Post)	2.05 lbs
Required Nitrogen Load Reduction	0.32 lbs
Percent Reduction Required	16%

Step 2: SMP Nitrogen Removal Calculation (DRAFT)

This section calculates the nitrogen load reduction for proposed SMPs. Load reduction calculation considers both pervious and impervious areas within SMP catchment area.
Fill in shaded cells for post-construction conditions. Use a separate row for each catchment area draining to an SMP. SMP must be sized to manage the entire SMP catchment area.
For alternative SMPs not in drop down (manufactured technologies or treatment trains), see NYC SWDM and enter SMP type and removal rate in Rows 7-10 (must attach documentation).

SMP Catchment Area (acres)	Impervious Area (acres)	SMP Type	Total Nitrogen Removal Rate (%)	Total Nitrogen Load Reduction (lbs)
1.00	0.00	Green Roof	35%	0.05
1.00	1.00	Sand Filter (Filtration)	40%	0.27
		[Enter Other SMP Type]		
		[Enter Other SMP Type]		
		[Enter Other SMP Type]		
		[Enter Other SMP Type]		
2.00	1.00			0.32

Step 3: No-Net Increase Verification (DRAFT)

This section verifies that proposed SMPs will reduce the post-construction nitrogen load equal to or less than the pre-construction nitrogen load, resulting in no net increase.

	Load (lbs)	Percent (%)	
Required Nitrogen Load Reduction	0.32	16%	(from Step 1)
Actual Nitrogen Load Reduction	0.32	16%	(from Step 2)

NO-NET-INCREASE REQUIREMENTS MET

As shown in Figure 2, the pre- and post-development conditions for the inputs for Step 1: Nitrogen Load Calculation are below, together with the calculated total nitrogen load:

Pre-Construction:

- Project Area: 4.0 acres
- Impervious Area: 2.5 acres
- Current Land Use: Commercial
- Total Nitrogen Load (pre): 1.73 lbs.

Post-Construction:

- Project Area: 4.0 acres
- Impervious Area: 3.0 acres
- Proposed Land Use: Commercial
- Total Nitrogen Load (post): 2.05 lbs.

Note that the pervious surface area of green roofs, porous pavement, vegetated SMPs, or other landscaped areas should not be included in the impervious area cell under Step 1 or Step 2. In this example, a green roof is considered pervious area not impervious area and, consequently, the WQv and required nitrogen load reduction is less than if considered a regular roof. The green roof also provides limited nitrogen removal in Step 2 given a minimum runoff coefficient of 0.2 for all surfaces (impervious and pervious).

Therefore, in this example, the SWPPP preparer is required to install SMPs to remove 0.32 lbs. (or 16%) of total nitrogen, which represents the load increase between pre- and post-development.

The SWPPP preparer proposes multiple SMPs and enters their associated catchment areas into the upper rows of the table in Step 2: SMP Nitrogen Removal Calculation. The calculator assigns the appropriate nitrogen removal rates and identifies the total nitrogen load removed per SMP.

SMP 1 Type: Green Roof

Impervious Area (First SMP Catchment Area): 0.0 acres

Total Nitrogen Removal Rate: 35%

Total Nitrogen Load Reduction: 0.05 lbs.

SMP 2 Type: Porous Pavement

Impervious Area (Second SMP Catchment Area): 1.0 acre

Total Nitrogen Removal Rate: 40%

Total Nitrogen Load Reduction: 0.27 lbs.

The total nitrogen load removal for the proposed SMPs is 0.32 lbs. (or 16%), which equals the NNI requirements as verified in Step 3: No-Net Increase Verification. The developer should print the calculator results as confirmation and include it in their SWPPP submittal.

APPENDIX C

Stormwater Management Practice Siting Criteria

SMP Siting Criteria

HORIZONTAL SETBACKS	Minimum Setback Distance (feet)
Building Foundations, Vaults and Protruded Basements	10
Flagpoles and Light Poles	10
Retaining Walls	10
Transit Structures	25
Highway/Roadway Structures	25
Monitoring Wells	50
DEP Infrastructure (e.g. water and/or sewer mains, etc.)	15
Property Line	5
Slopes 10% below practice Slopes 10% - 30% below the practice Note: avoid installing an infiltration facility near slopes greater than 30%.	100 100 + 5 feet for every 1% slope
VERTICAL SEPARATION	
Bottom of practice to the top of the high groundwater table	3
Bottom of practice to the top of bedrock or other impermeable material or subsurface layer	3

APPENDIX D

Stormwater Management Practice Sizing Examples

WATER QUALITY VOLUME SIZING EXAMPLES

Infiltration (vegetated)

Stormwater Planter

Design a stormwater planter that will treat the water quality volume from an impervious area of 3,000 square feet, with a runoff coefficient of 0.95. Assume a media saturated hydraulic conductivity of 2 in/hr and an infiltration rate of 2 in/hr.

Step 1: Calculate the WQ_V.

$$WQ_V = \frac{1.5\ in}{12} * A * R_V$$

where:
WQ_V = water quality volume (cf)
A = contributing area (sf) = 3,000 sf
R_V = runoff coefficient relating total rainfall and runoff
R_V = 0.05 + 0.009(I) = 0.95
I = percent impervious cover = 100%

$$WQ_V = \frac{1.5\ in}{12} * 3{,}000\ sf * 0.95$$

$$WQ_V = 356.25\ cf$$

Step 2: Calculate the SMP area assuming a maximum loading ratio of 1:20 for a stormwater planter practice. Use the area to set the initial length and width of the practice.

$$A_{SMP} = \frac{A}{20}$$

where:
A_{SMP} = area at the base of infiltration SMP (sf)
A = contributing area (sf) = 3,000 sf

$$A_{SMP} = \frac{3{,}000\ sf}{20}$$

$$A_{SMP} = 150\ sf$$

Assume a 15 ft by 10 ft practice.

Step 3: Calculate the volume of surface ponding assuming a surface ponding depth of 0.5 ft, which is less than the maximum surface ponding depth of 1 ft for a stormwater planter practice.

$$V_P = A_{SMP} * D_P$$

where:
V_P = volume of surface ponding (cf)
A_{SMP} = area of the SMP (sf) = 150 sf
D_P = depth of ponding (ft) = 0.5 ft

$$V_P = 150\ sf * 0.5\ ft$$

$$V_P = 75\ cf$$

In this case, the designer has chosen to use a hydraulic connection between the ponding zone and the stone base. Therefore, the ponding zone does not need to temporarily store 75% of the water quality volume.

Step 4: Calculate the volume of voids in the soil media layer assuming a soil media depth of 1.5 ft equal to the minimum soil media depth of 1.5 ft for a stormwater planter practice.

$$V_S = A_{SMP} * D_S * n_S$$

V_S = volume of voids in the soil media layer (cf)
A_{SMP} = area of the SMP (sf) = 150 sf
D_S = depth of soil media layer (ft) = 1.5 ft
n_S = available porosity of soil media (cf/cf) = 0.2 cf/cf

$$V_S = 150\ sf * 1.5\ ft * 0.2\frac{cf}{cf}$$

$$V_S = 45\ cf$$

Step 5: Calculate the volume of voids created by internal structures.

Assume there are no internal structures in this stormwater planter practice, so the volume is 0.

$$V_I = 0\ cf$$

Step 6: Calculate the volume of voids in the drainage layer assuming a drainage media depth of 1 ft, which is equal to the minimum drainage media depth of 1 ft for a stormwater planter practice.

$$V_D = (A_{SMP} * D_D - V_{I,d}) * n_D$$

where:
V_D = volume of voids in the drainage layer (cf)
A_{SMP} = area of the SMP (sf) = 150 cf
D_D = depth of the drainage layer (ft) = 1 ft
$V_{I,d}$ = volume of voids created by internal structures within the drainage layer (cf) = 0 cf
n_D = porosity of drainage layer media (cf/cf) = 0.4 cf/cf

$$V_D = (150\ sf * 1\ ft - 0\ cf) * 0.4\frac{cf}{cf}$$

$$V_D = 60\ cf$$

Step 7: Calculate the total SMP volume from the individual component volumes and compare to the WQ_V.

$$V_{SMP} = V_P + V_S + V_I + V_D$$

where:
V_{SMP} = storage volume of SMP (cf)
V_P = volume of surface ponding (cf) = 150 cf
V_S = volume of voids in the soil media layer (cf) = 90 cf
V_I = volume of voids created by internal structures such as chambers or pipes (cf) = 0 cf
V_D = volume of voids in the drainage layer (cf) = 120 cf

$$V_{SMP} = 150\ cf + 45\ cf + 0\ cf + 60\ cf$$

$$V_{SMP} = 255\ cf\ <\ WQ_V = 356.25\ cf \quad NO$$

Practice does not manage the entire WQv. Reconfigure the practice to increase the storage volume and return to associated step. In this case, the practice area will be increased, and Steps 2-8 are repeated.

Step 2: Calculate the SMP area assuming a loading ratio of 1:10, which is less than the maximum loading ratio of 1:20 for a stormwater planter practice. Use the area to set the initial length and width of the practice.

$$A_{SMP} = \frac{A}{10}$$

where:
A_{SMP} = area at the base of infiltration SMP (sf)
A = contributing area (sf) = 3,000 sf

$$A_{SMP} = \frac{3{,}000\ sf}{10}$$

$$A_{SMP} = 300\ sf$$

Assume a 30 ft by 10 ft practice.

Step 3: Calculate the volume of surface ponding assuming a surface ponding depth of 0.5 ft, which is less than the maximum surface ponding depth of 1 ft for a stormwater planter practice.

$$V_P = A_{SMP} * D_P$$

where:
V_P = volume of surface ponding (cf)
A_{SMP} = area of the SMP (sf) = 300 sf
D_P = depth of ponding (ft) = 0.5 ft

$$V_P = 300\ sf * 0.5\ ft$$

$$V_P = 150\ cf$$

In this case, the designer has chosen to use a hydraulic connection between the ponding zone and the stone base. Therefore, the ponding zone does not need to temporarily store 75% of the water quality volume.

Step 4: Calculate the volume of voids in the soil media layer assuming a soil media depth of 1.5 ft equal to the minimum soil media depth of 1.5 ft for a stormwater planter practice.

$$V_S = A_{SMP} * D_S * n_S$$

V_S = volume of voids in the soil media layer (cf)
A_{SMP} = area of the SMP (sf) = 300 sf
D_S = depth of soil media layer (ft) = 1.5 ft
n_S = available porosity of soil media (cf/cf) = 0.2 cf/cf

$$V_S = 300\ sf * 1.5\ ft * 0.2\frac{cf}{cf}$$

$$V_S = 90\ cf$$

Step 5: Calculate the volume of voids created by internal structures.

Assume there are no internal structures in this stormwater planter practice, so the volume is 0.

$V_I = 0\ cf$

Step 6: Calculate the volume of voids in the drainage layer assuming a drainage media depth of 1 ft, which is equal to the minimum drainage media depth of 1 ft for a stormwater planter practice.

$V_D = (A_{SMP} * D_D - V_{I,d}) * n_D$

where:
V_D = volume of voids in the drainage layer (cf)
A_{SMP} = area of the SMP (sf) = 300 cf
D_D = depth of the drainage layer (ft) = 1 ft
$V_{I,d}$ = volume of voids created by internal structures within the drainage layer (cf) = 0 cf
n_D = porosity of drainage layer media (cf/cf) = 0.4 cf/cf

$V_D = (300\ sf * 1\ ft - 0\ cf) * 0.4\frac{cf}{cf}$

$V_D = 120\ cf$

Step 7: Calculate the total SMP volume from the individual component volumes and compare to the WQ_V.

$V_{SMP} = V_P + V_S + V_I + V_D$

where:
V_{SMP} = storage volume of SMP (cf)
V_P = volume of surface ponding (cf) = 150 cf
V_S = volume of voids in the soil media layer (cf) = 90 cf
V_I = volume of voids created by internal structures such as chambers or pipes (cf) = 0 cf
V_D = volume of voids in the drainage layer (cf) = 120 cf

$V_{SMP} = 150\ cf + 90\ cf + 0\ cf + 120\ cf$

$V_{SMP} = 360\ cf > WQ_V = 356.25\ cf \quad OK$

Step 8: Check the ponding and infiltration drawdown times of the practice do not exceed the required times of 12 hours and 48 hours, respectively.

Infiltration drawdown time:

$dt_{SMP} = \frac{V_{SMP}}{\left(\frac{i}{12}\right) * A_{SMP}}$

where:
dt_{SMP} = drawdown time of infiltration SMP (hr)
V_{SMP} = volume of infiltration SMP (cf) = WQ_V = 360 cf
i = field measured infiltration rate (in/hr) = 2 in/hr
A_{SMP} = area at the base of infiltration SMP (sf) = 300 sf

$dt_{SMP} = \frac{360\ cf}{\left(\frac{2\ in/hr}{12}\right) * 300\ sf}$

$dt_{SMP} = 7.2\ hr < 48\ hr \quad OK$

Surface ponding drawdown time:

$dt_P = \frac{V_P}{\left(\frac{K_S}{12}\right) * \left(1 + \frac{0.5D_p}{D_m}\right) * \left(\frac{A_{P1} + A_{P2}}{2}\right)}$

where:
dt_P = drawdown time of surface ponding (hr)
V_P = volume of surface ponding (cf) = 75 cf
K_S = saturated hydraulic conductivity of media below the surface ponding area (in/hr) = 2 in/hr
D_p = maximum depth of ponding (ft) = 0.5 ft
D_m = depth of media below surface ponding area (ft) = 1.5 ft
A_{P1} = area at the base of surface ponding zone (sf) = 300 sf
A_{P2} = area at the top of surface ponding zone (sf) = 300 sf

$dt_P = \frac{150\ cf}{\left(\frac{2\frac{in}{hr}}{12}\right) * \left(1 + \frac{0.5 * 0.5\ ft}{1.5\ ft}\right) * \left(\frac{300\ sf + 300\ sf}{2}\right)}$

$dt_P = 2.57\ hr < 12\ hr \quad OK$

Note: A portion of the SMP volume for this practice may be applied towards meeting the V_V requirements, see Chapter 4 and Appendix C.

Evapotranspiration

Green Roof

Design a green roof that will treat the water quality volume from a 1,100 square foot rooftop with a runoff coefficient of 0.95. Assume that the green roof will cover 900 square feet (82%) of the rooftop due to required setbacks and/or equipment.

Step 1: Calculate the WQ_V.

$WQ_V = \frac{1.5\ in}{12} * A * R_V$

where:
WQ_V = water quality volume (cf)
A = contributing area (sf) = 1,100 sf
R_V = runoff coefficient relating total rainfall and runoff
R_V = 0.05 + 0.009(I) = 0.95
I = percent impervious cover = 100%

$WQ_V = \frac{1.5\ in}{12} * 1{,}100\ sf * 0.95$

$WQ_V = 130.63\ cf$

Note: Since the green roof will cover 900 square feet (82% of the total area) and the maximum loading ratio 1:1, the green roof may only treat up to 106.88 cf (82%) of the 130.63 cf water quality volume.

Step 2: Calculate the volume of surface ponding.

Green roofs are fast draining and typically do not pond water. Any ponding that does occur would not be stored long enough for evapotranspiration. Therefore, the volume of surface ponding is zero.

$V_P = 0\ cf$

Step 3: Calculate the volume of voids in the soil media layer assuming a soil media depth of 0.33 ft, which is equal to the minimum soil media depth of 0.33 ft for a green roof.

$V_S = A_{SMP} * D_S * n_S$

V_S = volume of voids in the soil media layer (cf)
A_{SMP} = area of the SMP (sf) = 900 sf
D_S = depth of soil media layer (ft) = 0.33 ft

n_S = available porosity of soil media (cf/cf) = 0.2 cf/cf

$V_S = 900\ sf * 0.33\ ft * 0.2\frac{cf}{cf}$

$V_S = 59.4\ cf$

Step 4: Calculate the volume of voids created by internal structures.

Assume there are no internal structures in this green roof practice, so the volume is 0.

$V_I = 0\ cf$

Step 5: Calculate the volume of voids in the drainage layer.

The active storage zone for a green roof is considered from the base of the soil media up, so the storage volume of the drainage layer is zero.

$V_D = 0\ cf$

Step 6: Calculate the total SMP volume from the individual component volumes and compare to the WQ_V.

$V_{SMP} = V_P + V_S + V_I + V_D$

where:
V_{SMP} = storage volume of SMP (cf)
V_P = volume of surface ponding (cf) = 0 cf
V_S = volume of voids in the soil media layer (cf) = 59.4 cf
V_I = volume of voids created by internal structures such as chambers or pipes (cf) = 0 cf
V_D = volume of voids in the drainage layer (cf) = 0 cf

$V_{SMP} = 0\ cf + 59.4\ cf + 0\ cf + 0\ cf$

$V_{SMP} = 59.4\ cf < WQ_V = 130.63\ cf \quad \boldsymbol{NOT\ MET}$

Since the SMP volume is less than the WQ_V, other practices must be used to treat the remaining WQ_V.

Infiltration (unvegetated)

Subsurface Gallery

Design a subsurface gallery that will treat the water quality volume from an impervious area of 90,000 square feet (2.07 acres) with a runoff coefficient of 0.95. Assume an infiltration rate of 1 in/hr.

Step 1: Calculate the WQ_V.

$$WQ_V = \frac{1.5\ in}{12} * A * R_V$$

where:
WQ_V = water quality volume (cf)
A = contributing area (sf) = 90,000 sf
R_V = runoff coefficient relating total rainfall and runoff
R_V = 0.05 + 0.009(I) = 0.95
I = percent impervious cover = 100%

$$WQ_V = \frac{1.5\ in}{12} * 90{,}000\ sf * 0.95$$

$$WQ_V = 10{,}687.5\ cf$$

Step 2: Calculate the SMP area assuming a loading ratio of 1:10. Note that the subsurface gallery does not have a maximum loading ratio. Use the area to set the initial length and width of the practice.

$$A_{SMP} = \frac{A}{10}$$

where:
A_{SMP} = area at the base of infiltration SMP (sf)
A = contributing area (sf) = 90,000 sf

$$A_{SMP} = \frac{90{,}000\ sf}{10}$$

$$A_{SMP} = 9{,}000\ sf$$

Assume a 90 ft x 100 ft practice.

Step 3: Calculate the volume of surface ponding.

There is no surface ponding associated with a subsurface gallery since the SMP is below ground level, so the volume is 0.

$$V_P = 0$$

Step 4: Calculate the volume of voids in the soil media layer.

There is no soil media associated with a subsurface gallery, so the volume is 0.

$$V_S = 0$$

Step 5: Calculate the volume of voids created by internal structures.

Assume 300 ft of 12" distribution pipe will be placed within the system in a grid pattern.

$$V_I = A_P * L_P$$

where:
V_I = volume of voids created by internal structure (cf)
A_P = area of pipe (sf) = (π) * $(0.5)^2$ = 0.79 sf
L_P = total length of pipe (ft) = 300 ft

$$V_I = 0.79\ sf * 300\ ft$$

$$V_I = 237\ cf$$

Step 6: Calculate the volume of voids in the drainage layer assuming a drainage media depth of 3 ft, which is greater than the minimum drainage media depth of 1 ft for a subsurface gallery practice.

$$V_D = (A_{SMP} * D_D - V_{I,d}) * n_D$$

where:
V_D = volume of voids in the drainage layer (cf)
A_{SMP} = area of the SMP (sf) = 9,000 sf
D_D = depth of the drainage layer (ft) = 2 ft
$V_{I,d}$ = volume of voids created by internal structures within the drainage layer (cf) = 273 cf
n_D = porosity of drainage layer media (cf/cf) = 0.4 cf/cf

$$V_D = (9{,}000\ sf * 3\ ft - 273\ cf) * 0.4\frac{cf}{cf}$$

$$V_D = 10{,}690.8\ cf$$

Step 7: Calculate the total SMP volume from the individual component volumes and compare to the WQ_V.

$$V_{SMP} = V_P + V_S + V_I + V_D$$

where:
V_{SMP} = storage volume of SMP (cf)
V_P = volume of surface ponding (cf) = 0 cf
V_S = volume of voids in the soil media layer (cf) = 0 cf
V_I = volume of voids created by internal structures such as chambers or pipes (cf) = 273 cf
V_D = volume of voids in the drainage layer (cf) = 10,690.8 cf

$$V_{SMP} = 0\ cf + 0\ cf + 273\ cf + 10{,}690.8\ cf$$

$$V_{SMP} = 10{,}963.8\ cf > WQ_V = 10{,}687.5\ cf \quad OK$$

Step 8: Check the infiltration drawdown time does not exceed the required time of 48 hours.

$$dt_{SMP} = \frac{V_{SMP}}{\left(\frac{i}{12}\right) * A_{SMP}}$$

where:
dt_{SMP} = drawdown time of infiltration SMP (hr)
V_{SMP} = volume of infiltration SMP (cf) = WQ_V = 10,963.8 cf
i = field measured infiltration rate (in/hr) = 1 in/hr
A_{SMP} = area at the base of infiltration SMP (sf) = 9,000 sf

$$dt_{SMP} = \frac{10{,}963.8\ cf}{\left(\frac{1\ in/hr}{12}\right) * 9{,}000\ sf}$$

$$dt_{SMP} = 14.62\ hr < 48\ hr \quad OK$$

Note: A portion of the SMP volume for this practice may be applied towards meeting the V_V requirements, see Chapter 4 and Appendix C.

Reuse

Cistern

Design a reuse system to treat the water quality volume from a 3,000 square foot impervious surface with a runoff coefficient of 0.95. Designers must additionally show that water will be reused for non-irrigation purposes.

Step 1: Calculate the WQ_V.

$$WQ_V = \frac{1.5\ in}{12} * A * R_V$$

where:
WQ_V = water quality volume (cf)
A = contributing area (sf) = 3,000 sf
R_V = runoff coefficient relating total rainfall and runoff
R_V = 0.05 + 0.009(I) = 0.95
I = percent impervious cover = 100%

$$WQ_V = \frac{1.5\ in}{12} * 3{,}000\ sf * 0.95$$

$$WQ_V = 356.25\ cf$$

Step 2: Calculate the total SMP volume from unit conversion of the WQ_V.

$$V_{SMP} = WQ_V * (7.5\frac{gal}{cf})$$

$$V_{SMP} = 356.25\ cf * (7.5\frac{gal}{cf})$$

$$V_{SMP} = 2{,}671.88\ gal$$

Therefore, to treat the water quality volume for the area draining to the practice, a 2,700-gallon cistern is required.

Note: The system may be designed larger if more water is needed for the intended reuse application.

Filtration

Bioretention

Design a bioretention practice that will treat the water quality volume from an impervious area of 21,780 square feet (0.5 acres), with a runoff coefficient of 0.95. Note that filtration system may only be used to treat the water quality volume in separate storm sewer areas. Assume a soil media saturated hydraulic conductivity of 2 in/hr.

Step 1: Calculate the WQ_V.

$$WQ_V = \frac{1.5\ in}{12} * A * R_V$$

where:
WQ_V = water quality volume (cf)
A = contributing area (sf) = 21,780 sf
R_V = runoff coefficient relating total rainfall and runoff
R_V = 0.05 + 0.009(I) = 0.95
I = percent impervious cover = 100%

$$WQ_V = \frac{1.5\ in}{12} * 21{,}780\ sf * 0.95$$

$$WQ_V = 2{,}586.38\ cf$$

Step 2: Calculate the SMP area assuming a loading ratio of 1:8, which is less than the maximum loading ratio of 1:20 for a bioretention practice. Use the area to set the initial length and width of the practice.

$$A_{SMP} = \frac{A}{8}$$

where:
A_{SMP} = area at the base of infiltration SMP (sf)
A = contributing area (sf) = 21,780 sf

$$A_{SMP} = \frac{21{,}780\ sf}{8}$$

$$A_{SMP} = 2{,}722.5\ sf$$

Round the SMP area up to 2,730 sf. Assume a 65 ft x 42 ft practice.

Step 3: Calculate the volume of surface ponding assuming the maximum surface ponding depth of 1 ft for a bioretention practice.

Assume the ponding zone is uniformly sloped. Use the SMP area and grading of the practice to determine the area at the base and top of the surface ponding zone.

$$V_P = \frac{1}{3}\left(A_{P1} + \sqrt{A_{P1} * A_{P2}} + A_{P2}\right) * D_P$$

where:
V_P = volume of surface ponding (cf)
A_{P1} = area at the base of surface ponding zone (sf) = 1,400 sf
A_{P2} = area at the top of surface ponding zone (sf) = 2,600 sf
D_P = depth of ponding (ft) = 1 ft

$$V_P = \frac{1}{3}\left(1{,}400\ sf + \sqrt{1{,}400\ sf * 2{,}600\ sf} + 2{,}600\ sf\right) * 1\ ft$$

$$V_P = 1{,}969.29\ cf$$

Since a hydraulic connection is not being used, confirm that the volume of surface ponding is greater than 75% of the water quality volume.

$$V_P = 1{,}969.29\ cf < 75\%\ of\ WQ_V = 1{,}939.79\ cf \qquad OK$$

Step 4: Calculate the volume of voids in the soil media layer assuming a soil media depth of 3.5 ft, which is greater than the minimum soil media depth of 2.5 ft for bioretention practices.

$$V_S = A_{SMP} * D_S * n_S$$

V_S = volume of voids in the soil media layer (cf)
A_{SMP} = area of the SMP (sf) = 2,730 sf
D_S = depth of soil media layer (ft) = 3.5 ft
n_S = available porosity of soil media (cf/cf) = 0.2 cf/cf

$$V_S = 2{,}730\ sf * 3.5\ ft * 0.2\frac{cf}{cf}$$

$$V_S = 1{,}911\ cf$$

Step 5: Calculate the volume of voids created by internal structures.

Assume 92 ft of 12" distribution pipe will be placed within the system in a grid pattern.

$$V_I = A_P * L_P$$

where:
V_I = volume of voids created by internal structure (cf)
A_P = area of pipe (sf) = (π) * $(0.5)^2$ = 0.79 sf
L_P = total length of pipe (ft) = 92 ft

$$V_I = 0.79\ sf * 92\ sf$$

$$V_I = 72.68\ cf$$

Step 6: Calculate the volume of voids in the drainage layer assuming a drainage media depth of 3 ft, which is greater than the minimum drainage media depth of 1 ft for bioretention practices.

$$V_D = (A_{SMP} * D_D - V_{I,d}) * n_D$$

where:
V_D = volume of voids in the drainage layer (cf)
A_{SMP} = area of the SMP (sf) = 2,730 cf
D_D = depth of the drainage layer (ft) = 3 ft
$V_{I,d}$ = volume of voids created by internal structures within the drainage layer (cf) = 72.68 cf
n_D = porosity of drainage layer media (cf/cf) = 0.4 cf/cf

$$V_D = (2{,}730\ sf * 3\ ft - 72.68\ cf) * 0.4\frac{ft^3}{ft^3}$$

$$V_D = 3{,}246.93\ cf$$

Step 7: Calculate the total SMP volume from the individual component volumes and compare to the WQ_V.

$$V_{SMP} = V_P + V_S + V_I + V_D$$

where:
V_{SMP} = storage volume of SMP (cf)
V_P = volume of surface ponding (cf) = 1,969.29 cf
V_S = volume of voids in the soil media layer (cf) = 1,911 cf
V_I = volume of voids created by internal structures such as chambers or pipes (cf) = 72.68 cf
V_D = volume of voids in the drainage layer (cf) = 3,246.93 cf

$$V_{SMP} = 1{,}969.29\ cf + 1{,}911\ cf + 72.68\ cf + 3{,}246.93\ cf$$

$$V_{SMP} = 7{,}199.9\ cf > WQ_V = 2{,}586.38\ cf \qquad OK$$

Step 8: Check the ponding and filtration drawdown times of the practice do not exceed the required times of 24 hours and 48 hours, respectively.

Filtration drawdown time:

$$dt_{SMP} = \frac{V_{SMP}}{\left(\frac{K_S}{12}\right) * \left(1 + \frac{0.5D_{pf}}{D_f}\right) * A_f}$$

where:
dt_{SMP} = drawdown time of filtration SMP (hr)
V_{SMP} = volume of filtration SMP (cf) = 7,199.9 cf
K_S = saturated hydraulic conductivity of filter media (in/hr) = 2 in/hr
D_{pf} = maximum depth of ponding above filter media (ft) = 1 ft
D_f = depth of filter media (ft) = 3.5 ft
A_f = area of filter bed (sf) = 2,730 sf

$$dt_{SMP} = \frac{7{,}199.9\ cf}{\left(\frac{2\frac{in}{hr}}{12}\right) * \left(1 + \frac{0.5 * 1\ ft}{3.5\ ft}\right) * 2{,}730\ sf}$$

$$dt_{SMP} = 13.85\ hr < 48\ hr \qquad OK$$

Surface ponding drawdown time:

$$dt_P = \frac{V_P}{\left(\frac{K_S}{12}\right) * \left(1 + \frac{0.5D_p}{D_m}\right) * \left(\frac{A_{P1} + A_{P2}}{2}\right)}$$

where:
dt_P = drawdown time of surface ponding (hr)
V_P = volume of surface ponding (cf) = 1,969.29 cf
K_S = saturated hydraulic conductivity of media below the surface ponding area (in/hr) = 2 in/hr
D_p = maximum depth of ponding (ft) = 1 ft
D_m = depth of media below surface ponding area (ft) = 3.5 ft
A_{P1} = area at the base of surface ponding zone (sf) = 1,400 sf
A_{P2} = area at the top of surface ponding zone (sf) = 2,600 sf

$$dt_P = \frac{1{,}969.29\ cf}{\left(\frac{2\frac{in}{hr}}{12}\right) * \left(1 + \frac{0.5 * 1\ ft}{3.5\ ft}\right) * \left(\frac{1{,}400\ sf + 2{,}600\ sf}{2}\right)}$$

$$dt_P = 5.17\ hr < 24\ hr \qquad OK$$

SEWER OPERATIONS VOLUME SIZING EXAMPLES

Detention

Detention Tank - CSS with SCP

A 93,200 sf site in the Bronx consists of a multistory commercial building. The site was proposed to connect to a 15 in. combined sewer. Design a detention tank to treat the sewer operations volume (V_V), given the following:

Area = 93,200 sf
Roof = 29,000 sf @ 0.95 runoff coefficient
Paved = 48,000 sf @ 0.85 runoff coefficient
Grass = 16,200 sf @ 0.20 runoff coefficient

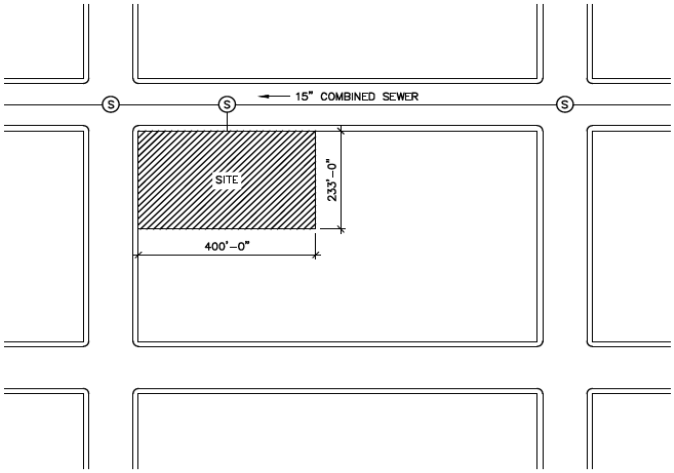


Figure F.1. Schematic of Site (Not to Scale)

Step 1: Identify the rainfall depth (R_D) based on the sewershed type and connection proposal type for the project. Use Table 2.7 in Chapter 2.

Since the project is 20,000 sf or more, and consists of a multistory commercial building, this project requires a site connection permit (SCP). In addition, the site is connecting to a 15 in. combined sewer.

Table 2.7. Applied rainfall depth by sewershed type and connection proposal type.

R_D	Description
1.85	CSS areas with SCP
1.50	CSS areas with HCP
1.50	MS4 areas wiith SCP
1.10	MS4 areas with HCP

According to Table 2.7, $R_D = 1.85\ in.$

Step 2: Calculate the runoff coefficient (C_W) using the weighted area approach.

$$C_W = \frac{(C_1A_1 + C_2A_2 + \cdots etc.)}{A_t}$$

where:
C_W = weighted runoff coefficient relating peak rate of rainfall and runoff
C_1 = the runoff coefficient for the area classified as roof = 0.95
A_1 = the area classified as roof (sf) = 29,000 sf
C_2 = the runoff coefficient for the area classified as paved = 0.85
A_2 = the area classified as paved (sf) = 48,000 sf
C_3 = the runoff coefficient for the area classified as grass = 0.20
A_3 = the area classified as grass (sf) = 16,200 sf
A_t = contributing area (sf) = 93,200 sf

$$C_W = \frac{(0.95 * 29{,}000\ sf) + (0.85 * 48{,}000\ sf) + (0.20 * 16{,}200\ sf)}{93{,}200\ sf}$$

$$C_W = 0.768$$

Step 3: Calculate V_V.

$$V_V = \frac{R_D}{12} * A * C_W$$

where:
V_V = sewer operations volume (cf)
R_D = rainfall depth (in) = 1.85 in
A = contributing area (sf) = 93,200 sf
C_W = weighted runoff coefficient relating peak rate of rainfall and runoff = 0.768

$$V_V = \frac{1.85\ in}{12} * 93{,}200\ sf * 0.768$$

$$V_V = 11{,}035\ cf$$

Step 4: Calculate the release rate to be maintained by the controlled-flow orifice. Use the maximum release rate per acre (q) shown in Table 2.9, Chapter 2.

The site is connecting to a 15 in. combined sewer.

Table 2.9. Maximum release rate per acre (cfs/acre) by sewershed type.

q (cfs/acre)	Description
1.0	MS4 areas
0.1	CSS areas

According to Table 2.9, $q = 0.1 \frac{cfs}{acre}$.

$$Q_{DRR} = \frac{q * A}{43560}\ or\ 0.046\ \ [whichever\ is\ greater]$$

where:
Q_{DRR} = maximum release rate for the site (cfs)
q = maximum release rate per acre (cfs/acre) = 0.1 cfs/acre
A = contributing area (sf) = 93,200 sf

$$Q_{DRR} = \frac{0.1\ \frac{cfs}{acre} * 93{,}200\ sf}{43560} or\ 0.046\ \ [whichever\ is\ greater]$$

$$Q_{DRR} = 0.214\ cfs\ > 0.046\ cfs$$

The maximum release rate is 0.214 cfs.

Step 5: Use the controlled-flow orifice equation to determine an appropriate orifice area by assuming the active storage depth.

In order to minimize the area required for the detention tank, choose the maximum depth that is still feasible according to site limitations and use a re-entrant orifice. In this case, the designer has chosen an active storage depth of 4 ft.

$$Q_O = C_D * A_o * \sqrt{2gH}$$

where:
Q_O = maximum release rate of orifice (cfs) = 0.214 cfs
C_D = coefficient of discharge, 0.52 for re-entrant orifice
A_O = area of orifice (sf)
g = acceleration due to gravity, 32.2 (ft/s^2)

H = maximum hydraulic head above the centerline of the orifice (ft) = 4 ft

$$0.214\ cfs = 0.52 * A_o * \sqrt{2 * 32.2\ \left(\frac{ft}{s^2}\right) * 4\ ft}$$

$$A_o = 0.026\ sf$$

Step 6: Translate the area of the controlled-flow orifice (A_O) into a diameter and check that it is greater than the minimum diameter of 1 in.

$$A_o = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

where:
A_O = area of orifice (sf) = 0.026 sf
D_O = diameter of orifice (in)

$$0.026\ sf = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

$$D_O = 2.18\ in\ > 1\ in \qquad OK$$

Set the orifice diameter to the nearest 0.25-inch interval rounding down, with a minimum orifice diameter of one-inch. In this case, use an orifice diameter of 2.00 inches.

Step 7: Confirm the orifice area of the selected orifice diameter from Step 6.

$$A_o = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

where:
A_O = area of orifice (sf)
D_O = diameter of orifice (in) = 2 in

$$A_O = \frac{\left[\pi * \left(\frac{2\ in}{2}\right)^2\right]}{144}$$

$$A_O = 0.022\ sf$$

Step 8: Confirm the required active storage depth in the tank using the orifice area from Step 7.

$$Q_O = C_D * A_o * \sqrt{2gH}$$

where:
Q_O = maximum release rate of orifice (cfs) = 0.214 cfs
C_D = coefficient of discharge, 0.52 for re-entrant orifice
A_O = area of orifice (sf) = 0.022 sf
g = acceleration due to gravity, 32.2 (ft/s^2)
H = maximum hydraulic head above the centerline of the orifice (ft)

$$0.214\ cfs = 0.52 * 0.022\ sf * \sqrt{2 * 32.2\ \left(\frac{ft}{s^2}\right) * H}$$

$$H = 5.4\ ft$$

If the active storage depth is too high, then increase the orifice size by 0.25 inches and re-run Steps 7-8 until a suitable depth is identified. If the active storage depth is too low, then decrease the orifice size by 0.25 inches (but not less than 1 inch) and re-run Steps 7-8. Alternatively, the designer can choose a different orifice configuration as needed to modify the active storage depth.

In this case, the depth is feasible.

Step 9: Set the dimensions of the detention tank's active storage zone.

Based on the active storage depth of 5.4 ft and the V_V of 11,035 cf, set the interior detention tank dimensions to L: 45.5 ft and W: 45.5 ft. The resulting detention tank has an active storage volume of 11,179 cf. Note that the exterior dimensions of the detention tank will be larger than the dimensions of the active storage zone (45.5'L x 45.5'W x 5.4'D) to accommodate wall thickness, bypass structures, and/or other internal features.

Detention Tank - CSS with HCP

A 15,000 sf site in the Bronx consists of a two-family (no-fee) residence. The site was proposed to connect to a 15 in. combined sewer. Design a detention tank to treat the sewer operations volume (V_V), given the following:

Area = 15,000 sf
Roof = 2,000 sf @ 0.95 runoff coefficient
Paved = 7,000 sf @ 0.85 runoff coefficient
Grass = 6,000 sf @ 0.20 runoff coefficient

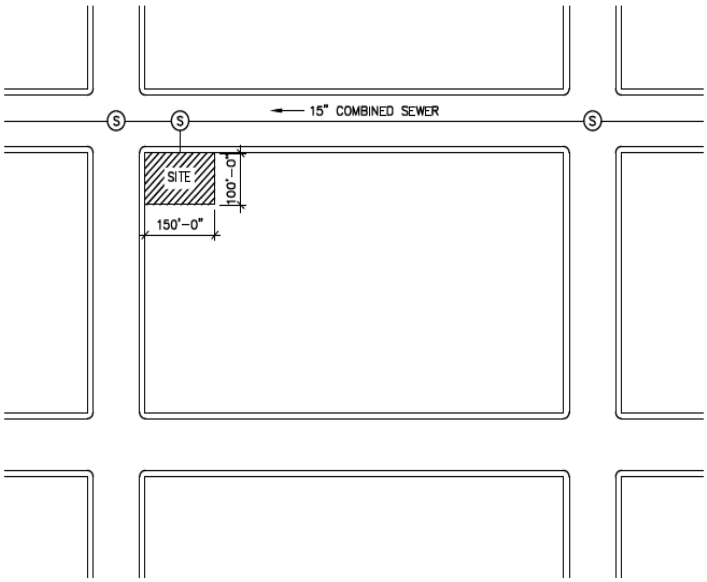


Figure F.2. Schematic of Site (Not to Scale)

Step 1: Identify the rainfall depth (R_D) based on the sewershed type and connection proposal type for the project. Use Table 2.7 in Chapter 2.

Since the project is less than 20,000 sf and consists of a two-family (no fee) residence, this project requires a house connection permit (HCP). In addition, the site is connecting to a 15 in. combined sewer.

Table 2.7. Applied rainfall depth by sewershed type and connection proposal type.

R_D	Description
1.85	CSS areas with SCP
1.50	CSS areas with HCP
1.50	MS4 areas with SCP
1.10	MS4 areas with HCP

According to Table 2.7, $R_D = 1.50\ in.$

Step 2: Calculate the runoff coefficient (C_W) using the weighted area approach.

$$C_W = \frac{(C_1A_1 + C_2A_2 + \cdots etc.)}{A_t}$$

where:
C_W = weighted runoff coefficient relating peak rate of rainfall and runoff
C_1 = the runoff coefficient for the area classified as roof = 0.95
A_1 = the area classified as roof (sf) = 2,000 sf
C_2 = the runoff coefficient for the area classified as paved = 0.85
A_2 = the area classified as paved (sf) = 7,000 sf
C_3 = the runoff coefficient for the area classified as grass = 0.20
A_3 = the area classified as grass (sf) = 6,000 sf
A_t = contributing area (sf) = 15,000 sf

$$C_W = \frac{(0.95 * 2{,}000\ sf) + (0.85 * 7{,}000\ sf) + (0.20 * 6{,}000\ sf)}{15{,}000\ sf}$$

$$C_W = 0.603$$

Step 3: Calculate V_V.

$$V_V = \frac{R_D}{12} * A * C_W$$

where:
V_V = sewer operations volume (cf)
R_D = rainfall depth (in) = 1.50 in
A = contributing area (sf) = 15,000 sf
C_W = weighted runoff coefficient relating peak rate of rainfall and runoff = 0.603

$$V_V = \frac{1.50\ in}{12} * 15{,}000\ sf * 0.603$$

$$V_V = 1{,}131\ cf$$

Step 4: Calculate the release rate to be maintained by the controlled-flow orifice. Use the maximum release rate per acre (q) shown in Table 2.9, Chapter 2.

The site is connecting to a 15 in. combined sewer.

Table 2.9. Maximum release rate per acre (cfs/acre) by sewershed type.

q (cfs/acre)	Description
1.0	MS4 areas
0.1	CSS areas

According to Table 2.9, $q = 0.1 \frac{cfs}{acre}$.

$$Q_{DRR} = \frac{q * A}{43560}\ or\ 0.046\ \ [whichever\ is\ greater]$$

where:
Q_{DRR} = maximum release rate for the site (cfs)
q = maximum release rate per acre (cfs/acre) = 0.1 cfs/acre
A = contributing area (sf) = 15,000 sf

$$Q_{DRR} = \frac{0.1\ \frac{cfs}{acre} * 15{,}000\ sf}{43560}\ or\ 0.046\ \ [whichever\ is\ greater]$$

$$Q_{DRR} = 0.034\ cfs\ < 0.046\ cfs$$

The maximum release rate is 0.046 cfs.

Step 5: Use the controlled-flow orifice equation to determine an appropriate orifice area by assuming the active storage depth.

In order to minimize the area required for the detention tank, choose the maximum depth that is still feasible according to site limitations and use a re-entrant orifice. In this case, the designer has chosen an active storage depth of 4 ft.

$$Q_O = C_D * A_o * \sqrt{2gH}$$

where:
Q_O = maximum release rate of orifice (cfs) = 0.046 cfs
C_D = coefficient of discharge, 0.52 for re-entrant orifice
A_O = area of orifice (sf)
g = acceleration due to gravity, 32.2 (ft/s^2)

H = maximum hydraulic head above the centerline of the orifice (ft) = 4 ft

$$0.046\ cfs = 0.52 * A_o * \sqrt{2 * 32.2\ \left(\frac{ft}{s^2}\right) * 4\ ft}$$

$$A_o = 0.006\ sf$$

Step 6: Translate the area of the controlled-flow orifice (A_O) into a diameter and check that it is greater than the minimum diameter of 1 in.

$$A_o = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

where:
A_O = area of orifice (sf) = 0.006 sf
D_O = diameter of orifice (in)

$$0.006\ sf = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

$$D_O = 1.05\ in\ > 1\ in \qquad OK$$

Set the orifice diameter to the nearest 0.25-inch interval rounding down, with a minimum orifice diameter of one-inch. In this case, use an orifice diameter of 1.00 inch.

Step 7: Confirm the orifice area of the selected orifice diameter from Step 6.

$$A_o = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

where:
A_O = area of orifice (sf)
D_O = diameter of orifice (in) = 1 in

$$A_O = \frac{\left[\pi * \left(\frac{1\ in}{2}\right)^2\right]}{144}$$

$$A_O = 0.005\ sf$$

Step 8: Confirm the required active storage depth in the tank using the orifice area from Step 7.

$$Q_O = C_D * A_o * \sqrt{2gH}$$

where:
Q_O = maximum release rate of orifice (cfs) = 0.046 cfs
C_D = coefficient of discharge, 0.52 for re-entrant orifice
A_O = area of orifice (sf) = 0.005 sf
g = acceleration due to gravity, 32.2 (ft/s^2)
H = maximum hydraulic head above the centerline of the orifice (ft)

$$0.046\ cfs = 0.52 * 0.005\ sf * \sqrt{2 * 32.2\ \left(\frac{ft}{s^2}\right) * H}$$

$$H = 4.9\ ft$$

If the active storage depth is too high, then increase the orifice size by 0.25 inches and re-run Steps 7-8 until a suitable depth is identified. If the active storage depth is too low, then decrease the orifice size by 0.25 inches (but not less than 1 inch) and re-run Steps 7-8. Alternatively, the designer can choose a different orifice configuration as needed to modify the active storage depth.

In this case, the depth is feasible.

Step 9: Set the dimensions of the detention tank's active storage zone.

Based on the active storage depth of 4.9 ft and the V_V of 1,131 cf, set the interior detention tank dimensions to L: 15.5 ft and W: 15.5 ft. The resulting detention tank has an active storage volume of 1,177 cf. Note that the exterior dimensions of the detention tank will be larger than the dimensions of the active storage zone (15.5'L x 15.5'W x 4.9'D) to accommodate wall thickness, bypass structures, and/or other internal features.

Detention Tank - MS4 with SCP

A 25,050 sf site consists of a multistory commercial building. The site was proposed to connect to a 12 in. storm sewer that eventually discharges into Gravesend Bay via an MS4 outfall. Design a detention tank to treat the sewer operations volume (V_V), given the following:

Area = 25,050 sf
Roof = 16,000 sf @ 0.95 runoff coefficient
Paved = 6,100 sf @ 0.85 runoff coefficient
Grass = 2,950 sf @ 0.20 runoff coefficient

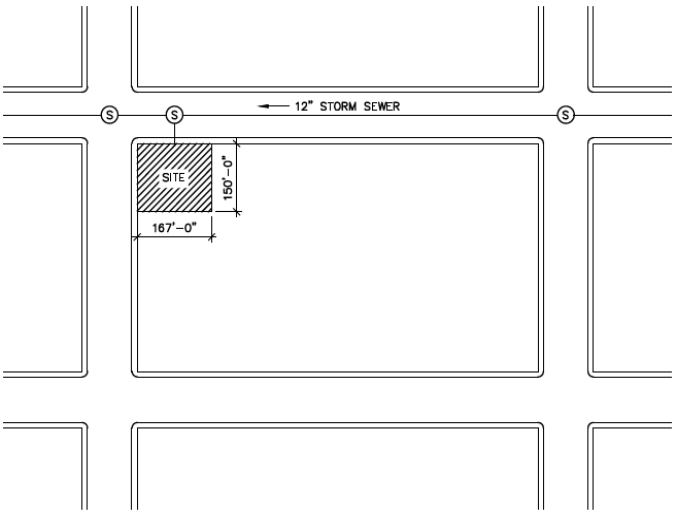


Figure F.3. Schematic of Site (Not to Scale)

Step 1: Identify the rainfall depth (R_D) based on the sewershed type and connection proposal type for the project. Use Table 2.7 in Chapter 2.

Since the project is 20,000 sf or more, and consists of a multistory commercial building, this project requires a site connection permit (SCP). In addition, the site is connecting to a 12 in. storm sewer that discharges through an MS4 outfall.

Table 2.7. Applied rainfall depth by sewershed type and connection proposal type.

R_D	Description
1.85	CSS areas with SCP
1.50	CSS areas with HCP
1.50	MS4 areas wiith SCP
1.10	MS4 areas with HCP

According to Table 2.7, $R_D = 1.50\ in.$

Step 2: Calculate the runoff coefficient (C_W) using the weighted area approach.

$$C_W = \frac{(C_1A_1 + C_2A_2 + \cdots etc.)}{A_t}$$

where:
C_W = weighted runoff coefficient relating peak rate of rainfall and runoff
C_1 = the runoff coefficient for the area classified as roof = 0.95
A_1 = the area classified as roof (sf) = 16,000 sf
C_2 = the runoff coefficient for the area classified as paved = 0.85
A_2 = the area classified as paved (sf) = 6,100 sf
C_3 = the runoff coefficient for the area classified as grass = 0.20
A_3 = the area classified as grass (sf) = 2,950 sf
A_t = contributing area (sf) = 25,050 sf

$$C_W = \frac{(0.95 * 16{,}000\ sf) + (0.85 * 6{,}100\ sf) + (0.20 * 2{,}950\ sf)}{25{,}050\ sf}$$

$$C_W = 0.837$$

Step 3: Calculate V_V.

$$V_V = \frac{R_D}{12} * A * C_W$$

where:
V_V = sewer operations volume (cf)
R_D = rainfall depth (in) = 1.50 in
A = contributing area (sf) = 25,050 sf
C_W = weighted runoff coefficient relating peak rate of rainfall and runoff = 0.837

$$V_V = \frac{1.50\ in}{12} * 25{,}050\ sf * 0.837$$

$$V_V = 2{,}621\ cf$$

Step 4: Calculate the release rate to be maintained by the controlled-flow orifice. Use the maximum release rate per acre (q) shown in Table 2.9, Chapter 2.

The site is connecting to a 12 in. storm sewer that discharges through an MS4 outfall.

Table 2.9. Maximum release rate per acre (cfs/acre) by sewershed type.

q (cfs/acre)	Description
1.0	MS4 areas
0.1	CSS areas

According to Table 2.9, $q = 1.0\ \frac{cfs}{acre}$.

$$Q_{DRR} = \frac{q\ * A}{43560}\ or\ 0.046\ \ [whichever\ is\ greater]$$

where:
Q_{DRR} = maximum release rate for the site (cfs)
q = maximum release rate per acre (cfs/acre) = 1.0 cfs/acre
A = contributing area (sf) = 25,050 sf

$$Q_{DRR} = \frac{1.0\ \frac{cfs}{acre} * 25{,}050\ sf}{43560} or\ 0.046\ \ [whichever\ is\ greater]$$

$$Q_{DRR} = 0.575\ cfs\ > 0.046\ cfs$$

The maximum release rate is 0.575 cfs.

Step 5: Use the controlled-flow orifice equation to determine an appropriate orifice area by assuming the active storage depth.

In order to minimize the area required for the detention tank, choose the maximum depth that is still feasible according to site limitations and use a re-entrant orifice. In this case, the designer has chosen an active storage depth of 4 ft.

$$Q_O = C_D * A_o * \sqrt{2gH}$$

where:
Q_O = maximum release rate of orifice (cfs) = 0.575 cfs
C_D = coefficient of discharge, 0.52 for re-entrant orifice
A_O = area of orifice (sf)

g = acceleration due to gravity, 32.2 (ft/s^2)
H = maximum hydraulic head above the centerline of the orifice (ft) = 4 ft

$$0.575\ cfs = 0.52 * A_o * \sqrt{2 * 32.2\ \left(\frac{ft}{s^2}\right) * 4\ ft}$$

$$A_o = 0.069\ sf$$

Step 6: Translate the area of the controlled-flow orifice (A_O) into a diameter and check that it is greater than the minimum diameter of 1 in.

$$A_o = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

where:
A_O = area of orifice (sf) = 0.069 sf
D_O = diameter of orifice (in)

$$0.069\ sf = \frac{\left[\pi * \left(\frac{D_O}{2}\right)^2\right]}{144}$$

$$D_O = 3.56\ in\ > 1\ in \qquad OK$$

Set the orifice diameter to the nearest 0.25-inch interval rounding down, with a minimum orifice diameter of one-inch. In this case, use an orifice diameter of 3.50 inches.

Step 7: Confirm the orifice area of the selected orifice diameter from Step 6.

$$A_o = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

where:
A_O = area of orifice (sf)
D_O = diameter of orifice (in) = 3.50 inches

$$A_O = \frac{\left[\pi * \left(\frac{3.50\ in}{2}\right)^2\right]}{144}$$

$$A_O = 0.067\ sf$$

Step 8: Confirm the required active storage depth in the tank using the orifice area from Step 7.

$$Q_O = C_D * A_o * \sqrt{2gH}$$

where:
Q_O = maximum release rate of orifice (cfs) = 0.575 cfs
C_D = coefficient of discharge, 0.52 for re-entrant orifice
A_O = area of orifice (sf) = 0.067 sf
g = acceleration due to gravity, 32.2 (ft/s^2)
H = maximum hydraulic head above the centerline of the orifice (ft)

$$0.575\ cfs = 0.52 * 0.067\ sf * \sqrt{2 * 32.2\ \left(\frac{ft}{s^2}\right) * H}$$

$$H = 4.2\ ft$$

If the active storage depth is too high, then increase the orifice size by 0.25 inches and re-run Steps 7-8 until a suitable depth is identified. If the active storage depth is too low, then decrease the orifice size by 0.25 inches (but not less than 1 inch) and re-run Steps 7-8. Alternatively, the designer can choose a different orifice configuration as needed to modify the active storage depth.

In this case, the depth is feasible.

Step 9: Set the dimensions of the detention tank's active storage zone.

Based on the active storage depth of 4.2 ft and the V_V of 2,621 cf, set the interior detention tank dimensions to L: 25 ft and W: 25 ft. The resulting detention tank has an active storage volume of 2,625 cf. Note that the exterior dimensions of the detention tank will be larger than the dimensions of the active storage zone (25'L x 25'W x 4.2'D) to accommodate wall thickness, bypass structures, and/or other internal features.

Detention Tank - MS4 with HCP

A 3,000 sf site consists of a one-family (no-fee) residence. The site was proposed to connect to a 12 in. storm sewer that eventually discharges into East River via an MS4 outfall. Design a detention tank to treat the sewer operations volume (V_V), given the following:

Area = 3,000 sf
Roof = 2,100 sf @ 0.95 runoff coefficient
Paved = 500 sf @ 0.85 runoff coefficient
Grass = 400 sf @ 0.20 runoff coefficient

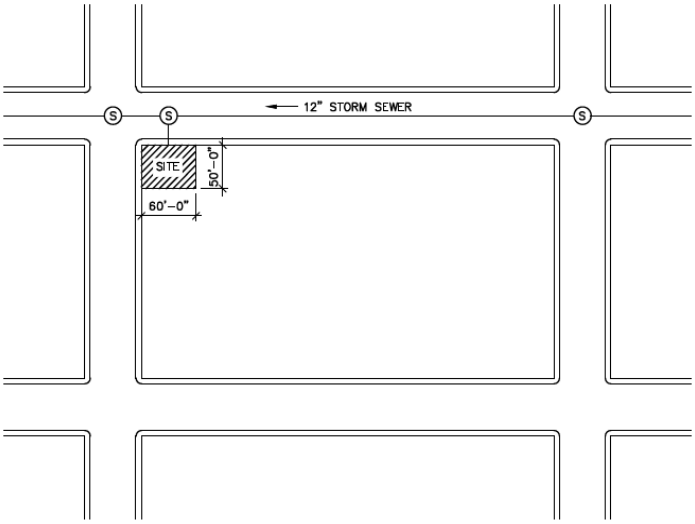


Figure F.4. Schematic of Site (Not to Scale)

Step 1: Identify the rainfall depth (R_D) based on the sewershed type and connection proposal type for the project. Use Table 2.7 in Chapter 2.

Since the project is less than 20,000 sf and consists of a one-family (no fee) residence, this project requires a house connection permit (HCP). In addition, the site is connecting to a 12 in. storm sewer that discharges through an MS4 outfall.

Table 2.7. Applied rainfall depth by sewershed type and connection proposal type.

R_D	Description
1.85	CSS areas with SCP
1.50	CSS areas with HCP
1.50	MS4 areas with SCP
1.10	MS4 areas with HCP

According to Table 2.7, $R_D = 1.10\ in.$

Step 2: Calculate the runoff coefficient (C_W) using the weighted area approach.

$$C_W = \frac{(C_1A_1 + C_2A_2 + \cdots etc.)}{A_t}$$

where:
C_W = weighted runoff coefficient relating peak rate of rainfall and runoff
C_1 = the runoff coefficient for the area classified as roof = 0.95
A_1 = the area classified as roof (sf) = 2,100 sf
C_2 = the runoff coefficient for the area classified as paved = 0.85
A_2 = the area classified as paved (sf) = 500 sf
C_3 = the runoff coefficient for the area classified as grass = 0.20
A_3 = the area classified as grass (sf) = 400 sf
A_t = contributing area (sf) = 3,000 sf

$$C_W = \frac{(0.95 * 2{,}100\ sf) + (0.85 * 500\ sf) + (0.20 * 400\ sf)}{3{,}000\ sf}$$

$$C_W = 0.833$$

Step 3: Calculate V_V.

$$V_V = \frac{R_D}{12} * A * C_W$$

where:
V_V = sewer operations volume (cf)
R_D = rainfall depth (in) = 1.10 in
A = contributing area (sf) = 3,000 sf
C_W = weighted runoff coefficient relating peak rate of rainfall and runoff = 0.833

$$V_V = \frac{1.10\ in}{12} * 3{,}000\ sf * 0.833$$

$$V_V = 229\ cf$$

Step 4: Calculate the release rate to be maintained by the controlled-flow orifice. Use the maximum release rate per acre (q) shown in Table 2.9, Chapter 2.

The site is connecting to a 12 in. storm sewer that discharges through an MS4 outfall.

Table 2.9. Maximum release rate per acre (cfs/acre) by sewershed type.

q (cfs/acre)	Description
1.0	MS4 areas
0.1	CSS areas

According to Table 2.9, $q = 1.0 \frac{cfs}{acre}$.

$$Q_{DRR} = \frac{q * A}{43560}\ or\ 0.046\ \ [whichever\ is\ greater]$$

where:
Q_{DRR} = maximum release rate for the site (cfs)
q = maximum release rate per acre (cfs/acre) = 1.0 cfs/acre
A = contributing area (sf) = 3,000 sf

$$Q_{DRR} = \frac{1.0\ \frac{cfs}{acre} * 3{,}000\ sf}{43560}\ or\ 0.046\ \ [whichever\ is\ greater]$$

$$Q_{DRR} = 0.069\ cfs\ > 0.046\ cfs$$

The maximum release rate is 0.069 cfs.

Step 5: Use the controlled-flow orifice equation to determine an appropriate orifice area by assuming the active storage depth.

In order to minimize the area required for the detention tank, choose the maximum depth that is still feasible according to site limitations and use a re-entrant orifice. In this case, the designer has chosen an active storage depth of 4 ft.

$$Q_O = C_D * A_o * \sqrt{2gH}$$

where:
Q_O = maximum release rate of orifice (cfs) = 0.069 cfs
C_D = coefficient of discharge, 0.52 for re-entrant orifice
A_O = area of orifice (sf)

g = acceleration due to gravity, 32.2 (ft/s^2)
H = maximum hydraulic head above the centerline of the orifice (ft) = 4 ft

$$0.069\ cfs = 0.52 * A_o * \sqrt{2 * 32.2\ \left(\frac{ft}{s^2}\right) * 4\ ft}$$

$$A_o = 0.008\ sf$$

Step 6: Translate the area of the controlled-flow orifice (A_O) into a diameter and check that it is greater than the minimum diameter of 1 in.

$$A_o = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

where:
A_O = area of orifice (sf) = 0.008 sf
D_O = diameter of orifice (in)

$$0.008\ sf = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

$$D_O = 1.21\ in\ > 1\ in \qquad OK$$

Set the orifice diameter to the nearest 0.25-inch interval rounding down, with a minimum orifice diameter of one-inch. In this case, use an orifice diameter of 1 inch.

Step 7: Confirm the orifice area of the selected orifice diameter from Step 6.

$$A_o = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

where:
A_O = area of orifice (sf)
D_O = diameter of orifice (in) = 1 inch

$$A_O = \frac{\left[\pi * \left(\frac{1\ in}{2}\right)^2\right]}{144}$$

$$A_O = 0.005\ sf$$

Step 8: Confirm the required active storage depth in the tank using the orifice area from Step 7.

$$Q_O = C_D * A_o * \sqrt{2gH}$$

where:
Q_O = maximum release rate of orifice (cfs) = 0.069 cfs
C_D = coefficient of discharge, 0.52 for re-entrant orifice
A_O = area of orifice (sf) = 0.005 sf
g = acceleration due to gravity, 32.2 (ft/s^2)
H = maximum hydraulic head above the centerline of the orifice (ft)

$$0.069\ cfs = 0.52 * 0.005\ sf * \sqrt{2 * 32.2\ \left(\frac{ft}{s^2}\right) * H}$$

$$H = 10.9\ ft$$

If the active storage depth is too high, then increase the orifice size by 0.25 inches and re-run Steps 7-8 until a suitable depth is identified. If the active storage depth is too low, then decrease the orifice size by 0.25 inches (but not less than 1 inch) and re-run Steps 7-8. Alternatively, the designer can choose a different orifice configuration as needed to modify the active storage depth.

In this case, the depth is too high to drain via gravity connection to the storm sewer. Using an orifice size of 1.25 inches results in an active storage depth of 3.4 ft.

Step 9: Set the dimensions of the detention tank's active storage zone.

Based on the active storage depth of 3.4 ft and the V_V of 229 cf, set the interior detention tank dimensions to L: 8.5 ft and W: 8.5 ft. The resulting detention tank has an active storage volume of 246 cf. Note that the exterior dimensions of the detention tank will be larger than the dimensions of the active storage zone (8.5'L x 8.5'W x 3.4'D) to accommodate wall thickness, bypass structures, and/or other internal features.

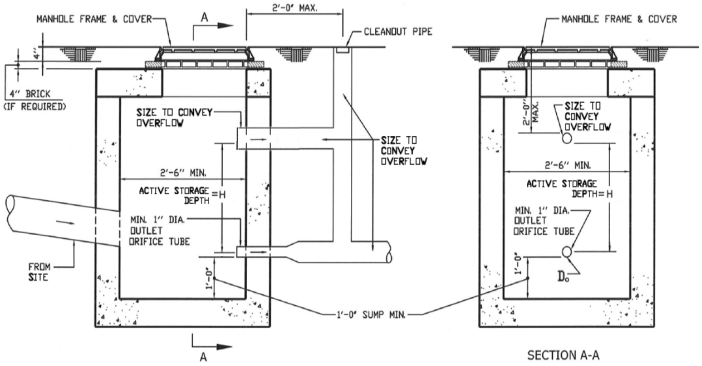


Figure F.5. Detention Tank with Re-Entrant Orifice

APPENDIX E

Site Design Example

Site Design Example

Design stormwater management practices for a 21,545 square foot commercial development that proposes a new site connection. This site is located within the sewershed of a combined sewer system and has no site constraints. Based on geotechnical investigations, the soil permeability rate across the site is at least 0.5 in/hr.

Step 1: Determine applicable permit requirements for the site.

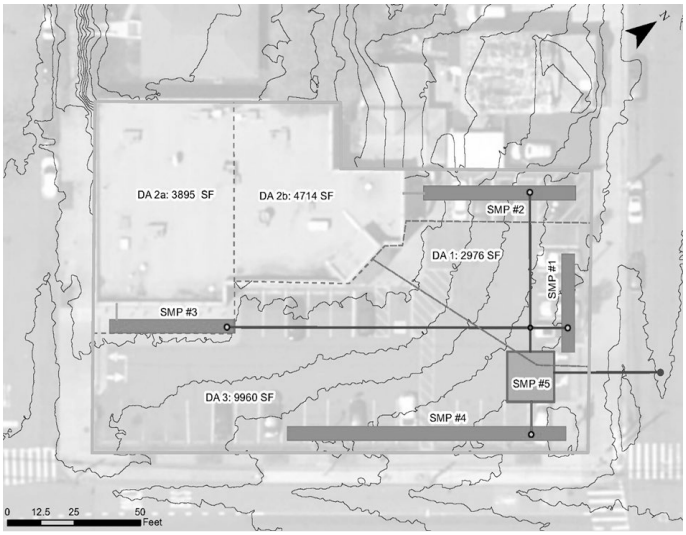
Since the project disturbs more than 20,000 square feet and involves commercial development, a Stormwater Construction Permit is applicable. As shown in Table 2.3 of Chapter 2, commercial development is a covered development activity that requires the preparation of a SWPPP meeting erosion and sediment control (ESC), water quality (WQ_V), and runoff reduction (RR) requirements. The no-net increase (NNI) requirement is not applicable because the project is not located in an MS4 sewershed area and does not discharge into an impaired water body.

The project proposes a new site connection and is located within the sewershed of a combined sewer system. Therefore, a Site Connection Permit is also applicable. A connection proposal must be prepared to meet the sewer operations (V_V) requirements.

Step 2: Use Appendix C to select appropriate practices for meeting the WQ_V, RR, and V_V requirements. The ESC requirements should be met using best practices in accordance with the NYS Standards and Specifications for Erosion and Sediment Control (The Blue Book).

Since the site has no constraints and the soil permeability rate is at least 0.5 in/hr, an infiltration practice is preferred. To meet the WQ_V and RR requirements, the designer has chosen to use a bioretention practice for each of the four drainage areas. The designer has chosen to use a detention tank to meet the V_V requirements.

Figure G.1. Schematic of Scenario 1



SMP 1: Bioretention

Design a bioretention practice (SMP 1) that will treat the water quality volume from an impervious area of 2,976 square feet with a runoff coefficient of 0.95. This example assumes a soil media saturated hydraulic conductivity of 2 in/hr, and an infiltration rate of 1.5 in/hr.

Note: If a bioretention practice is designed to meet the water quality volume, the practice will, by default, also meet the runoff reduction criteria.

Step 3.1: Calculate the WQ_V.

$$WQ_V = \frac{1.5\ in}{12} * A * R_V$$

where:
WQ_V = water quality volume (cf)
A = contributing area (sf) = 2,976 sf
R_V = runoff coefficient relating total rainfall and runoff
R_V = 0.05 + 0.009(I) = 0.95
I = percent impervious cover = 100%

$$WQ_V = \frac{1.5\ in}{12} * 2{,}976\ sf * 0.95$$

$$WQ_V = 353.4\ cf$$

Step 3.2: Calculate the minimum SMP area using the maximum loading ratio of 1:20 for a bioretention practice. Use the minimum area to set the initial length and width of the practice.

$$A_{SMP} = \frac{A}{20}$$

where:
A_{SMP} = area at the base of infiltration SMP (sf)
A = contributing area (sf) = 2,976 sf

$$A_{SMP} = \frac{2{,}976\ sf}{20}$$

$$A_{SMP} = 148.8\ sf$$

Round the SMP area up to 150 sf. Assume a 30 ft by 5 ft practice.

Step 3.3: Calculate the volume of surface ponding assuming the maximum surface ponding depth of 1 ft for a bioretention practice.

Assume the ponding zone is relatively flat.

$$V_P = A_{SMP} * D_P$$

where:
V_P = volume of surface ponding (cf)
A_{SMP} = area of the SMP (sf) = 150 sf
D_P = depth of ponding (ft) = 1 ft

$$V_P = 150\ sf * 1\ ft$$

$$V_P = 150\ cf$$

Since the bioretention practice uses engineered soil media, confirm that the volume of surface ponding is at least 10% of the water quality volume.

$$V_P = 150\ cf > 10\%\ of\ WQ_V = 35.3\ cf \qquad OK$$

In this case, the designer has also chosen to use a hydraulic connection between the ponding zone and the stone base. Therefore, the ponding zone does not need to temporarily store 75% of the water quality volume.

Step 3.4: Calculate the volume of voids in the soil media layer assuming a soil media depth of 2.5 ft, equal to the minimum soil media depth of 2.5 ft for a bioretention practice.

$$V_S = A_{SMP} * D_S * n_S$$

V_S = volume of voids in the soil media layer (cf)
A_{SMP} = area of the SMP (sf) = 150 sf
D_S = depth of soil media layer (ft) = 2.5 ft
n_S = available porosity of soil media (cf/cf) = 0.2 cf/cf

$$V_S = 150\ sf * 2.5\ ft * 0.2\frac{cf}{cf}$$

$$V_S = 75\ cf$$

Step 3.5: Calculate the volume of voids created by internal structures.

Assume there are no internal structures in this bioretention practice, so the volume is 0.

$$V_I = 0\ cf$$

Step 3.6: Calculate the volume of voids in the drainage layer assuming a drainage media depth of 2.5 ft, which is greater than the minimum drainage media depth of 1 ft for a bioretention practice.

$$V_D = (A_{SMP} * D_D - V_{I,d}) * n_D$$

where:
V_D = volume of voids in the drainage layer (cf)
A_{SMP} = area of the SMP (sf) = 150 cf
D_D = depth of the drainage layer (ft) = 2.5 ft
$V_{I,d}$ = volume of voids created by internal structures within the drainage layer (cf) = 0 cf
n_D = porosity of drainage layer media (cf/cf) = 0.4 cf/cf

$$V_D = (150\ sf * 2.5\ ft - 0\ cf) * 0.4\frac{cf}{cf}$$

$$V_D = 150\ cf$$

Step 3.7: Calculate the total SMP volume from the individual component volumes and compare to the WQ_V.

$$V_{SMP} = V_P + V_S + V_I + V_D$$

where:
V_{SMP} = storage volume of SMP (cf)
V_P = volume of surface ponding (cf) = 150 cf
V_S = volume of voids in the soil media layer (cf) = 75 cf
V_I = volume of voids created by internal structures such as chambers or pipes (cf) = 0 cf
V_D = volume of voids in the drainage layer (cf) = 150 cf

$$V_{SMP} = 150\ cf + 75\ cf + 0\ cf + 150\ cf$$

$$V_{SMP} = 375\ cf > WQ_V = 353.4\ cf \qquad OK$$

Step 3.8: Check that the ponding and infiltration drawdown times of the practice do not exceed the required times of 24 hours and 48 hours, respectively.

Infiltration drawdown time:

$$dt_{SMP} = \frac{V_{SMP}}{\left(\frac{i}{12}\right) * A_{SMP}}$$

where:
dt_{SMP} = drawdown time of infiltration SMP (hr)
V_{SMP} = volume of infiltration SMP (cf) = WQ_V = 375 cf
i = field measured infiltration rate (in/hr) = 1.5 in/hr
A_{SMP} = area at the base of infiltration SMP (sf) = 150 sf

$$dt_{SMP} = \frac{375\ cf}{\left(\frac{1.5\ in/hr}{12}\right) * 150\ sf}$$

$$dt_{SMP} = 20\ hr < 48\ hr \qquad OK$$

rface ponding drawdown time:

$$dt_P = \frac{V_P}{\left(\frac{K_S}{12}\right) * \left(1 + \frac{0.5D_p}{D_m}\right) * \left(\frac{A_{P1} + A_{P2}}{2}\right)}$$

where:
dt_P = drawdown time of surface ponding (hr)
V_P = volume of surface ponding (cf) = 150 cf
K_S = saturated hydraulic conductivity of media below the surface ponding area (in/hr) = 2 in/hr
D_p = maximum depth of ponding (ft) = 1 ft
D_m = depth of media below surface ponding area (ft) = 2.5 ft
A_{P1} = area at the base of surface ponding zone (sf) = 150 sf
A_{P2} = area at the top of surface ponding zone (sf) = 150 sf

$$dt_P = \frac{150\ cf}{\left(\frac{2\frac{in}{hr}}{12}\right) * \left(1 + \frac{0.5 * 1\ ft}{2.5\ ft}\right) * \left(\frac{150\ sf + 150\ sf}{2}\right)}$$

$$dt_P = 5\ hr < 24\ hr \qquad OK$$

SMP 2-4: Bioretention

Steps 4-6: Design bioretention practices (SMP 2, SMP 3, and SMP 4) for the other three drainage areas by running through the same steps as for SMP 1. Assume a soil media saturated hydraulic conductivity of 2 in/hr, and an infiltration rate of 1.5 in/hr.

Table G.1 shows the final dimensions, SMP volume, and required water quality volume for each bioretention practice.

Table G.1. Summary of WQ_V Design

SMP #	Drainage Area (sf)	Dimensions (L' x W' x D')	SMP Volume (cf)	WQ_V (cf)
1	2,976	30 x 5 x 6	375	353.4
2	4,714	48 x 5 x 6	600	559.8
3	3,895	39 x 5 x 6	487.5	462.5
4	9,960	100 x 5 x 6	1,250	1,182.8

SMP 5: Detention Tank

Design a detention tank (SMP 5) that will treat the sewer operations volume from an impervious area of 21,545 square feet with a weighted runoff coefficient of 0.88.

Step 7.1: Identify the rainfall depth (R_D) based on the sewershed type and connection proposal type for the project. Use Table 2.7 in Chapter 2.

As determined in Step 1, the project requires a site connection permit (SCP). In addition, the project is located within the sewershed of a combined sewer system.

Table 2.7. Applied rainfall depth by sewershed type and connection proposal type.

R_D	Description
1.85	CSS areas with SCP
1.50	CSS areas with HCP
1.50	MS4 areas with SCP
1.10	MS4 areas with HCP

According to Table 2.7, $R_D = 1.85\ in.$

Step 7.2: Calculate the total V_V.

$$V_V = \frac{R_D}{12} * A * C_W$$

where:
V_V = sewer operations volume (cf)
R_D = rainfall depth (in) = 1.85 in
A = contributing area (sf) = 21,545 sf
C_W = weighted runoff coefficient relating peak rate of rainfall and runoff = 0.88

$$V_V = \frac{1.85\ in}{12} * 21{,}545\ sf * 0.88$$

$$V_V = 2{,}922.9\ cf$$

Step 7.3: Subtract the amount of SMP volume that may be credited towards meeting the total V_V from Step 7.2. The remaining volume ($V_{V,Tank}$) must be managed by the detention tank.

50% of the V_{SMP} from each bioretention practice can be credited towards the V_V.

Total creditable V_{SMP}:

$$V_{SMP,TC} = 0.5(V_{SMP,1} + V_{SMP,2} + V_{SMP,3} + V_{SMP,4})$$

where:
$V_{SMP,TC}$ = total creditable SMP volume (cf)
$V_{SMP,1}$ = volume from SMP 1 (cf) = 375 cf
$V_{SMP,2}$ = volume from SMP 2 (cf) = 600 cf
$V_{SMP,3}$ = volume from SMP 3 (cf) = 487.5 cf
$V_{SMP,4}$ = volume from SMP 4 (cf) = 1,250 cf

$$V_{SMP,TC} = 0.5(375\ cf + 600\ cf + 487.5\ cf + 1{,}250\ cf)$$

$$V_{SMP,TC} = 1{,}356.25\ cf$$

Remaining volume managed by the detention tank:

$$V_{V,Tank} = 2{,}922.9\ cf - 1{,}356.25\ cf$$

$$V_{V,Tank} = 1{,}566.65\ cf$$

Step 7.4: Calculate the release rate to be maintained by the controlled-flow orifice. Use the maximum release rate per acre (q) shown in Table 2.9, Chapter 2.

The project is located within the sewershed of a combined sewer system.

Table 2.9. Maximum release rate per acre (cfs/acre) by sewershed type.

q (cfs/acre)	Description
1.0	MS4 areas
0.1	CSS areas

According to Table 2.9, $q = 0.1\ \frac{cfs}{acre}$.

$$Q_{DRR} = \frac{q * A}{43560}\ or\ 0.046\ \ [whichever\ is\ greater]$$

where:
Q_{DRR} = maximum release rate for the site (cfs)
q = maximum release rate per acre (cfs/acre) = 0.1 cfs/acre
A = contributing area (sf) = 93,200 sf

$$Q_{DRR} = \frac{0.1\ \frac{cfs}{acre} * 21{,}545\ sf}{43560} or\ 0.046\ \ [whichever\ is\ greater]$$

$$Q_{DRR} = 0.049\ cfs\ > 0.046\ cfs$$

The maximum release rate is 0.049 cfs.

Step 7.5: Use the controlled-flow orifice equation to determine an appropriate orifice area by assuming the active storage depth.

In order to minimize the area required for the detention tank, choose the maximum depth that is still feasible according to site limitations and use a re-entrant orifice. In this case, the designer has chosen an active storage depth of 4 ft.

$$Q_O = C_D * A_o * \sqrt{2gH}$$

where:
Q_O = maximum release rate of orifice (cfs) = 0.049 cfs
C_D = coefficient of discharge, 0.52 for re-entrant orifice
A_O = area of orifice (sf)
g = acceleration due to gravity, 32.2 (ft/s^2)
H = maximum hydraulic head above the centerline of the orifice (ft) = 4 ft

$$0.049\ cfs = 0.52 * A_o * \sqrt{2 * 32.2\ \left(\frac{ft}{s^2}\right) * 4\ ft}$$

$$A_o = 0.006\ sf$$

Step 7.6: Translate the area of the controlled-flow orifice (A_O) into a diameter and check that it is greater than the minimum diameter of 1 in.

$$A_o = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

where:
A_O = area of orifice (sf) = 0.006 sf
D_O = diameter of orifice (in)

$$0.006\ sf = \frac{\left[\pi * \left(\frac{D_O}{2}\right)^2\right]}{144}$$

$$D_O = 1.05\ in\ > 1\ in \qquad OK$$

Set the orifice diameter to the nearest 0.25-inch interval rounding down, with a minimum orifice diameter of one-inch. In this case, use an orifice diameter of 1.00 inch.

Step 7.7: Confirm the orifice area of the selected orifice diameter from Step 7.6.

$$A_o = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

where:
A_O = area of orifice (sf)
D_O = diameter of orifice (in) = 1 in

$$A_O = \frac{\left[\pi * \left(\frac{1\ in}{2}\right)^2\right]}{144}$$

$$A_O = 0.005\ sf$$

Step 7.8: Confirm the required active storage depth in the tank using the orifice area from Step 7.7.

$$Q_O = C_D * A_o * \sqrt{2gH}$$

where:
Q_O = maximum release rate of orifice (cfs) = 0.049 cfs
C_D = coefficient of discharge, 0.52 for re-entrant orifice
A_O = area of orifice (sf) = 0.005 sf
g = acceleration due to gravity, 32.2 (ft/s^2)
H = maximum hydraulic head above the centerline of the orifice (ft)

$$0.049\ cfs = 0.52 * 0.005\ sf * \sqrt{2 * 32.2\ \left(\frac{ft}{s^2}\right) * H}$$

$$H = 5.5\ ft$$

If the active storage depth is too high, then increase the orifice size by 0.25 inches and re-run Steps 7.7-7.8 until a suitable depth is identified. If the active storage depth is too low, then decrease the orifice size by 0.25 inches (but not less than 1 inch) and re-run Steps 7.7-7.8. Alternatively, the designer can choose a different orifice configuration as needed to modify the active storage depth.

In this case, the depth is feasible.

Step 7.9: Set the dimensions of the detention tank's active storage zone.

Based on the active storage depth of 5.5 ft and the $V_{V,Tank}$ of 1,566.65 cf, set the interior detention tank dimensions to L: 17 ft and W: 17 ft. The resulting detention tank has an active storage volume of 1,589.5 cf. Note that the exterior dimensions of the detention tank will be larger than the dimensions of the active storage zone (17'L x 17'W x 5.5'D) to accommodate wall thickness, bypass structures, and/or other internal features.

Table G.2 summarizes the final designs for the bioretention practices and the detention tank.

Table G.2. Summary of WQ_V and V_V Design

SMP #	Drainage Area (sf)	Dimensions (L' x W' x D')	SMP Volume (cf)	WQ_V (cf)	V_V (cf)
1	2,976	30 x 5 x 6	375	353.4	187.5
2	4,714	48 x 5 x 6	600	559.8	300
3	3,895	39 x 5 x 6	487.5	462.5	243.75
4	9,960	100 x 5 x 6	1,250	1,182.8	625
5	21,545	17 x 17 x 5.5	1,589.5	0	1,589.5
Total	**21,545**	**-**	**-**	**2,558.5**	**2,945.75**

APPENDIX F

Controlled-Flow Pump Workbook

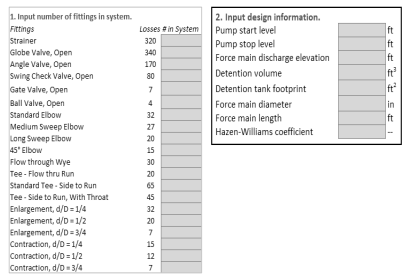
APPENDIX F: Detention in Series Workbook and Example
Workbook notes

This workbook is intended for detention system designs where a controlled-flow orifice with gravity drainage is infeasible. In these cases, the required maximum release rates are maintained with a controlled-flow pump system. When working to target a specific release rate for a pump system, the average release rate should not exceed the maximum rate for the facility at the time when the volume is being provided. The average rate for the system is determined by taking the average of the maximum and minimum rates for the system. The maximum and minimum rates are determined by finding the operation point for each rate respectively. The operation point is defined as the point where the system head curve intersects with the pump curve. The following steps and inputs are required to use this workbook.

The ***Notes*** section provides space to include notes and details on the system specifications. The ***Reviewer*** name should also be included here. Notes on how to choose a Hazen-Williams coefficient are also included in this section for reference.


Pump Head Losses
Reviewer:
Date: 4/2/2021
Notes:
*Choosing Hazen-Williams Coefficient:
New Wrought or Cast Iron, Steel, Ductile Iron, Vitrified: 130
New Concrete: 120
Old Concrete or Brick: 100

The ***first section (1)*** asks for user inputs on the fittings proposed for the system and the number of each type of fitting. The user should place numbers corresponding to each type of fitting in the orange 'input' boxes. Any fitting that is not used can remain blank.


1. Input number of fittings in system.

Fittings	Losses # in System
Strainer	320
Globe Valve, Open	340
Angle Valve, Open	170
Swing Check Valve, Open	80
Gate Valve, Open	7
Ball Valve, Open	4
Standard Elbow	32
Medium Sweep Elbow	27
Long Sweep Elbow	20
45° Elbow	15
Flow through Wye	30
Tee - Flow thru Run	20
Standard Tee - Side to Run	65
Tee - Side to Run, With Throat	45
Enlargement, d/D = 1/4	32
Enlargement, d/D = 1/2	20
Enlargement, d/D = 3/4	7
Contraction, d/D = 1/4	15
Contraction, d/D = 1/2	12
Contraction, d/D = 3/4	7

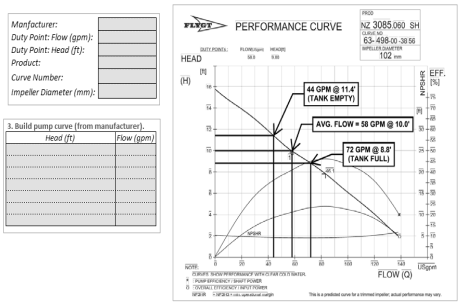
2. Input design information.

Pump start level	ft
Pump stop level	ft
Force main discharge elevation	ft
Detention volume	ft^3
Detention tank footprint	ft^2
Force main diameter	in
Force main length	ft
Hazen-Williams coefficient	--

The following information should be included in the ***second section (2).***

- Pump start level (L3) - The elevation of water where the pump system is designed to turn on. This is typically near the top of the tank.
- Pump stop level (L4) - The elevation of water where the pump system is designed to turn off. This is typically near the bottom of the tank.
- Force main discharge elevation (L5) - The elevation that the proposed force main will discharge by gravity only (where it is no longer under pressure). The nature of this location requires that it be above the sewer.
- Detention volume (L6) - The required detention volume in cubic feet calculated for the system. The required detention volume for singular detention systems can be computed using equations in Chapter 2, while the required detention volume of systems in series can be computed using equations in Section 4.11.
- Detention tank footprint (L7) - The area of the detention tank in square feet.
- Force main diameter (L8) - The force main pipe diameter in inches. Minimum of 2-inches and provided in half-inch increments.
- Force main length (L9) - The force main length in feet, not including any equivalent lengths provided in section 1 (number of fittings in system).
- Hazen-Williams coefficient (L10) - The proposed Hazen-Williams coefficient, typically 130 for new wrought or cast iron, steel, ductile iron, or vitrified clay pipes.

The ***third section (3)*** asks the user to recreate a pump curve provided by a manufacturer. The following table should be populated with values corresponding to a provided pump curve (example shown). The pump curve example given corresponds to ***Example 1.*** A table is also available for the user to input pump product information directly in the workbook.


Manufacturer:
Duty Point: Flow (gpm):
Duty Point: Head (ft):
Product:
Curve Number:
Impeller Diameter (mm):

3. Build pump curve (from manufacturer).

Head (ft)	Flow (gpm)

In the ***fourth section (4)***, the user is asked to provide the proposed maximum pump rate at which the pump will operate in gallons per minute ***(Q21)***, or the operation point for when the pressure head is the lowest, and the proposed minimum pump rate at which the pump will operate ***(Q22)***, or the operation point for when the pressure head is the highest. These inputs will allow for the following outputs to be calculated.

- The equivalent length of pipe for fittings (V15)
- The minimum static lift in feet (V17)
- The maximum static lift in feet (V18)
- The provided storage depth in feet (V19)
- The maximum water level in feet (V20)
- The maximum head loss in feet (P21)
- The minimum head loss in feet (P22)
- The maximum pump rate in cubic feet-per-second (V21)
- The minimum pump rate in cubic feet-per-second (V22)
- The average pump rate in cubic feet-per-second (V23), which is the average of V21 and V22.

4. Change minimum and maximum flow rates until points align with pump curve.

	Head (ft)	Flow (gpm)
Maximum	8.81	72
Minimum	11.44	44
Average	10.12	58

Calculations:

Equivalent length of pipe for fittings	152	ft
Minimum static lift	5.01	ft
Maximum static lift	9.92	ft
Provided storage depth	5.24	ft
Maximum water level	156.99	ft
Maximum pump rate	0.160	cfs
Minimum pump rate	0.098	cfs
Average rate	0.129	cfs
$V^2/2g$	0.17	ft

The process of finding the actual pump behavior requires testing a proposed maximum and minimum pump rate (***Q21*** and ***Q22***) against the minimum and maximum head losses (***P21*** and ***P22***) - iterating until each operation point is found. The maximum and minimum rates must be adjusted until agreement with the pump curve is achieved. Once each operation point is found, this determines the actual release rate of the pump system. If this is lower than the maximum, then the pump system is acceptable. If the maximum pump rate exceeds the maximum release rate, the force main size must be changed or a smaller pump should be selected.

Pump Head Losses

Reviewer:
Date: 11/24/2021

Notes:

Choosing Hazen-Williams Coefficient:
New Wrought or Cast Iron, Steel, Ductile Iron, Vitrified: 130
New Concrete: 120

1. Input number of fittings in system.

Fittings	*Losses*	*# in System*
Strainer	320	
Globe Valve, Open	340	
Angle Valve, Open	170	
Swing Check Valve, Open	80	
Gate Valve, Open	7	
Ball Valve, Open	4	
Standard Elbow	32	
Medium Sweep Elbow	27	
Long Sweep Elbow	20	
45° Elbow	15	
Flow through Wye	30	
Tee - Flow thru Run	20	
Standard Tee - Side to Run	65	
Tee - Side to Run, With Throat	45	
Enlargement, d/D = 1/4	32	
Enlargement, d/D = 1/2	20	
Enlargement, d/D = 3/4	7	
Contraction, d/D = 1/4	15	
Contraction, d/D = 1/2	12	
Contraction, d/D = 3/4	7	

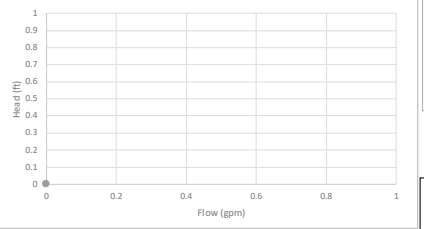
2. Input design information.

Pump start level	ft
Pump stop level	ft
Force main discharge elevation	ft
Detention volume	ft^3
Detention tank footprint	ft^2
Force main diameter	in
Force main length	ft
Hazen-Williams coefficient	--

3. Build pump curve (from manufacturer).

Head (ft)	*Flow (gpm)*

Pump Performance Curve**



Manufacturer:
Duty Point: Flow (gpm):
Duty Point: Head (ft):
Product:
Curve Number:
Impeller Diameter (mm):

4. Change minimum and maximum flow rates until points align with pump curve.

	Head (ft)	*Flow (gpm)*
Maximum	#DIV/0!	
Minimum	#DIV/0!	
Average	#DIV/0!	#DIV/0!

Calculations:

Equivalent length of pipe for fittings	0	ft
Minimum static lift	#DIV/0!	ft
Maximum static lift	0.00	ft
Provided storage depth	#DIV/0!	ft
Maximum water level	#DIV/0!	ft
Maximum pump rate	0.000	cfs
Minimum pump rate	0.000	cfs
Average rate	0.000	cfs
$V^2/2g$	#DIV/0!	ft

***Note that applicants must include the pump curve on the site plan, along with all of the necessary**

*Key

#	*user input*
#	*provided pump curve information*
#	*calculation*

Flow Rate

1. Input values:	Pipe diameter		in
	Hazen-Williams C		--
	Pipe length		ft
	Head loss		ft
2. Results:	*Flow rate Q*	#DIV/0!	cfs
		#DIV/0!	gpm
	$V^2/2g$	#DIV/0!	ft

Head Loss

1. Input values: (**Flow rate can be entered in either cfs or gpm, or both.)	Pipe diameter		in
	Hazen-Williams C		--
	Flow rate Q**		cfs
			gpm
	Pipe length		ft
2. Results:	*Head loss % (Q, cfs)*	#DIV/0!	%
	Head loss % (Q, gpm)	#DIV/0!	%
	Head loss	#DIV/0!	ft
	$V^2/2g$	#DIV/0!	ft

Equivalent Pipe Length (Pipes in Parallel)

1. For two pipes in parallel to be replaced by a single pipe of equivalent capacity, input:	Pipe 1 diameter		in
	Pipe 1 length		ft
	Pipe 2 diameter		in
	Pipe 2 length		ft
	Assumed head loss		ft
	Diameter of proposed eq. pipe		in
2. Equivalent pipe length:		#DIV/0!	ft

Equivalent Pipe Length (Pipes in Series)

1. For two pipes connected in series to be replaced by a single pipe of equivalent capacity, input:	Pipe 1 diameter		in
	Pipe 1 length		ft
	Pipe 2 diameter		in
	Pipe 2 length		ft
	Assumed flow rate Q		cfs
	Diameter of proposed eq. pipe		in
2. Equivalent pipe length:		#DIV/0!	ft

Pump Head Losses

Reviewer: C. Moskos
Date: 11/24/2021

Example:
- 1 pump
- Fittings: 1 strainer, 1 swing check valve, 3 ball valves, 3 standards elbows, 1 45° elbow, 1 'flow thru run' tee, 1 'side to run' tee
- Pump start level: 152.08'
- Pump stop level: 151.75'
- Force main discharge elevation: 162'
- Detention volume: 1919 ft^3
- Detention tank footprint: 366 ft^2
- Force main diameter: 3"
- Force main length: 62'
- Hazen-Williams coefficient: 130*

Choosing Hazen-Williams Coefficient:
New Wrought or Cast Iron, Steel, Ductile Iron, Vitrified: 130
New Concrete: 120

1. Input number of fittings in system.

Fittings	*Losses*	*# in System*
Strainer	320	1
Globe Valve, Open	340	
Angle Valve, Open	170	
Swing Check Valve, Open	80	1
Gate Valve, Open	7	
Ball Valve, Open	4	3
Standard Elbow	32	3
Medium Sweep Elbow	27	
Long Sweep Elbow	20	
45° Elbow	15	1
Flow through Wye	30	
Tee - Flow thru Run	20	1
Standard Tee - Side to Run	65	1
Tee - Side to Run, With Throat	45	
Enlargement, d/D = 1/4	32	
Enlargement, d/D = 1/2	20	
Enlargement, d/D = 3/4	7	
Contraction, d/D = 1/4	15	
Contraction, d/D = 1/2	12	
Contraction, d/D = 3/4	7	

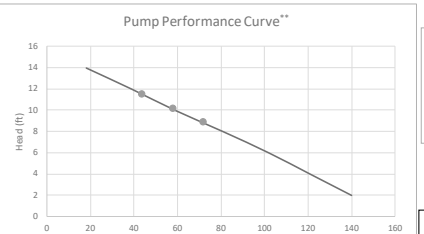
2. Input design information.

Pump start level	152.08	ft
Pump stop level	151.75	ft
Force main discharge elevation	162.00	ft
Detention volume	1919	ft^3
Detention tank footprint	366	ft^2
Force main diameter	3.0	in
Force main length	62.00	ft
Hazen-Williams coefficient	130	--

3. Build pump curve (from manufacturer).

Head (ft)	*Flow (gpm)*
2	140
4	121
6	103
8	81
10	59
12	39
14	18

Pump Performance Curve**



Manufacturer: Flygt
Duty Point: Flow (gpm): 58.0
Duty Point: Head (ft): 9.8
Product: NZ 3085.060 SH
Curve Number: 63-498-00-3856
Impeller Diameter (mm): 102

4. Change minimum and maximum flow rates until points align with pump curve.

	Head (ft)	*Flow (gpm)*
Maximum	8.81	**72**
Minimum	11.44	**44**
Average	10.12	58

Calculations:

Equivalent length of pipe for fittings	152	ft
Minimum static lift	5.01	ft
Maximum static lift	9.92	ft
Provided storage depth	5.24	ft
Maximum water level	156.99	ft
Maximum pump rate	0.160	cfs
Minimum pump rate	0.098	cfs
Average rate	0.129	cfs
$V^2/2g$	0.17	ft

***Note that applicants must include the pump curve on the site plan, along with all of the necessary**

*Key

#	*user input*
#	*provided pump curve information*
#	*calculation*

Flow Rate

1. Input values:	Pipe diameter		in
	Hazen-Williams C		--
	Pipe length		ft
	Head loss		ft
2. Results:	*Flow rate Q*	#DIV/0!	cfs
		#DIV/0!	gpm
	$V^2/2g$	#DIV/0!	ft

Head Loss

1. Input values: (**Flow rate can be entered in either cfs or gpm, or both.)	Pipe diameter		in
	Hazen-Williams C		--
	Flow rate Q**		cfs
			gpm
	Pipe length		ft
2. Results:	*Head loss % (Q, cfs)*	#DIV/0!	%
	Head loss % (Q, gpm)	#DIV/0!	%
	Head loss	#DIV/0!	ft
	$V^2/2g$	#DIV/0!	ft

Equivalent Pipe Length (Pipes in Parallel)

1. For two pipes in parallel to be replaced by a single pipe of equivalent capacity, input:	Pipe 1 diameter		in
	Pipe 1 length		ft
	Pipe 2 diameter		in
	Pipe 2 length		ft
	Assumed head loss		ft
	Diameter of proposed eq. pipe		in
2. Equivalent pipe length:		#DIV/0!	ft

Equivalent Pipe Length (Pipes in Series)

1. For two pipes connected in series to be replaced by a single pipe of equivalent capacity, input:	Pipe 1 diameter		in
	Pipe 1 length		ft
	Pipe 2 diameter		in
	Pipe 2 length		ft
	Assumed flow rate Q		cfs
	Diameter of proposed eq. pipe		in
2. Equivalent pipe length:		#DIV/0!	ft

APPENDIX G

Detention in Series Workbook and Examples

APPENDIX G: Detention in Series Workbook and Examples
PROJECT NAME
PROJECT ID
ADDRESS

Notes: Use this form to determine the required storage volumes for detention systems in series. There are two parts to this form. In the first part, users input properties of the downstream detention system. In the second part, users input properties of each individual upstream area that drains to the downstream detention system. Inputs are entered in the yellow cells and outputs are shown in the gray cells.

ERRORS None

DOWNSTREAM SYSTEM

INPUTS			**OUTPUTS**	
Permit Type	Total Contributing Area	Maximum Release Rate	Required Detention Volume	Effective C-value
name	sf	cfs	cf	#
CSS - SCP	40000	0.092	3883	0.63

UPSTREAM SYSTEM

INPUTS					**OUTPUTS**	
TDA ID	TDA Area	C-value	Detention System Type	Maximum Release Rate	Required Detention Volume	Effective C-value
name	sf	#	name	cfs	cf	#
1	20000	0.95	Blue Roof	0.5	1829	0.41
2	20000	0.85	None			0.85

I. Detention Facilities with a variable outflow

For a detention facility where the outflow is controlled by means of an outlet orifice tube, subject to a head which increases as the depth of storage increases, in a storage facility with an approximately uniform area with respect to storage height, and for roof detention by means of controlled flow roof drains, the average flow rate out of the detention facility is approximately 2/3 of the maximum outflow rate. The following procedure is used to compute the maximum required detention storage volume in ft^3:

1. Compute the duration of the storm in minutes with a 10 yr. return frequency, t_V, which requires the maximum detention volume with outflow controlled by an orifice or by controlled flow roof drains, by the equation:

$$t_V = 0.27(C_{WT}\,A_t/Q_{DRR})^{0.5} - 15$$

where:
t_V = the duration of the storm in min. with a 10 yr. return frequency requiring the maximum detention volume with a variable outflow
C_{WT} = the weighted runoff coefficient for the area tributary to the detention facility
A_t = the area tributary to the detention facility in ft^2
Q_{DRR} = the detention facility maximum release rate in cfs

2. Compute the maximum required detention volume in ft^3 with outflow controlled by an orifice tube or by controlled flow roof drains, V_V, by the equation:

$$V_V = [0.19C_{WT}A_t/(t_V + 15) - 40Q_{DRR}]\,t_V$$

where:
V_V = the maximum required detention volume in ft^3 with a variable outflow
C_{WT} = the weighted runoff coefficient for the area tributary to the detention facility
A_t = the area tributary to the detention facility in ft^2
t_V = the duration of the storm in min., with a 10 yr. return frequency, requiring the maximum detention volume with a variable outflow
Q_{DRR} = the detention facility maximum release rate in cfs

3. For roof detention compute the duration of the storm in minutes with a 10 yr. return frequency, t_V, which requires the maximum detention volume, and compute the maximum required detention volume in ft^3 with outflow controlled by controlled flow roof drains, V_V, with a detention facility maximum release rate in cfs, Q_{DRR}, as in I-1 through I-2 above. Confirm that the detention volume provided on the controlled flow roof, based on the slopes and geometry of the roof, is equal to or greater than the volume required, V_V, and that the actual release rate from the roof does not exceed the proposed maximum release rate in cfs for the roof, Q_{DRR}, following the procedure detailed in the DEP "Guidelines for the Design and Construction of Stormwater Management Systems".

III. Weighted effective runoff coefficient for series detention systems

1. A. When the flow from a roof which has been restricted by controlled flow roof drains is discharged to a subsurface detention facility, the weighted effective weighted runoff coefficient for the roof, C_{WE}, is based on the average rainfall intensity in in/hr, i_{10}, for the duration in min. of the storm with a 10 yr. return frequency, as computed under I-1, t_V, for which the roof detention volume in ft^3, V_V, was computed. Compute the weighted effective runoff coefficient for the roof with runoff restricted by controlled flow roof drains, C_{WE}, by the equation:

$$C_{WE} = 311Q_{DRR}(t_V + 15)/A_t$$

where:
C_{WE} = the weighted effective weighted runoff coefficient for the roof with runoff restricted by controlled flow roof drains
Q_{DRR} = the maximum release rate from the roof in cfs
t_V = the duration in min of the rainfall event for which the roof detention volume was computed
A_t = the area of the roof in ft^2 tributary to the roof detention
311 = 43,560 ft^2 per ac./140

B. Use this effective weighted runoff coefficient for the roof with runoff restricted by controlled flow roof drains, C_{WE}, to compute the weighted runoff coefficient for the area tributary to the sub- surface detention facility, C_{WT}, to which this restricted roof will discharge, as on page 2 above. Compute the maximum required detention volume in ft^3, V_V as in I-1 through I-2, or V_C as in II-1 through II-2.

Detention System Types
None
Blue Roof
Tank
Subsurface
Pond
Wetland

Permit Type	Vv
CSS - SCP	1.85
MS4 - SCP	1.50
CSS - HCP	1.50
MS4 - HCP	1.10

Detention in Series Example

A site in Queens consists of a multistory office building and a parking lot for its tenants. The site was proposed to connect to a 15 in. combined sewer. The building owner intends to use a blue roof and detention tank in series to meet the stormwater management requirement. The total roof area will be used for detention. Design a blue roof and a downstream detention system that treats runoff from the roof and the parking lot, given the following:

Total Contributing Area = 40,000 sf
Roof (sloped 1/8 in per ft) = 20,000 sf @ 0.95 runoff coefficient.
Paved = 20,000 sf @ 0.85 runoff coefficient

Use the Detention In Series Workbook provided in Appendix I.

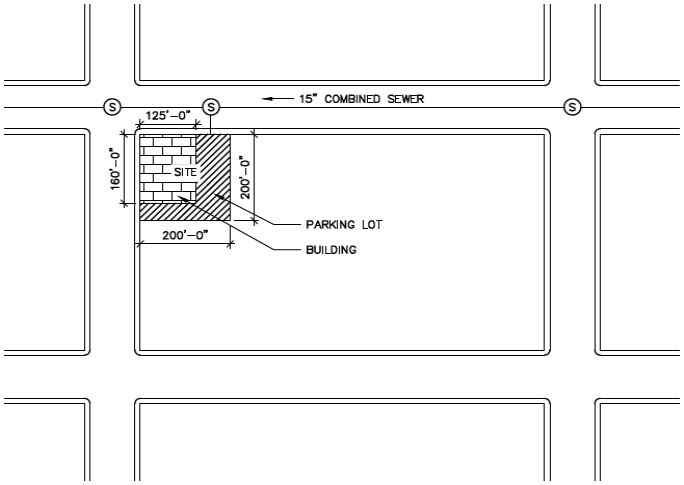


Figure I.1. Schematic of Example 1 (Not to Scale)

Step 1: Input the properties of the blue roof that will drain into the downstream detention system.

The first upstream area that drains to the downstream detention system is the 20,000 sf blue roof.

UPSTREAM SYSTEM

INPUTS					OUTPUTS	
TDA ID	TDA Area	C-value	Detention System Type	Maximum Release Rate	Required Detention Volume	Effective C-value
name	sf	#	name	cfs	cf	#
1	20000	0.95	Blue Roof			

Figure I.2. Inputs for the Blue Roof Properties

Step 2: Design the maximum release rate to be maintained by the blue roof.

Identify a controlled-flow roof drain by an approved manufacturer. In this case, the designer has selected a controlled-flow roof drain that restricts flow to 10 gpm/in.

The roof has an area of 20,000 sf. According to the 2014 Plumbing Code by the NYC Department of Buildings, not less than four roof drains shall be installed in roofs over 10,000 sf in area. In this case, the designer has chosen to install four roof drains.

Ponding depths should not exceed 4 inches above the low point (or as specified in the current Construction Codes). The designer has chosen to use a ponding depth of 2 inches.

$$Q_{ROOF} = \frac{Q_i N_{RD} d_{max}}{449}$$

where:
Q_{ROOF} = maximum release rate from rooftop detention (cfs)
Q_i = maximum release rate from each drain (gpm/in) = 10 gpm/in
N_{RD} = number of roof drains = 4
d_R = the roof drain depth of flow (in) = 2 in

$$Q_{ROOF} = \frac{10\frac{gpm}{in} * 4 * 2\,in}{449}$$

$$Q_{ROOF} = 0.18\,cfs$$

The blue roof can maintain a maximum release rate of approximately 0.2 cfs. Input this maximum release rate into the workbook.

UPSTREAM SYSTEM

INPUTS					OUTPUTS	
TDA ID	TDA Area	C-value	Detention System Type	Maximum Release Rate	Required Detention Volume	Effective C-value
name	sf	#	name	cfs	cf	#
1	20000	0.95	Blue Roof	0.2		

Figure I.3. Input for the Maximum Release Rate Maintained by the Blue Roof

Step 3: Based on the inputs from Steps 1 and 2, the workbook will automatically calculate the duration of a storm (min) with a 10-year return frequency. This calculation is shown below.

The total roof area will be used for detention. Therefore, the available area is the entire 20,000 sf.

$$t_V = 0.27(\frac{C_{WT}A_t}{Q_{DRR}})^{0.5} - 15$$

where:
t_V = the duration of the storm with a 10 yr. return frequency requiring the maximum detention volume with a variable outflow (min)
C_{WT} = the weighted runoff coefficient for the contributing area = 0.95
A_t = contributing area (sf) = 20,000 sf
Q_{DRR} = maximum release rate for the site (cfs) = 0.2 cfs

$$t_V = 0.27(\frac{0.95 * 20{,}000\ sf}{0.2\ cfs})^{0.5} - 15$$

$$t_V = 68.2\ min$$

Step 4: Based on the inputs from Steps 1 and 2, the workbook will automatically calculate the required detention volume through the blue roof. This calculation is shown below.

$$V_V = (\frac{0.19C_{WT}A_t}{t_V + 15} - 40Q_{DRR})t_V$$

where:
V_v = the maximum required detention volume (cf)
C_{WT} = the weighted runoff coefficient for the contributing area = 0.95
A_t = contributing area (sf) = 20,000 sf
t_V = the duration of the storm with a 10 yr. return frequency requiring the maximum detention volume with a variable outflow (min) = 68.2 min
Q_{DRR} = maximum release rate for the site (cfs) = 0.2 cfs

$$V_V = [\frac{0.19 * 0.95 * 20{,}000\ sf}{68.2\ min + 15} - (40 * 0.2\ cfs)](68.2\ min)$$

$$V_V = 2{,}414\ cf$$

UPSTREAM SYSTEM

INPUTS					OUTPUTS	
TDA ID	TDA Area	C-value	Detention System Type	Maximum Release Rate	Required Detention Volume	Effective C-value
name	sf	#	name	cfs	cf	#
1	20000	0.95	Blue Roof	0.2	2414	

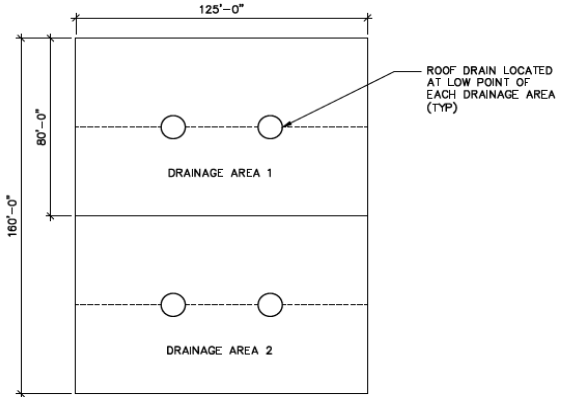
Figure I.4. Output for the Required Detention Volume Through the Blue Roof

Step 5: Check that the available storage volume of the roof is greater than the required detention volume.

The total roof area will be used for detention. Therefore, the available area is the entire 20,000 sf.

The designer has considered two different roof configurations: 1) a uni-directionally sloped roof, as shown in Figure I.5 and 2) a multi-directionally sloped roof, as shown in Figure I.6.

Uni-directionally Sloped Roof:



The lengths and widths of each drainage area are as follows:

Drainage Area 1: 125'L x 80'W
Drainage Area 2: 125'L x 80'W

If the roof is sloped 1/8 in per ft, the height difference between the high and low points of each drainage area is 5 inches. The ponding depth is 2 inches. Therefore, the high point of each drainage area will not be inundated.

Calculate the available storage volume of each drainage area, using the volume of a triangular prism.

$$V_A = \frac{1}{2}LW * \frac{d_R}{12}$$

where:
V_A = the available storage volume of each drainage area (cf)
L = the length of each drainage area (ft) = 125 ft
W = the width of each drainage area (ft = 80 ft
d_R = the roof drain depth of flow (in) = 2 in

$$V_A = \frac{1}{2} * 125\ ft * 80\ ft * \frac{2\ in}{12}$$

$$V_A = 833\ cf$$

The total available storage volume is:

$$V_T = V_1 + V_2$$

where:
V_T = the total available storage volume (cf)
V_1 = the available storage volume of Drainage Area 1 (cf) = 833 cf
V_2 = the available storage volume of Drainage Area 2 (cf) = 833 cf

$$V_T = 833\ cf + 833\ cf$$

$$V_T = 1{,}666\ cf \leq V_V = 2{,}414\ cf \quad \textbf{\textit{NOT MET}}$$

Since the required detention volume is greater than the available storage volume, select a different controlled-flow roof drain or design depth of flow and re-run Steps 2-4.

In this case, the designer has chosen 3 inches as the new design depth of flow. The new ponding depth results in a maximum release rate of 0.27 cfs, a required detention volume of 2,242 cf, and a total available storage volume of 2,500 cf.

Multi-directionally Sloped Roof:

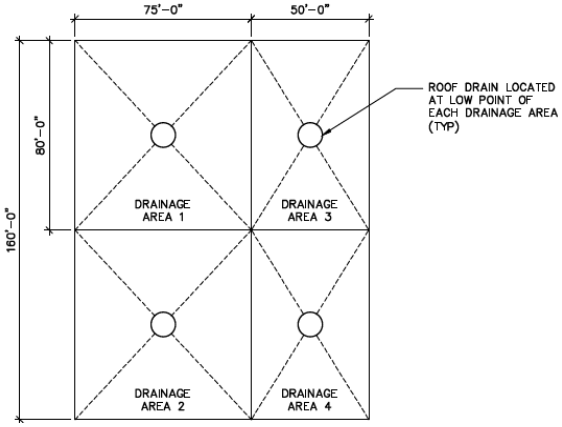


Figure I.6. Plan View of Multi-Directionally Sloped Blue Roof

The lengths and widths of each drainage area are as follows:

Drainage Area 1: 75'L x 80'W
Drainage Area 2: 75'L x 80'W
Drainage Area 3: 50'L x 80'W
Drainage Area 4: 50'L x 80'W

If the roof is sloped 1/8 in per ft, the height difference between the high and low points is 6.9 inches for drainage areas 1 and 2, and 5.9 inches for drainage areas 3 and 4. The ponding depth is 2 inches. Therefore, the high point of each drainage area will not be inundated.

Calculate the available storage volume of each drainage area, using the volume of a pyramid.

Drainage Areas 1 and 2:

$$V_A = \frac{1}{3}LW * \frac{d_R}{12}$$

where:
V_A = the available storage volume of each drainage area (cf)

W = the width of each drainage area (ft = 80 ft
d_R = the roof drain depth of flow (in) = 2 in

$$V_A = \frac{1}{3} * 75\ ft * 80\ ft * \frac{2\ in}{12}$$

$$V_A = 333\ cf$$

Drainage Areas 3 and 4:

$$V_A = \frac{1}{3}LW * \frac{d_R}{12}$$

where:
V_A = the available storage volume of each drainage area (cf)
L = the length of each drainage area (ft) = 50 ft
W = the width of each drainage area (ft = 80 ft
d_R = the roof drain depth of flow (in) = 2 in

$$V_A = \frac{1}{3} * 50\ ft * 80\ ft * \frac{2\ in}{12}$$

$$V_A = 222\ cf$$

The total available storage volume is:

$$V_T = V_1 + V_2 + V_3 + V_4$$

where:
V_T = the total available storage volume (cf)
V_1 = the available storage volume of Drainage Area 1 (cf) = 333 cf
V_2 = the available storage volume of Drainage Area 2 (cf) = 333 cf
V_3 = the available storage volume of Drainage Area 3 (cf) = 222 cf
V_4 = the available storage volume of Drainage Area 4 (cf) = 222 cf

$$V_T = 333\ cf + 333\ cf + 222\ cf + 222\ cf$$

$$V_T = 1{,}110\ cf \leq V_V = 2{,}414\ cf \quad \textbf{\textit{NOT MET}}$$

Since the required detention volume is greater than the available storage volume, select a different controlled-flow roof drain or design depth of flow and re-run Steps 2-4.

In this case, the designer has chosen 3 inches as the new design depth of flow. The new ponding depth results in a maximum release rate of 0.27 cfs, a required detention volume of 2,242 cf, and a total available storage volume of 1,666 cf.

A uni-directionally sloped roof provides sufficient storage volume for a ponding depth of 3 inches. The multi-directionally sloped roof does not provide enough storage volume for the same depth. Therefore, the designer has chosen to use a uni-directionally sloped roof, with a ponding depth of 3 inches.

The inputs have been updated, and the workbook automatically outputs the new required detention volume of 2,242 cf.

UPSTREAM SYSTEM

INPUTS					OUTPUTS	
TDA ID	TDA Area	C-value	Detention System Type	Maximum Release Rate	Required Detention Volume	Effective C-value
name	sf	#	name	cfs	cf	#
1	20000	0.95	Blue Roof	0.27	2242	

Figure I.7. Inputs and Output for the Required Detention Volume Through the Blue Roof, Using a Ponding Depth of 3"

Step 6: Based on the inputs from Steps 1 and 2, the workbook will automatically calculate the effective weighted runoff coefficient for the blue roof. This calculation is shown below.

$$C_{WE} = \frac{311 Q_{DRR}(t_V + 15)}{A_t}$$

where:
C_{WE} = the effective weighted runoff coefficient for the roof with runoff restricted by controlled-flow roof drains
Q_{DRR} = maximum release rate for the site (cfs) = 0.27 cfs
t_V = the duration of the storm with a 10 yr. return frequency requiring the maximum detention volume with a variable outflow (min) = 56.6 min
A_t = contributing area (sf) = 20,000 sf

$$C_{WE} = \frac{311 * 0.27\ cfs * (56.6\ min + 15)}{20{,}000\ sf}$$

$$C_{WE} = 0.301$$

UPSTREAM SYSTEM

INPUTS					OUTPUTS	
TDA ID	TDA Area	C-value	Detention System Type	Maximum Release Rate	Required Detention Volume	Effective C-value
name	sf	#	name	cfs	cf	#
1	20000	0.95	Blue Roof	0.27	2242	0.301

Figure I.8. Output for the Effective C-Value of the Blue Roof

Step 7: Input the properties of the parking lot that will drain into the downstream detention system.

The second upstream area that drains to the downstream detention system is the 20,000 sf parking lot. Since there is no detention system specifically for the parking lot, the effective weighted runoff coefficient remains as 0.85. The workbook will automatically output this value.

UPSTREAM SYSTEM

INPUTS					OUTPUTS	
TDA ID	TDA Area	C-value	Detention System Type	Maximum Release Rate	Required Detention Volume	Effective C-value
name	sf	#	name	cfs	cf	#
1	20000	0.95	Blue Roof	0.27	2242	0.301
2	20000	0.85	None			0.850

Figure I.9. Inputs and Output for the Parking Lot

Step 8: Calculate the release rate to be maintained by the controlled-flow orifice for the downstream detention system. Use the maximum release rate per acre (q) shown in Table 2.9, Chapter 2.

Since the project is 20,000 sf or more, and consists of a multistory office building, this project requires a site connection permit (SCP). In addition, the site is connecting to a 15 in. combined sewer.

Table 2.9. Maximum release rate per acre (cfs/acre) by sewershed type.

q (cfs/acre)	Description
1.0	MS4 areas
0.1	CSS areas

According to Table 2.9, $q = 0.1 \frac{cfs}{acre}$.

$$Q_{DRR} = \frac{q * A}{43560}\ or\ 0.046\ \ [whichever\ is\ greater]$$

where:
Q_{DRR} = maximum release rate for the site (cfs)
q = maximum release rate per acre (cfs/acre) = 0.1 cfs/acre
A = contributing area (sf) = 40,000 sf

$$Q_{DRR} = \frac{0.1\ \frac{cfs}{acre} * 40{,}000\ sf}{43560} or\ 0.046\ \ [whichever\ is\ greater]$$

$$Q_{DRR} = 0.092\ cfs\ > 0.046\ cfs$$

The maximum release rate is 0.092 cfs.

Step 9: Input the properties of the downstream detention system. Use the maximum release rate from Step 8.

Since the project is 20,000 sf or more, and consists of a multistory office building, this project requires a site connection permit (SCP). The site has a total contributing area of 40,000 sf.

DOWNSTREAM SYSTEM

INPUTS			OUTPUTS	
Permit Type	Total Contributing Area	Maximum Release Rate	Required Detention Volume	Effective C-value
name	sf	cfs	cf	#
CSS - SCP	40000	0.092		

Figure I.10. Inputs for the Downstream Detention System

Step 10: Based on the inputs from Step 9, the workbook will automatically calculate the effective weighted runoff coefficient for the downstream detention system. This calculation is shown below.

$$C_W = \frac{(C_1 A_1 + C_2 A_2 + \cdots etc.)}{A_t}$$

where:
C_W = weighted runoff coefficient relating peak rate of rainfall and runoff
C_1 = the effective weighted runoff coefficient for the area classified as roof = 0.30
A_1 = the area classified as roof (sf) = 20,000 sf
C_2 = the effective weighted runoff coefficient for the area classified as paved = 0.85
A_2 = the area classified as paved (sf) = 20,000 sf
A_t = contributing area (sf) = 40,000 sf

$$C_W = \frac{(0.30 * 20{,}000\ sf) + (0.85 * 20{,}000\ sf)}{40{,}000\ sf}$$

$$C_W = 0.575$$

DOWNSTREAM SYSTEM

INPUTS			OUTPUTS	
Permit Type	Total Contributing Area	Maximum Release Rate	Required Detention Volume	Effective C-value
name	sf	cfs	cf	#
CSS - SCP	40000	0.092		0.575

Figure I.11. Output for the Effective C-Value of the Downstream Detention System

Step 11: Identify the rainfall depth (R_D) based on the sewershed type and connection proposal type for the project. Use Table 2.7 in Chapter 2.

Since the project is 20,000 sf or more, and consists of a multistory office building, this project requires a site connection permit (SCP). In addition, the site is connecting to a 15 in. combined sewer.

Table 2.7. Applied rainfall depth by sewershed type and connection proposal type.

1.85	CSS areas with SCP
1.50	CSS areas with HCP
1.50	MS4 areas wiith SCP
1.10	MS4 areas with HCP

According to Table 2.7, $R_D = 1.85\ in.$

Step 12: Based on the inputs from Step 9, the workbook will automatically calculate the required detention volume through the detention tank. This calculation is shown below.

$$V_V = \frac{R_D}{12} * A * C_W$$

where:
V_V = the maximum required detention volume (or sewer operations volume) (cf)
R_D = rainfall depth (in) = 1.85 in
A = contributing area (sf) = 40,000 sf
C_W = weighted runoff coefficient relating peak rate of rainfall and runoff = 0.575

$$V_V = \frac{1.85\ in}{12} * 40{,}000\ sf * 0.575$$

$$V_V = 3{,}548\ cf$$

DOWNSTREAM SYSTEM

INPUTS			OUTPUTS	
Permit Type	Total Contributing Area	Maximum Release Rate	Required Detention Volume	Effective C-value
name	sf	cfs	cf	#
CSS - SCP	40000	0.092	3548	0.575

Figure I.12. Output for the Required Detention Volume Through the Downstream Detention System

Step 13: Use the controlled-flow orifice equation to determine an appropriate orifice area for the detention tank, by assuming the active storage depth.

In order to minimize the area required for the detention tank, choose the maximum depth that is still feasible according to site limitations and use a re-entrant orifice. In this case, the designer has chosen an active storage depth of 4 ft.

$$Q_O = C_D * A_o * \sqrt{2gH}$$

where:
Q_O = maximum release rate of orifice (cfs) = 0.092 cfs
C_D = coefficient of discharge, 0.52 for re-entrant orifice

A_O = area of orifice (sf)
g = acceleration due to gravity, 32.2 (ft/s^2)
H = maximum hydraulic head above the centerline of the orifice (ft) = 4 ft

$$0.092\ cfs = 0.52 * A_o * \sqrt{2 * 32.2\ \left(\frac{ft}{s^2}\right) * 4\ ft}$$

$$A_o = 0.011\ sf$$

Step 14: Translate the area of the controlled-flow orifice (A_O) into a diameter and check that it is greater than the minimum diameter of 1 in.

$$A_o = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

where:
A_O = area of orifice (sf) = 0.011 sf
D_O = diameter of orifice (in)

$$0.011\ sf = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

$$D_O = 1.42\ in\ > 1\ in \qquad OK$$

Set the orifice diameter to the nearest 0.25-inch interval rounding down, with a minimum orifice diameter of one-inch. In this case, use an orifice diameter of 1.25 inches.

Step 15: Confirm the orifice area of the selected orifice diameter from Step 14.

$$A_o = \frac{\left[\pi * \left(\frac{D_o}{2}\right)^2\right]}{144}$$

where:
A_O = area of orifice (sf)
D_O = diameter of orifice (in) = 1.25 inches

$$A_o = \frac{\left[\pi * \left(\frac{1.25\ in}{2}\right)^2\right]}{144}$$

$$A_O = 0.009\ sf$$

Step 16: Confirm the required active storage depth in the tank using the orifice area from Step 15.

$$Q_O = C_D * A_o * \sqrt{2gH}$$

where:
Q_O = maximum release rate of orifice (cfs) = 0.092 cfs
C_D = coefficient of discharge, 0.52 for re-entrant orifice
A_O = area of orifice (sf) = 0.009 sf
g = acceleration due to gravity, 32.2 (ft/s^2)
H = maximum hydraulic head above the centerline of the orifice (ft)

$$0.092\ cfs = 0.52 * 0.009\ sf * \sqrt{2 * 32.2\ \left(\frac{ft}{s^2}\right) * H}$$

$$H = 6.0\ ft$$

If the active storage depth is too high, then increase the orifice size by 0.25 inches and re-run Steps 13-14 until a suitable depth is identified. If the active storage depth is too low, then decrease the orifice size by 0.25 inches (but not less than 1 inch) and re-run Steps 13-14. Alternatively, the designer can choose a different orifice configuration as needed to modify the active storage depth.

In this case, the depth is too high to drain via gravity connection to the storm sewer. Using a flush orifice, which has a coefficient of discharge of 0.61, results in an active storage depth of 4.4 ft.

Step 17: Set the dimensions of the detention tank's active storage zone.

Based on the active storage depth of 4.4 ft and the V_V of 3,548 cf, set the interior detention tank dimensions to L: 28.5 ft and W: 28.5 ft. The resulting detention tank has an active storage volume of 3,574 cf. Note that the exterior dimensions of the detention tank will be larger than the dimensions of the active storage zone (28.5'L x 28.5'W x 4.4'D) to accommodate wall thickness, bypass structures, and/or other internal features.

APPENDIX H

Right-of-Way Guidance Materials

- ROW Geotechnical Procedures
- ROW SMP Data Tracking Form

Environmental Protection

NYC DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF ENVIRONMENTAL PLANNING AND ANALYSIS

PROCEDURE GOVERNING

LIMITED GEOTECHNICAL INVESTIGATION

FOR

RIGHT-OF-WAY STORMWATER MANAGEMENT PRACTICES

NYC Stormwater Manual

July 2021

Table of Contents

Attachments:

- Attachment A: Geotechnical Report Summary Table
- Attachment B: Soil Boring Log
- Attachment C: Falling-Head Borehole Test Log
- Attachment D: Soil Sampling Laboratory Test Results (Example)

Limited Geotechnical Investigation

1 General Guidelines

The Limited Geotechnical Investigation consists of:

a) Soil borings to determine the soil characteristics (field observation and laboratory testing) as well as the depths to groundwater table and bedrock where encountered, AND
b) In-situ soil permeability tests to determine infiltration rates of the existing soil.

The minimum required number of soil borings and permeability tests, collectively referred to as B/PTs, is as follows depending on the size (footprint area) of the proposed stormwater management practice (SMP):

- SMPs with areas less than 1000 SF: at least one B/PT per SMP
- SMPs with areas 1000 SF or more and less than 5000 SF: at least two B/PTs per SMP
- Additionally, the Qualified Professional[1] must make a reasonable determination based on the soil textural classifications and the standard penetration tests to determine if additional tests may be needed; this is particularly critical in areas of fill soils where characteristics will vary greatly over small distances.

Where two or more B/PTs are being conducted for a single SMP, the Qualified Professional must select appropriate locations and spacing between the B/PTs to ensure the geotechnical investigation results will be representative of the underlying soil across the footprint of the SMP.

The following sections provide more detail on the soil boring and PT procedures.

1.1 Geotechnical Investigation Locations

Soil borings and permeability tests shall be conducted in separate boreholes no closer than 5 ft apart. If a boulder or other obstruction is encountered during drilling for any SMP, another attempt shall be made within 5 ft - 10 ft of the original borehole. Each borehole should be given a name corresponding to the SMP ID and the test (B/PT) and an accurate coordinate (latitude and longitude) of each borehole should be recorded.

Soil borings and PTs must be performed within the footprint of the SMP. In the event that drilling cannot be conducted within the footprint area, drilling should be done no more than 10 ft beyond the footprint of the SMP.

[1] As defined in Chapter 19.1 of Title 15 of Rules of the City of New York

1.2 Geotechnical Investigation Methodology

1.2.1 Soil Boring Procedure and Equipment

The Qualified Professional shall approve the drilling method that will minimize disturbance to the soil tested from the following list of acceptable equipment:

- Direct Push Method with a 4-inch inner diameter casing
- Hollow-stem auger (HSA) with a 4-inch inner diameter hollow-stem
- Rotary Tri-cone Roller Bit cased by 4-inch inner diameter casing

In the event that no subsurface records (utility records such as water, sewer, etc) were obtainable for drilling and/or the Qualified Professional chooses, pneumatic and/or hand auger is an acceptable method of boring up to the depth of the first soil sample or PT (see **Section 1.2.3**. for soil sampling and PT depths). The reason for conducting this procedure must be properly documented and reported to DEP.

Only water from a hydrant or any clean potable water source shall be used as drilling fluid. It is not acceptable to recycle the drilling fluid or to use drilling mud. Proper sediment control must be used at all times to prevent runoff containing fine or coarse material from entering the catch basins or leaving the work zone.

The Qualified Professional shall be on-site to observe the soil boring operation and keep a continuous and accurate Boring Log for each location recording all pertinent data. Refer to **Section 2.1.1** for details on the Boring Log.

1.2.1.1 Standard Penetration Test

In each soil boring location, a Standard Penetration Test (SPT) shall be conducted continuously in accordance with ASTM D1586 (i.e. a 24-inch long, 2-inch outside diameter split-barrel-sampler driven by blows from a 140-pound hammer falling freely from a height of 30 inches) to the depth detailed in **Section 1.2.3**.

The number of blows required to drive the 24-inch split-barrel sampler every 6-inch increment will be recorded. The Standard Penetration Resistance (N-value) shall be determined as the sum of the blows required to drive the sampler to the second and third 6-inch increments, representing the number of blows per foot.

1.2.1.2 Soil Sampling

The Qualified Professional shall make observations of the soil samples at all depths during drilling and submit observations for each soil boring location as individual Boring Logs.

The Qualified Professional shall collect soil samples that are representative of the actual recovered soil at specific depths for laboratory analysis. Collected samples shall be stored in labeled jars, to be delivered to an approved AASHTO-certified laboratory for subsequent examination and testing. Samples shall be taken and tested as outlined in **Section 1.3**.

1.2.2 Permeability Test Procedure and Equipment

The recommended method for the in-situ permeability test is the falling-head borehole test as outlined below; however, the Qualified Professional may choose to conduct permeability tests following a percolation test or double-ring infiltrometer test procedure, depending on project or site conditions.

Prior to conducting any permeability test, the following conditions shall be checked:

- If a soil boring was conducted within 20 ft. of a planned PT location, the borehole from the soil boring must be completely backfilled before the PT is commenced.
- Clean water must be used in conducting PTs. PTs conducted using "dirty water" creates faulty results, which shall be rejected, and retest will be required.
- Permeability tests shall not be performed when the ambient temperature is below 0°C, in frozen soils, or with water at temperatures less than 5°C (see **Section 1.2.2.4** on temperature measurement requirements).

1.2.2.1 Falling-head borehole test procedure

The falling-head borehole test procedure is as follows:

- Drive the 4-inch inner diameter casing to the required test depth (refer to soil boring procedure for allowable equipment). The space (annulus) between the casing and borehole must be kept at a minimum. If the casing cannot be driven and a larger hole is first bored to allow for the casing, the annulus must be backfilled and packed with drill cuttings before any water is introduced for testing into the casing.
- Measure the depth to the bottom of the hole to the nearest inch.
- Ensure that the depth to the bottom of the hole is within 1 inch of the depth to the bottom of the casing.
- Place approximately 6 - 8 inches of coarse sand (4.75mm – 2mm) at the bottom of the casing.
- Wash out casing using a continuous flow of clean water at low water pressure (the water shall not disturb the coarse sand layer at the bottom of the casing) until the water exiting the casing runs clear with no discoloration.
- Saturate the soil beneath the bottom of the casing for at least thirty (30) minutes using clean water.
- Fill casing to the top with clean water and record the temperature of the water at the bottom of the casing at the start of the test (see **Section 1.2.2.4** for details on temperature measurement).
- Record the time at the beginning of the test.
- Record the falling water level in the casing at 1, 2, 3, 4, 5, 10, and 15 minutes after the beginning of the test or until the water level in the casing has stopped falling.

- At the conclusion of the test, fill the casing to the top with clean water and maintain the water at this level for five (5) minutes.
- Repeat the test once for each testing depth using the same procedure.

Falling-head borehole tests may be terminated after the 30-minute saturation period and reported accordingly for the following conditions:

- If the casing is completely filled during the saturation period and there is no visible drop in water level after 30 minutes, the falling-head borehole test shall be reattempted for the same depth at another location between 5 ft to 10 ft away. If there is no visible drop in water level after 30 minutes at the reattempted location, the falling-head borehole test shall be terminated for that depth only and the soil permeability rate shall be reported as "0.000 in/hr".
- If the casing cannot be filled due to rapid infiltration (RI) during the saturation period and no water is retained in the casing after 30 minutes, the falling-head borehole test shall be reattempted for the same depth at another location between 5 ft to 10 ft away. If rapid infiltration is observed during the saturation period for the reattempt, the falling-head borehole test shall be terminated for that depth only and the permeability coefficient reported as "RI".

The Qualified Professional must log continuous data during this test and report them accurately in Falling-head Borehole Test Logs (FH Logs). Refer to the below and **Section 2.1.3** for details on the PT Log.

Average permeability rates shall be calculated based on a modification of ASTM D6391 using the following formula. The FH Log template with the formula and associated calculation methods is provided. In general, no permeability calculations are necessary at the time of drilling since permeability values (and other variables used to calculate permeability values) are automatically calculated in the FH Log once all the data recorded during the falling-head borehole test are inputted into the template.

$$K_m = \pi \cdot R_t \cdot \frac{D \cdot \left(\ln \frac{h_1}{h_2}\right)}{11 \cdot (t_2 - t_1)}$$

$$R_t = \frac{2.2902(0.9842^{\mathrm{T}})}{\mathrm{T}^{0.1702}}$$

Where:
- K_m = Mean permeability [in/hr], and $K_m = \sqrt{k_h \cdot k_v}$
- k_h = Horizontal permeability [in/hr]
- k_v = Vertical permeability [in/hr]
- D = Inner diameter of casing [in]
- h = Height of water above bottom of casing at time t [in]
- t = Time [hr]

R_t = Ratio of viscosity of water at test temperature to the viscosity of water at 20 °C

T = temperature [°C]

1.2.2.2 Percolation test procedure

Percolation tests are commonly used for on-site sewage (septic) and stormwater (dry well) systems. They differ from cased borehole tests in that there is no casing and there is no control for water lost at the sides of the test pit hole during percolation testing. The percolation test method shall not be utilized for proposed SMP locations less than 10 feet from buildings or underground structures. Percolation tests must be conducted in accordance with the NYS procedure[2] for onsite sewage treatment systems.

Following the above percolation test procedure will result in a measurement of the stabilized rate of percolation of the soil. This stabilized percolation rate must be translated to a permeability, or infiltration rate, using a reduction factor that accounts for water lost at the sides of the test pit. The following equation may be used to calculate the infiltration rate:

$$I = \frac{P_s}{R_f}$$

where:

I: infiltration rate (in/hr)

P_s: stabilized rate of percolation (in/hr)

R_f: Reduction factor of 1.92

The reduction factor assumes the percolation rate is affected by the depth of water in the test hole and that the percolating surface of the hole is in uniform soil. If there are site conditions that cause significant deviations from either assumption, such as noticeably different soil strata along the percolation test hole, then this methodology is not appropriate for determining infiltration rates.

1.2.2.3 Double-Ring Infiltrometer test procedure

Double-Ring Infiltrometer tests require less equipment compared to the other permeability test procedures but can be more difficult to use in very pervious or very impervious soils, in dry or stiff soils, or if the rings are fractured when installed. Double-Ring Infiltrometer tests shall be conducted in accordance with the latest version of ASTM D3385, the Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer.

[2] Full procedure available at the following links (accessible as of July 2021): https://www.dec.ny.gov/docs/water_pdf/2014designstd.pdf or https://www.health.ny.gov/environmental/water/drinking/wastewater_treatment_systems/docs/design_handbook.pdf

1.2.2.4 Temperature Measurement

Temperatures shall be measured in °C using equipment meeting the specifications as shown in Table 1 and calibrated against a National Institute of Standards and Technology (NIST) Standard or with certified calibration traceable to NIST.

Table 1 – Acceptable Temperature Measurement Equipment

Equipment	Specifications
Liquid-in-glass thermometer (nonmercury)	• Temperature range, at least -5 to +45°C • 0.5°C gradations or smaller • Calibrated accuracy within 1 percent of full scale or 0.5°C, whichever is less
Thermistor	• Calibrated accuracy within 0.1 to 0.2°C • Digital readout to at least 0.1°C

1.2.3 Geotechnical Investigation Depths

The minimum depth for all soil borings is 20 ft or 5 ft below the SMP base (i.e. the depth of the infiltrating surface), whichever is deeper.

Bulk soil samples for laboratory testing shall be collected and analyzed for every 2 ft of soil depth, starting at the 3-5 ft depth then every 2 ft interval thereafter to the extent possible to the full soil boring depth. If different soil stratums are encountered within an interval, the Qualified Professional is recommended to recover separate samples for each stratum.

PTs must be conducted at the depth of the SMP base. Qualified Professionals are recommended to conduct additional PTs at depths beyond the SMP base if soils with high fines are observed at the shallow depths and sandy soils are observed at deeper depths, which may allow for the use of stone columns for infiltration.

For example, a SMP that infiltrates at 5 ft depth requires, at a minimum:

- Soil boring to 20 ft
- Soil samples collected and analyzed at the following depths: 3-5 ft, 5-7 ft, 7-9 ft, 9-11 ft, 11-13 ft, 13-15 ft, 15-17 ft, 17-19 ft
- PT at 5 ft

Qualified Professionals should take into account any proposed surface elevation changes when determining appropriate geotechnical investigation depths.

1.3 Geotechnical Laboratory Testing

Laboratory tests shall be conducted by an AASHTO-certified laboratory to determine the distribution of particle sizes of the soil – particularly the fines (silts and clays) content – in accordance with ASTM D422.

2 Geotechnical Report

2.1 Geotechnical Investigation Data

Geotechnical reports must include a Geotechnical Report Summary Table, detailed boring logs, and permeability test logs. Additionally, field-measured B/PT locations must be accurately recorded and submitted on a map that also shows the location of the SMP(s).

2.1.1 Geotechnical Report Summary Table

Pertinent data from the soil borings, PTs, laboratory test results, and any other information acquired during the geotechnical investigation shall be summarized in the Geotechnical Report Summary Table format provided (see Attachment A).

2.1.2 Boring Logs

Separate boring logs must be prepared for all soil borings. An example boring log template is provided as Attachment B. At a minimum, boring logs must include the information listed below:

- Identification number (ID No.)
- Soil boring location and coordinates (latitude/longitude)
- Description of equipment (drilling, SPT, soil sampling, etc)
- Weather
- Number of blows per 6-inch intervals of continuous penetration
- Length of sample recovery (inches) for each 2-ft interval
- Depths of soil samples retrieved for laboratory analysis
- Thickness of each soil stratum encountered (including pavement, fill or topsoil layers).
- Characteristics of the soil (based on field observations) for all depths, including:
  1. Soil description per Modified Burmister
  2. Soil classification per Unified Soil Classification System (USCS), in parentheses
  3. Color
  4. Soil moisture (dry, moist, or wet)
  5. Soil consistency:
     a. for Cohesive soil: very soft, soft, medium stiff, stiff, very stiff, hard
     b. for Granular soils: very loose, loose, medium dense, dense, very dense
  6. If present:
     a. Debris (brick, concrete, wood, glass, etc.)
     b. Cobbles, boulders, etc.
     c. Odor (organic, chemical, etc.)
     d. Notable soil formations which may affect permeability (e.g. "bull's liver", glacial till, etc.)
     e. Indication of possible contamination (ash, petroleum, slag, etc.)
     f. Decomposed vegetation
- Depth to groundwater and/or bedrock, if encountered
- Other subsurface conditions encountered during drilling (e.g. utilities, structures, etc.)

- Additional observations noted during soil boring

2.1.3 Permeability Test Logs

Permeability test logs must be submitted for all PTs, including those that were terminated. At a minimum, PT logs must include the following:

- Permeability test method
- PT ID number
- Weather and ambient temperature
- PT location and coordinates (latitude/longitude)
- Description of equipment utilized
- PT depth
- Depth to groundwater and/or bedrock, if encountered
- Water temperature at the start of the test
- All water depth readings as required by test procedure
- Calculation steps
- Resulting permeability rates

Falling-head borehole test results shall be reported on the FH Log (see Attachment C). The following are additional notes for reporting on falling-head borehole test results:

- Early termination of falling-head borehole tests shall be noted in the "Inspectors Remarks" section of the FH Logs and in the Geotechnical Report Summary Table under "General Geotech Notes". No field data shall be reported as "Depth (in)", and no permeability values shall be calculated for terminated falling-head tests.
- The FH Log template contains default time values of 1, 2, 3, 4, 5, 10, and 15 minutes after the start of the test. If the water level drops below the casing before the 15-minute measurement period, these default values must be modified to the actual time values for which water depth measurements were recorded.
- If the permeability rate cannot be calculated (for example, due to RI), the FH Log shall clearly indicate that calculations are not valid.

2.1.4 Laboratory Test Results

Laboratory testing and reporting must include a sieve analysis of soil samples and plotting of gradation curves, as well as soil classification based on the USCS.

The following USCS-classified sieve sizes are to be included with data points for all sampled depths overlaid on the same gradation curve:

4"
3"
1-1/2"
3/4"
3/8"
#4
#10

#40
#60
#100
#200

An example of an acceptable format for reporting soil sieve analyses and gradation curves is provided as Attachment D.

Project: [Project Description]
Prepared By: [Consultant/Sub Name]

NYC Department of Environmental Protection

Geotechnical Report Summary Table

NYC Environmental Protection

SMP ID No.	Soil Laboratory Results				Permeability Analysis				Groundwater Table Depth (ft)	Bedrock Depth (ft)	General Geotechnical Notes	Additional Notes
	Boring ID No.	Depth (ft)	USCS Symbol	% Passing No 200 Sieve	Permeability Test ID No.	PT Method	Permeability Test Depth (ft)	Average Permeability Rate (in/hr)				

Notes:
Only numbers should be inputted in the '% Passing No 200 Sieve', 'Average Permeability Coef. (ft)', 'Groundwater Table Depth (ft)', and 'Bedrock Depth (ft)' columns.
For the '% Passing No. 200 Sieve' column, values must be between 0 and 1. (i.e. use either 0.15 or 15% not 15). Numbers greater than 1 will not be accepted.
Please refer below for allowable exceptions and other specific instructions:
(NE = not encountered, NR = no record, NP = not performed)

Column	Exception(s)
'USCS Symbol', '% Passing No 200 Sieve'	If soil sampling was cancelled due to groundwater, bedrock, obstructions, etc., enter "NP" (details should be included in the 'General Geotech Notes' column) If soil sample could not be obtained or recovery was too low to be analyzed, enter "NR"
Average Permeability Coef. (ft)	For high permeabilities where the water level drop rate could not be measured, enter "RI" If a PT could not be conducted at specific depths, input depth with "NP" as the Permeability Rate (details should be included in the 'General Geotech Notes' or 'Additional Notes' as applicable)
Groundwater Table Depth (ft)	Enter the depth that groundwater was encountered. If groundwater was not encountered, enter "NE" If perched water was encountered, enter "NE" (but include in the 'General Geotech Notes' column)
Bedrock Depth (ft)	Enter the depth that bedrock was encountered. If bedrock was not encountered, enter "NE"

Relevant information to include under General Geotechnical Notes include (but not limited to): refusal (please provide possible cause of refusal), suspected contamination, perched water, etc.

July 2021

NYC Environmental Protection COMPANY NAME/LOGO

Boring ID No. <XXXX>

Project: <Project Name/Description>
Location: <Description of Location>

INSPECTOR: <name> DRILLER: <name> Start Date: <date> Weather: <weather>
CONTRACTOR: <name> HELPER: <name> Start Time: <time>
OVERSIGHT: <name>

Total Boring Depth: <###> ft Drill Bit Type: <type> Weight of Hammer for casing: <###> lbs
Rig Type: <type> Casing Inner Diameter: 4 in Weight of Hammer for spoon: <###> lbs
Depth of Casing: ft Type of Hammer: <type>

Depth to Groundwater Table (bgs): <###> ft Drop: in
Depth to Bedrock (bgs): <###> ft Split Spoon Diameter: in

<XXXX> BORING LOG

Depth Below Ground Surface (ft)	Soil Sample Retrieval and Sample No.	Soil Description (Field Observations)	SPT Blows per 6"	N Value	Recovery Length (inches)	Remarks
0		asphalt pavement				
5						
10						
15						
20						

Boring terminated at xx feet below ground surface

Latitude: <latitude> Longitude: <longitude>

Inspector's Remarks:

July 2021

Falling-Head Borehole Test Log

NYC Environmental Protection COMPANY NAME/LOGO

PT ID No. <ID>
Sheet <#> of <#>

Project: <Project Name/Description>
LOCATION:

INSPECTOR: <name> DRILLER: <name> Start Date: <date> Weather: <weather and ambient temperature>
CONTRACTOR: <name> HELPER: <name> Start Time: <time>
OVERSIGHT: <name>

Depth of PT: <depth> ft Drill Bit Type: <type> Weight of Hammer for casing: 140 lbs
Rig Type: <type> Casing Internal Diameter: 4 in Type of Hammer: <type>
Casing Length: <length> in

ASTM D-6391
PERMEABILITY COEFFICIENT (Km) FORMULA:

General Formula:

$$K_m = \pi R_t \times \frac{\left[D\left\{Ln\left(\frac{h_1}{h_2}\right)\right\}\right]}{11 \times (t_2 - t_1)}$$

Formula for 4" internal diameter casing (in/hr):

$$K_m = 1.142 R_t \times \frac{\left[Ln\left(\frac{h_1}{h_2}\right)\right]}{(t_2 - t_1)}$$

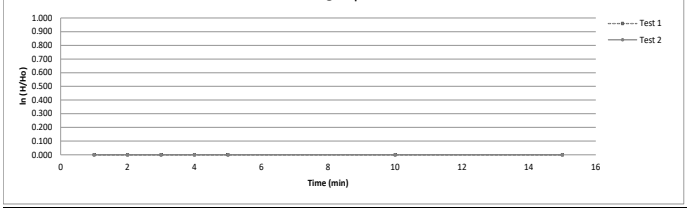
where:

$$R_t = {2.2902(0.9842^T)}/{T^{0.1702}}$$

<ID> @ <depth> ft

TEST 1						TEST 2					
Water temperature (°C), T:			Rt= -			Water temperature (°C), T:			Rt= -		
FIELD DATA		CALCULATED DATA				FIELD DATA		CALCULATED DATA			
Time (min)	Depth (in)	Height (in)	Ln (H/Ho)	(t_1-t_2)	*Kv (in/hr)	Time (min)	Depth (in)	Height (in)	Ln (H/Ho)	(t_1-t_2)	*Kv (in/hr)
1		-	-	0.017	-	1		-	-	0.017	-
2		-	-	0.017	-	2		-	-	0.017	-
3		-	-	0.017	-	3		-	-	0.017	-
4		-	-	0.017	-	4		-	-	0.017	-
5		-	-	0.017	-	5		-	-	0.017	-
10		-	-	0.083	-	10		-	-	0.083	-
15		-	-	0.083	-	15		-	-	0.083	-

<ID> @ <depth> ft



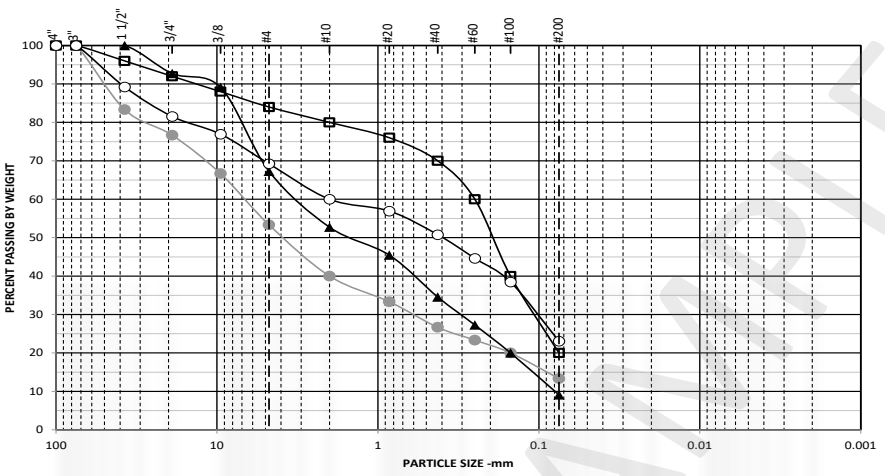
TEST 1 FINAL RESULTS			TEST 2 FINAL RESULTS		
Time Weighted Average Permeability Coefficient	K_m=	0.0000 in/hr	Time Weighted Average Permeability Coefficient	K_m=	0.0000 in/hr

AVERAGE <ID> @ <depth> ft			Coordinates:	
Time Weighted Average Permeability Coefficient	*K_m=	0.0000 in/hr	Longitude:	<longitude>
			Latitude:	<latitude>

Inspectors Remarks:

DEFINITION OF VARIABLES
*K_m= Mean permeability rate
T = Temperature of permeant (water), in °C
Ln = Natural Logarithmic
t_1 = Time at the start of the test in the same units selected for Km
R_t = Ratio of viscosity of water at test temperature to the viscositye of water at 20°C
t_2= Time at the end of the test in the units selected for Km
h_1= Height of the water above the bottom of the casing at the start of the test in the same units selected for Km
h_2= Height of the water above the bottom of the casing at the end of the test in the same units selected for Km

July 2021



Boring ID No. XXXX

Symbol	●	□	▲	○	◆
Depth	5-7	7-9	11-13	18-20	-
% Gravel	46.67	16.00	32.73	30.77	-
% Sand	40.00	64.00	58.18	46.15	-
% Fines	13.33	20.00	9.09	23.08	-
% -2μ	-	-	-	-	-
Cc	-	-	0.36	-	-
Cu	-	-	41.54	-	-
D_{100} (mm)	75.00	75.00	37.50	75.00	-
D_{60} (mm)	7.13	0.25	3.38	2.00	-
D_{30} (mm)	0.64	0.11	0.32	0.11	-
D_{10} (mm)	-	-	0.08	-	-
USCS	SP-SM	SM	SP	SM-ML	-
w (%)	-	-	-	-	-

Particle Size (Sieve #)	Percent Finer				
	●	□	▲	○	◆
4"	100.0	100.0	100.0	100.0	-
3"	100.0	100.0	100.0	100.0	-
1 1/2"	83.3	96.0	100.0	89.2	-
3/4"	76.7	92.0	92.7	81.5	-
3/8"	66.7	88.0	89.1	76.9	-
4	53.3	84.0	67.3	69.2	-
10	40.0	80.0	52.7	60.0	-
20	33.3	76.0	45.5	56.9	-
40	26.7	70.0	34.5	50.8	-
60	23.3	60.0	27.3	44.6	-
100	20.0	40.0	20.0	38.5	-
200	13.3	20.0	9.1	23.1	-

Depth (ft bgs)	Symbol	DESCRIPTION AND REMARKS
5-7	●	sandy silt
		Color/Odor/Impurities: brown
7-9	□	silt and sand
		Color/Odor/Impurities: dark brown - brown
11-13	▲	poorly graded sand, little silt
		Color/Odor/Impurities: light brown
18-20	○	silt and clay, some sand
		Color/Odor/Impurities: brown/gray
-	◆	-

PARTICLE SIZE DISTRIBUTION

Project: <Project Description>

NYC Environmental Protection

Company Name/Logo

Laboratory Name

Comments:

July 2021

ROW SMP Data Tracking Form Updated July 2021

PROJECT LEVEL DATA

No.	Field Name	Field Description	Response
1	Project ID	Contract ID of project	
2	Project Description	Short description of project	
3	Project Borough	Borough (Bronx, Manhattan, Queens, Brooklyn, or Staten Island)	
4	Project Area	Approximate area of entire project in **acres**	
5	Agency	City agency (DDC, DOT, etc) managing project	
6	Contact First Name	Project manager first name	
7	Contact Last Name	Project manager last name	
8	Design Completion Date	Design completion date, may use date when contract drawings were finalized	
9	Construction NTP Date	Enter date Notice to Proceed (NTP) was issued for construction	
10	Construction Guarantee End Date	Enter date when the contractor guarantee period for SMPs ended	
11	Construction Project Acceptance Date	Enter date when all SMPs were accepted	
12	Construction End Date	Enter construction contract end date	

ROW SMP Data Tracking Form Updated July 2021

SMP INFORMATION - SEPARATE REPONSES ARE REQUIRED FOR EACH SMP, ADD ADDITIONAL COLUMNS FOR EACH SMP

No.	Field Name	Field Description	Response <SMP1>
1	SMP ID	Assign a unique ID to each SMP. Alphanumeric only.	
2	SMP Type	Choose from: ROW Precast Porous Concrete, ROW Bioswale with Type D inlet, ROW Infiltration Basin, ROW Bioswale. *If ROW Infiltration Basin, indicate if grass or concrete.	
3	SMP X-Coordinate	X-coordinate of SMP using NAD 1983 State Plane Long Island FIPS 3104 Feet, measured at asset inlet or upstream corner for Porous Concrete	
4	SMP Y-Coordinate	Y-coordinate of SMP using NAD 1983 State Plane Long Island FIPS 3104 Feet, measured at asset inlet or upstream corner for Porous Concrete	
5	SMP BBL	BBL nearest to SMP	
6	Disturbed impervious drainage area of SMP	Disturbed drainage area (in SF) specific to the SMP, as delineated in Chapter 6 - SMP Sizing	
7	SMP storage volume	Storage volume of the SMP as calculated according to Chapter 4	
8	SMP Length	Length of SMP as measured parallel to the curb, in ft	
9	SMP Width	Width of SMP as measured perpendicular to the curb, in ft	
10	SMP Features	Indicate if SMP utilizes stormwater chambers and/or stone columns	
11	SMP Standards Date	Indicate date of ROW GI Standards referenced for project	
12	Soil Depth	For ROW Bioswale (with or without Type D inlet), indicate depth of soil layer - 1.5 ft or 2 ft. Put zero for other SMP Types.	
13	Stone Depth	Indicate depth of stone layer in ft	
14	Volume of Stormwater Chamber	If SMP utilizes stormwater chamber, volume of stormwater chamber in CF. Leave blank if no stormwater chamber.	
15	Number of Stone Columns	If SMP utilizes stone columns, number of stone columns	
16	Depth of Stone Columns	Indicate number of feet below ground surface the stone columns extend to	
17	HDPE Barrier?	Indicate 'Y' or 'N' if SMP utilizes HDPE barrier	
18	Bridge Connection?	Indicate 'Y' or 'N' if SMP is hydraulically connected to another SMP	
19	Curb Type	Choose from: Bluestone, Bluestone Cobblestone, Cobblestone, Concrete, Granite, Granite Cobblestone, None, or Steel-Faced	
20	Tree Latin Name and Cultivar	If SMP has a tree, indicate latin name and cultivar of tree. Otherwise leave blank.	
21	Planting Plan (Wet or Dry)	If SMP is ROW Bioswale (with or without Type D inlet), indicate whether planting plan is for wet sites, dry sites, or combination	
22	Planting Plan (Sun or Shade)	If SMP is ROW Bioswale (with or without Type D inlet), indicate whether planting plan is for sunny, shady, or mixed	
23	Planting Plan (Residential or Industrial)	If SMP is ROW Bioswale (with or without Type D inlet), indicate whether planting plan is for residential or commercial/industrial	
24	Soil Boring ID	ID of soil boring conducted for the SMP	
25	Soil Boring X-Coordinate	x-coordinate of soil boring using NAD 1983 State Plane Long Island FIPS 3104 Feet	
26	Soil Boring Y-Coordinate	y-coordinate of soil boring using NAD 1983 State Plane Long Island FIPS 3104 Feet	
27	Soil Sample Depth at SMP base	Depth of soil sample taken at the SMP base. For ROW Porous Concrete, should be 3'-5' and for all others should be 5'-7'	
28	Soil Sample USCS at SMP base	Based on lab analysis, USCS Soil Classification symbols for soil sample taken at SMP base	
29	Soil Sample % fines at SMP base	Based on lab analysis, % passing No. 200 sieve for soil sample taken at SMP base	
30	Stone Column Soil Sample Depth	Depth of soil sample for which the stone column penetrates into. Leave blank if no stone columns.	
31	Stone Column Soil Sample USCS	Based on lab analysis, USCS Soil Classification symbols for soil sample at stone column depth. Leave blank if no stone columns.	
32	Stone Column Soil Sample % fines	Based on lab analysis, % passing No. 200 sieve for soil sample at stone column depth. Leave blank if no stone columns.	
33	Soil Boring - Groundwater	Enter depth (ft) of groundwater encountered during soil boring. Put "NE" if not encountered.	
34	Soil Boring - Bedrock	Enter depth (ft) of bedrock encountered during soil boring. Put "NE" if not encountered.	
35	Permeability Test ID	ID of permeability test conducted for the SMP	
36	Permeability Test X-Coordinate	x-coordinate of permeability test using NAD 1983 State Plane Long Island FIPS 3104 Feet	
37	Permeability Test Y-Coordinate	y-coordinate of permeability test using NAD 1983 State Plane Long Island FIPS 3104 Feet	
38	Permeability Test Depth	Depth below ground surface of permeability test taken to represent SMP base, in ft	
39	Permeability Test Method	Indicate which permeability test procedure was utilized (falling-head borehole, percolation, or double-ring infiltrometer)	
40	Permeability Test Result	Result of permeability test at SMP base, in inches per hour	

SPECIAL MATERIALS

CITYWIDE ADMINISTRATIVE SERVICES

■ NOTICE

OFFICIAL FUEL PRICE ($) SCHEDULE NO. 8872
FUEL OIL AND KEROSENE

CONTR. NO.	ITEM NO.	FUEL/OIL TYPE		DELIVERY	VENDOR	CHANGE ($)	PRICE ($) EFF. 12/06/2021
4087216	1.3	#2DULS		CITYWIDE BY TW	SPRAGUE	-.0074 GAL.	2.5776 GAL.
4087216	2.3	#2DULS		PICK-UP	SPRAGUE	-.0074 GAL.	2.4729 GAL.
4087216	3.3	#2DULS	**WINTERIZED**	CITYWIDE BY TW	SPRAGUE	-.0074 GAL.	2.7759 GAL.
4087216	4.3	#2DULS	**WINTERIZED**	PICK-UP	SPRAGUE	-.0074 GAL.	2.6711 GAL.
4087216	5.3	#1DULS		CITYWIDE BY TW	SPRAGUE	-.0024 GAL.	2.8875 GAL.
4087216	6.3	#1DULS		PICK-UP	SPRAGUE	-.0024 GAL.	2.7827 GAL.
4087216	7.3	#2DULS	**>=80%**	CITYWIDE BY TW	SPRAGUE	-.0074 GAL.	2.6054 GAL.
4087216	8.3	#2DULS	**WINTERIZED**	CITYWIDE BY TW	SPRAGUE	-.0074 GAL.	2.8964 GAL.
4087216	9.3	B100	**B100<=20%**	CITYWIDE BY TW	SPRAGUE	.0141 GAL.	4.3993 GAL.
4087216	10.3	#2DULS	**>=80%**	PICK-UP	SPRAGUE	-.0074 GAL.	2.5006 GAL.
4087216	11.3	#2DULS	**WINTERIZED**	PICK-UP	SPRAGUE	-.0074 GAL.	2.7916 GAL.
4087216	12.3	B100	**B100 <=20%**	PICK-UP	SPRAGUE	.0141 GAL.	4.2945 GAL.
4087216	13.3	#1DULS	**>=80%**	CITYWIDE BY TW	SPRAGUE	-.0024 GAL.	2.8971 GAL.
4087216	14.3	B100	**B100 <=20%**	CITYWIDE BY TW	SPRAGUE	.0141 GAL.	4.4082 GAL.
4087216	15.3	#1DULS	**>=80%**	PICK-UP	SPRAGUE	-.0024 GAL.	2.7923 GAL.
4087216	16.3	B100	**B100 <=20%**	PICK-UP	SPRAGUE	.0141 GAL.	4.3034 GAL.
4087216	17.3	#2DULS		BARGE MTF III & ST. WI	SPRAGUE	-.0074 GAL.	2.5382 GAL.
20225400107	3.0	#2DULSB50		STATEN ISLAND	SPRAGUE	.0034 GAL.	3.2307 GAL.
3687192	1.0	JET		FLOYD BENNETT	SPRAGUE	.0110 GAL.	3.1167 GAL.
4287030	1.0	#4B5		MANHATTAN	UNITED METRO	.0100 GAL.	2.5558 GAL.
4287030	2.0	#4B5		BRONX	UNITED METRO	.0100 GAL.	2.5758 GAL.
4287030	3.0	#4B5		BROOKLYN	UNITED METRO	.0100 GAL.	2.5158 GAL.
4287030	4.0	#4B5		QUEENS	UNITED METRO	.0100 GAL.	2.5458 GAL.
4287031	5.0	#4B5		RICHMOND	APPROVED OIL COMPANY	.0100 GAL.	2.7358 GAL.
4187014	1.0	#2B5		MANHATTAN	SPRAGUE	-.0063 GAL.	2.7303 GAL.
4187014	3.0	#2B5		BRONX	SPRAGUE	-.0063 GAL.	2.6823 GAL.
4187014	5.0	#2B5		BROOKLYN	SPRAGUE	-.0063 GAL.	2.6953 GAL.
4187014	7.0	#2B5		QUEENS	SPRAGUE	-.0063 GAL.	2.7033 GAL.
4187014	9.0	#2B5		STATEN ISLAND	SPRAGUE	-.0063 GAL.	2.7823 GAL.
4187014	11.0	#2B10		CITYWIDE BY TW	SPRAGUE	-.0052 GAL.	2.7910 GAL.
4187014	12.0	#2B20		CITYWIDE BY TW	SPRAGUE	-.0031 GAL.	2.9667 GAL.
4187015	2.0**(H)**	#2B5		MANHATTAN, (RACK PICK-UP)	APPROVED OIL COMPANY	-.0063 GAL.	2.4956 GAL.
4187015	4.0**(I)**	#2B5		BRONX, (RACK PICK-UP)	APPROVED OIL COMPANY	-.0063 GAL.	2.4956 GAL.
4187015	6.0**(L)**	#2B5		BROOKLYN, (RACK PICK-UP)	APPROVED OIL COMPANY	-.0063 GAL.	2.4956 GAL.

4187015	8.0**(M)**	#2B5		QUEENS, (RACK PICK-UP)	APPROVED OIL COMPANY	-.0063	GAL.	2.4956 GAL.
4187015	10.0**(N)**	#2B5		STATEN ISLAND (RACK PICK-UP)	APPROVED OIL COMPANY	-.0063	GAL.	2.4956 GAL.

NOTE:

4087216	#2DULSB5	**95% ITEM 8.3 & 5% ITEM 9.3**	CITYWIDE BY TW	SPRAGUE	-.0063	GAL.	2.9715 GAL.**(A)**
4087216	#2DULSB10	**90% ITEM 8.3 & 10% ITEM 9.3**	CITYWIDE BY TW	SPRAGUE	-.0052	GAL.	3.0467 GAL.**(B)**
4087216	#2DULSB20	**80% ITEM 8.3 & 20% ITEM 9.3**	CITYWIDE BY TW	SPRAGUE	-.0031	GAL.	3.1970 GAL.**(C)**
4087216	#2DULSB5	**95% ITEM 11.3 & 5% ITEM 12.3**	PICK-UP	SPRAGUE	-.0063	GAL.	2.8667 GAL.**(D)**
4087216	#2DULSB10	**90% ITEM 11.3 & 10% ITEM 12.3**	PICK-UP	SPRAGUE	-.0052	GAL.	2.9419 GAL.**(E)**
4087216	#2DULSB20	**80% ITEM 11.3 & 20% ITEM 12.3**	PICK-UP	SPRAGUE	-.0031	GAL.	3.0922 GAL.**(F)**
4087216	#1DULSB20	**80% ITEM 13.3 & 20% ITEM 14.3**	CITYWIDE BY TW	SPRAGUE	.0009	GAL.	3.1993 GAL.
4087216	#1DULSB20	**80% ITEM 15.3 & 20% ITEM 16.3**	PICK-UP	SPRAGUE	.0009	GAL.	3.0945 GAL.

OFFICIAL FUEL PRICE ($) SCHEDULE NO. 8873
FUEL OIL, PRIME AND START

CONTR. NO.	ITEM NO.	FUEL/OIL TYPE	DELIVERY	VENDOR	CHANGE ($)	PRICE ($) EFF. 12/06/2021

OFFICIAL FUEL PRICE ($) SCHEDULE NO. 8874
FUEL OIL AND REPAIRS

CONTR. NO.	ITEM NO.	FUEL/OIL TYPE	DELIVERY	VENDOR	CHANGE ($)	PRICE ($) EFF. 12/06/2021
20211200451		#2B5	ALL BOROUGHS (PICKUP UNDER DELIVERY)	APPROVED OIL	-.0063 GAL	2.9097 GAL.**(J)**
20211200451		#4B5	ALL BOROUGHS (PICKUP UNDER DELIVERY)	APPROVED OIL	.0100 GAL	2.8062 GAL.**(K)**

OFFICIAL FUEL PRICE ($) SCHEDULE NO. 8875
GASOLINE

CONTR. NO.	ITEM NO.	FUEL/OIL TYPE	DELIVERY	VENDOR	CHANGE ($)	PRICE ($) EFF. 12/06/2021
3787120	1.0	REG UL	CITYWIDE BY TW	GLOBAL MONTELLO	-.0216 GAL	2.6306 GAL.
3787120	2.0	PREM UL	CITYWIDE BY TW	GLOBAL MONTELLO	-.0165 GAL	2.8321 GAL.
3787120	3.0	REG UL	PICK-UP	GLOBAL MONTELLO	-.0216 GAL	2.5656 GAL.
3787120	4.0	PREM UL	PICK-UP	GLOBAL MONTELLO	-.0165 GAL	2.7671 GAL.
3787121	**6.0**	**E70 (WINTER)**	**CITYWIDE BY DELIVERY**	**UNITED METRO**	**.0338 GAL**	**3.8955 GAL.(G)**

NOTE:

1. **(A), (B) and (C) Contract 4087216, item 8.3 replaced item 7.3 (Summer Version) effective November 1, 2021**
2. As of February 9, 2018, the Bio-Diesel Blender Tax Credit was retroactively reinstated for calendar year 2017. Should the tax credit be further extended, contractors will resume deducting the tax credit as a separate line item on invoices.
3. Federal excise taxes are imposed on taxable fuels, (i.e., gasoline, kerosene, and diesel), when removed from a taxable fuel terminal. This fuel excise tax does not include Leaking Underground Storage Tank (LUST) tax. LUST tax applies to motor fuels for both diesel and gasoline invoices. Going forward, LUST Tax will appear as an additional fee at the rate of $0.001 per gallon and will be shown as a separate line item on your invoice.
4. The National Oil Heat Research Alliance (NORA) has been extended until February 6, 2029. A related assessment of $.002 per gallon has been added to the posted weekly fuel prices and will appear as a separate line item on invoices. This fee applies to heating oil only and since 2015 has included #4 heating oil. All other terms and conditions remain unchanged.
5. Contract #4087216, effective June 1, 2020, replaces former items (1.2-17.2) on Contract #3987206
6. Due to RIN price adjustments Biomass-based Diesel (2020) is replaced by Biomass-based Diesel (2021) commencing 01/01/2021.
7. Metro Environmental Services, LLC Requirement Contract #: 20201201516/4087084 for Fuel Site Maintenance Services, Citywide has been registered and Contract is available on DCAS / OCP's "Requirements Contract" website for citywide use as of January 27, 2020. Link to Fuel Site Maintenance Services, Citywide contract via OCP website: https://mspwvw-dcsocp.dcas.nycnet/nycprocurement/dmss/asp/RCDetails.asp?vContract=20201201516
8. **(D), I and (F) Contract 4087216, item 11.3 replaced item 10.3 (Summer Version) effective November 1, 2021**

9. (G) Contract 3787121, item 6.0 replaced item 5.0 (Summer Blend) effective November 1, 2021

10. NYC Agencies are reminded to fill their fuel tanks as the end of the fiscal year approaches (June 30th).

11. (J) and **(K)** Effective October 1, 2020 contract #20211200451 **PICKUP (ALL BOROUGHS) under DELIVERY** by Approved Oil.

12. (H), (I), (L), (M) and **(N)** Items 2.0(Manhattan), 4.0(Bronx), 6.0(Brooklyn), 8.0(Queens) and 10.0(Staten Island) are for **RACK PICKUP ONLY**.

13. NYC Agencies are reminded to begin preparing Purchase Orders for the New Fiscal Year (FY'22) as the end of the current fiscal year approaches (June 30th) where need and encouraged to continue utilizing Direct Order system for your fuel ordering, where it's in place

REMINDER FOR ALL AGENCIES:

All entities utilizing DCAS fuel contracts are reminded to pay their invoices **on time** to avoid interruption of service. Please send inspection copy of receiving report for all gasoline (E70, UL & PREM) delivered by tank wagon to OCP/Bureau of Quality Assurance (BQA), 1 Centre Street, 18th Floor, New York, NY 10007.

☛ **d10**

COMPTROLLER

■ **NOTICE**

NOTICE OF ADVANCE PAYMENT OF AWARDS PURSUANT TO THE STATUTES IN SUCH cases made and provided, notice is hereby given that the Comptroller of the City of New York, will be ready to pay, at 1 Centre Street, Room 629, New York, NY 10007, on **12/15/2021**, to the person or persons legally entitled an amount as certified to the Comptroller by the Corporation Counsel on damage parcels, as follows:

Damage Parcel No.	Block	Lot
2, 2A	328	PART OF AND ADJACENT TO LOT 60

Acquired in the proceeding entitled: VICTORY BOULEVARD FROM SENECA AVENUE TO GRAND AVENUE subject to any liens and encumbrances of record on such property. The amount advanced shall cease to bear interest on the specified date above.

Scott M. Stringer
Comptroller

d1-14

NOTICE OF ADVANCE PAYMENT OF AWARDS PURSUANT TO THE STATUTES IN SUCH cases made and provided, notice is hereby given that the Comptroller of the City of New York, will be ready to pay, at 1 Centre Street, Room 629, New York, NY 10007, on **12/15/2021**, to the person or persons legally entitled an amount as certified to the Comptroller by the Corporation Counsel on damage parcels, as follows:

Damage Parcel No.	Block	Lot
199	3722	31
92	3758	8
123, 124, 125, 127	3760	18, 19, 20, 21
131, 131A	3760	40
132	3760	27
141, 142, 141A, 142A	3791	34, 37

Acquired in the proceeding entitled: NEW CREEK BLUEBELT, PHASE 4 subject to any liens and encumbrances of record on such property. The amount advanced shall cease to bear interest on the specified date above.

Scott M. Stringer
Comptroller

d1-14

NOTICE OF ADVANCE PAYMENT OF AWARDS, PURSUANT TO THE STATUTES IN SUCH cases made and provided, notice is hereby given that the Comptroller of the City of New York, will be ready to pay, at 1 Centre Street, Room 629, New York, NY 10007, on **12/15/2021** to the person or persons legally entitled an amount as certified to the Comptroller by the Corporation Counsel on damage parcels, as follows:

Damage Parcel No.	Block	Lot
23A	13629	STREET BED ADJACENT TO LOT 25
24A	13629	STREET BED ADJACENT TO LOT 23
25A	13629	STREET BED ADJACENT TO LOT 21
26A	13629	STREET BED ADJACENT TO LOT 19
67A & 67B	13604	STREET BED ADJACENT TO LOT 28
68A & 68B	13604	STREET BED ADJACENT TO LOT 26
73A, 73B	13604	STREET BED ADJACENT TO LOT 15
74A, 74B	13604	STREET BED ADJACENT TO LOT 14
75A, 75B	13604	STREET BED ADJACENT TO LOT 10

Acquired in the proceeding entitled: ROSEDALE AVENUE AREA STREETS – STAGE 1 subject to any liens and encumbrances of record on such property. The amount advanced shall cease to bear interest on the specified date above.

Scott M. Stringer
Comptroller

d1-14

NOTICE OF ADVANCE PAYMENT OF AWARDS PURSUANT TO THE STATUTES IN SUCH cases made and provided, notice is hereby given that the Comptroller of the City of New York, will be ready to pay, at 1 Centre Street, Room 629, New York, NY 10007 on 12/20/2021, to the person or persons legally entitled an amount as certified, to the Comptroller by the Corporation Counsel on damage parcels, as follows:

Damage Parcel No.	Block	Lot
131, 133, 136	3861	1, 14, 24

Acquired in the proceeding entitled: MID-ISLAND BLUEBELT, PHASE 3 (NEW CREEK) subject to any liens and encumbrances of record on such property. The amount advanced shall cease to bear interest on the specified date above.

Scott M. Stringer
Comptroller

d7-20

NOTICE OF ADVANCE PAYMENT OF AWARDS PURSUANT TO THE STATUTES IN SUCH cases made and provided, notice is hereby given that the Comptroller of the City of New York, will be ready to pay, at 1 Centre Street, Room 629, New York, NY 10007 on 12/20/2021, to the person or persons legally entitled an amount as certified, to the Comptroller by the Corporation Counsel on damage parcels, as follows:

Damage Parcel No	Block	Lot
76A, 76B	13604	STREET BED ADJACENT TO LOT 8
79A, 79B	13605	STREET BED ADJACENT TO LOT 55
80A, 80B	13605	STREET BED ADJACENT TO LOT 52
81A, 81B	13605	STREET BED ADJACENT TO LOT 50
82A, 82B	13605	STREET BED ADJACENT TO LOT 47
83A, 83B	13605	STREET BED ADJACENT TO LOT 46
84A, 84B	13605	STREET BED ADJACENT TO LOT 42
85A, 85B	13605	STREET BED ADJACENT TO LOT 40
86A, 86B, 86C, 86D	13605	STREET BED ADJACENT TO LOT 39
88A, 88B, 88C, 88D	13605	STREET BED ADJACENT TO LOT 35

Acquired in the proceeding entitled: ROSEDALE AVENUE AREA STREETS – STAGE 1 subject to any liens and encumbrances of record on such property. The amount advanced shall cease to bear interest on the specified date above.

Scott M. Stringer
Comptroller

d7-20

HUMAN RESOURCES ADMINISTRATION

■ **NOTICE**

The 2022-2023 Biennial Temporary Assistance and Supplemental Nutrition Assistance Program Employment Plan for the City of New York for the period January 1, 2022, through December 31, 2023, mandated by Social Services Law Sec. 333 and 18 N.Y.C.R.R. Sec. 385.10, is available for review and comment until the close of business on **January 3, 2022.** Every two years, each local social services district submits for approval to the New York State Office of Temporary and Disability Assistance (OTDA), a plan that describes the district's employment services program. The Plan includes a description of the education, work, training, and support services programs provided to public assistance applicants and recipients, along with other information required by OTDA.

The plan can be obtained by writing to the New York City Human Resources Administration, 4 World Trade Center, 150 Greenwich Street, 35th Floor, New York, NY 10007, Attn: Andrew Mandell, Assistant Deputy Commissioner, Office of Policy, Procedures and Training, by email, to mandella@dss.nyc.gov, or from HRA's Internet www.nyc.gov/hra.

Persons wishing to comment on the 2022-2023 Biennial Temporary Assistance and Supplemental Nutrition Assistance Program Employment Plan, should do so in writing to Mr. Mandell, at the above addresses, either by mail or email.

n30-d10

OFFICE OF THE MAYOR

■ **NOTICE**

Notice of Intent to Issue New Solicitation(s) Not Included in FY 2022 Annual Contracting Plan and Schedule

NOTICE IS HEREBY GIVEN that the Mayor will be issuing the following solicitation(s) not included in the FY 2022 Annual Contracting Plan and Schedule that is published, pursuant to New York City Charter § 312(a):

Agency: NYC Department of Correction (072)
Description of services sought: Investigative Case Management Maintenance and Support Services
Start date of the proposed contract: 8/1/21
End date of the proposed contract: 6/30/24
Method of solicitation the agency intends to utilize: MWBE Noncompetitive
Personnel in substantially similar titles within agency: None
Headcount of personnel in substantially similar titles within agency: 0

Agency: NYC Department of Correction (072)
Description of services sought: Emerson Liebert/Ventiv Uninterrupted Power Supply/Automatic Transfer Switch (UPS/ATS) Maintenance and Support
Start date of the proposed contract: 3/1/22
End date of the proposed contract: 2/28/27
Method of solicitation the agency intends to utilize: MWBE Noncompetitive
Personnel in substantially similar titles within agency: None
Headcount of personnel in substantially similar titles within agency: 0

☛ **d10**

CHANGES IN PERSONNEL

BOARD OF ELECTION POLL WORKERS
FOR PERIOD ENDING 10/01/21

NAME			TITLE NUM	SALARY	ACTION	PROV	EFF DATE	AGENCY
DIAZ	DERICK		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DIAZ	LILLIAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DIOP	CHEIKH	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DIVER	FLORELLE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DONG	JESSIE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DONG	YAN	L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DONNELL	LAVIE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DONTCHEVA	VENETA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DOPSON	GARY	O	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DOUCETTE	ADRIENNE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DOUGHERTY	DANIEL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DOUGLAS	VIRGINIA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DRAYTON	LORRAINE	E	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DU	YANGBO		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DUMAS	VICKY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DUNHAM	TRACY	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DURAN	YENELSA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
DWIGHT	LAURA	N	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
EALES	JOHN	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
EDWARDS	DAISY	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
EDWARDS	EUGENIA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ELAM	TREVOR	P	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
EMMANUEL	EMEVIOMO	D	8POLL	$1.0000	APPOINTED	YES	01/01/21	300
ENG	ISABELLA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ENGERT	ALEC	J	9POLL	$1.0000	APPOINTED	YES	01/01/21	300

BOARD OF ELECTION POLL WORKERS
FOR PERIOD ENDING 10/01/21

NAME			TITLE NUM	SALARY	ACTION	PROV	EFF DATE	AGENCY
EPSTEIN	KENNETH	R	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ESKELIN	RAMI	W	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ESTREMERA	AMBER		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
EUTSAY	JOY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
EVANS	TORRIE	E	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FABIEN	MICHAELL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FAIRWEATHER	GARY	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FAISON	CHELSEA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FALZARANO	GINO		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FARRELL	NICOLE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FATEMA	KANJI		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FAUSTINO	ALEX		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FAY LE-TAN	CLEO	C	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FEASTER	MONICA	F	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FELDMAN	MOLLY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FELICIANO CORTE	ALFIE	K	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FENG	YAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FERNANDEZ	IRINA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FERRARIS	GABRIELL		9POLL	$1.0000	APPOINTED	YES	09/15/21	300
FIAMAFLE	KOSSI	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FIFIELD	ROBIN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FIHMAN	MANUEL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FISH	JEN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FLEMING	MICHAEL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FLORIO	FRANCES		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FLOWERS	EDWARD		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FOODIM	ANNE	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FRAME	AMANDA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FRANCO	LISSETTE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FRASER	CASSIUS		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FRAZIER	JALIL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FREIRE	DANNY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FRERE-JOHNSON	TUERE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FRID	ELIA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
FRIEDMAN	LAYNE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GAHAGAN	EVITA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GAITHER	JAYLEN	X	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GALANTE	ANTHONY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GALINDO	GABRIELA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GAMBLE	SHERMAN		9POLL	$1.0000	APPOINTED	YES	09/24/21	300
GAO	QIONGZHE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GARCIA	ANDRIA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GARCIA	JOHANNA	L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GARLAND-KELLY	FREEDOM		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GASKIN	ALTHEA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GASTON	ELAINE	G	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GERMAN	DIANA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GERMAN	LORRAINE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GERSON	GREGORY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GIARRATANO	TIMOTHY	F	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GIBBS	ARIANA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300

BOARD OF ELECTION POLL WORKERS
FOR PERIOD ENDING 10/01/21

NAME			TITLE NUM	SALARY	ACTION	PROV	EFF DATE	AGENCY
GIBSON	CAMILLE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GIBSON	EMMA	C	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GILBERT	JOSHUA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GILLIS	MONAI	S	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GILMORE	ELIZABET	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GIORGIO	CHRISTIN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300

GIST SR	NADIR		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GLEESON	MARTIN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GODA	RAINA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GOKHAN	ALI		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GOLDMAN	MEREDITH	E	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GOLDMAN	MILANA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GOMEZ	KENYA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GONZALEZ	BRENDIS	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GONZALEZ	BRIAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GONZALEZ	ELIJAH		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GONZALEZ	ENID		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GONZALEZ	JESUS	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GOODHALL	CHRISTIN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GOODRIDGE	GEOFFREY	K	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GOODWIN	ISIS		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GORMAN	JONATHAN	R	9POLL	$1.0000	APPOINTED	YES	01/21/21	300
GRAIL	ESME		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GRANT	CHRISTEE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GRANT	JESSICA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GRAVES	LAKISHA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GRAY	ASHLEY	L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GREEN	ASHLEY	E	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GREENBAUM	WILLIAM		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GREER	CINDY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GRGUREV	MICHELLE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GRIFFITH	ARLEEN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GRIJALVA	STEPHANI		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GRINAGE	TAWANA	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GROSSMAN	JEFF	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GRULLON	PATRICIA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GRULLON	SHERLY	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GRULLON	THAYANA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GUAN	SHAOWEI		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GUERRERO	ANDRES		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GUICHARDO	JOSE	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GUO	MENGYI		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GUO	YUFENG		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
GUTHRIE	DOROTHY	S	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HAGAN	AMPSON		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HAIRSTON	NEKYA	G	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HAITHCOCK	DAVIS	S	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HAMILTON	ROYAL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HAMON	TABITHA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HANCE	TISHA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HANDY	MARK		9POLL	$1.0000	APPOINTED	YES	01/01/21	300

BOARD OF ELECTION POLL WORKERS
FOR PERIOD ENDING 10/01/21

NAME			TITLE NUM	SALARY	ACTION	PROV	EFF DATE	AGENCY
HAQ	AFNAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HAQUE	LAZIMUL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HARPER	LEANORA	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HARRIS	DAMON		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HAYS	MACY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HAYTHE	NATIFAH		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HENDERSON	TAJA-NIA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HENRION	MARILYN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HERNANDEZ	DANIELA	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HERNANDEZ	LISBETH		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HERNANDEZ DE PE	CARLOS		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HERZBERG	WENDY	L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HIGGINBOTTHAM	JOHNNIE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HILLARD	ROBERT		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HLADIK	DANIEL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HOFFMAN	MEGAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HOHENSTEIN	ALBERT		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HONG	SARAH		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HOO	WALCOTT		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HOPE	RONIQUE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HORINE	MELISSA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HOROWITZ	ADINA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HOULTON	KRISTEN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HOVSEPIAN III	MICHAEL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HUANG	HAORAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HUANG	LARRY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HUANG	NANCY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HUANG	PEIJIAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HUGHES	VERONICA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HUNTT	DANA	B	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HURLEY	JUSTYNA	L	9POLL	$1.0000	APPOINTED	YES	09/24/21	300
HWANG	TIMES	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
HWANG SR	JONG	H	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
IANNONE	ELIZABET	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
IMAM	TAREQUE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
INGRAM	RACHEL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
IRVINE	ALEXANDR		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ISAAC	LATEASHA	S	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ISAACSON	DAVID		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ISABELL	T	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ISLAM	MOHAMMAD		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ISLAM	ZARRIN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ITALIANO	LAURA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JACKSON	COLE	L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JACKSON	KIANA	E	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JACKSON	MELANIE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JACKSON	SABRINA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JANKE	TIMOTHY	L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JAPA	ERIKSH	P	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JAVAID	IRUM		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JEAN	TINAYA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300

BOARD OF ELECTION POLL WORKERS
FOR PERIOD ENDING 10/01/21

NAME			TITLE NUM	SALARY	ACTION	PROV	EFF DATE	AGENCY
JEAN BAPTISTE	ROOMEL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JENNINGS	DARYLL	W	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JENNINGS	MADELEIN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JIANG	HANNAH		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JOHN-CHARLES	ALLANA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JOHNSON	GEORGE	T	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JOHNSON	KASHYA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JOHNSON	MICHAEL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JONES	ANTOINET		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JONES	JENNIFER		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JONES	KIMBERLY	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JONES	LEELON		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JONES	LEONARD		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JONES	SHALETTE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JOSEPH	RENNA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JUDD	STEVON	S	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
JUNG	URSILA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KALU	KEONA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KAMARA	KADIAH	O	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KAMINER	ANITA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KAMPEL	DAVID		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KANDOLO	DIVINE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KAPLAN	SANDRA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KAUL	USHA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KAUSCH	KATHY AN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KE	JENNIFER	X	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KEENE	ABBEY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KEHDI	MARY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KELLEY	AARON		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KELVIN	JOANNE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KELVIN	PETER	N	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KENNEDY	KRISTEN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KENT	LIZA	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KEPLER	RODGER	V	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KHAN	MOHAMMME		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KHANAM	JANNATH		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KHEYMAN	MIRA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KIM	ALICE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KIM	JEAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KINSEY	SUSAN	R	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KIRSTAN-NAPIER	KIRSTAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KLEIN	MILENE	E	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KNIGHT	ANGELA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KNIGHT	AUDRA	L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KNOX	KEVIN	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KOCHMAN	JOHN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KOHL	SAM		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KONS	ANNA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KORNBLUTH	NANCY	L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KOSEL	NATALIE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KOSTMAN	TREVOR	B	9POLL	$1.0000	APPOINTED	YES	01/01/21	300

BOARD OF ELECTION POLL WORKERS
FOR PERIOD ENDING 10/01/21

NAME			TITLE NUM	SALARY	ACTION	PROV	EFF DATE	AGENCY
KOTELAWALA	USHA	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KOUSANI	ALI	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KUNDRA	SATISH		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
KUSHNER SALITAN	NORA	S	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LABARBERA	MICHAEL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LAGARES	MARISOL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LAGUARDIA	DOLORES	C	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LAHDILI	GERALDIN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LAMARCHE	CARLOS		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LAMBERT	NORMAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LANDSMAN	JORDAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LANGUE	AURELIE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LANIER	RITA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LANTINGUA	MAYERLIN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LARREA	DAYANNA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LAU	SIU KEI	R	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LAUGHTON	KIMBERLY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LAVO	ANGELINA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LAW-GISIKO	LAYLA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LAWSON	MARGARET	L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LAZAR	JENNA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LEE	FELITA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LEE	JOONG	S	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LEE	MAYA	J	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LEE	MEILING		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LEE	MICHELLE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LEE	WILLIAM		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LEMONIDES	ZOE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LEON	MARIA	I	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LEONA	NORMA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LEUNG	BELINDA	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LEUNG	CHI HANG		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LEVIN	SARA	Z	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LEWIS	HANNAH	T	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LI	CHUN	K	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LI	JACK		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LI	RUI		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LI	VICTOR		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LIANG	ELAINE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LIANLY	TAYA	F	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LIEBESKIND	WILLIAM		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LIGHTFOOT-BRIGG	KARLA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300

LIMA	STEPHANI	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LIN	ANN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LIN	YU	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LING	LAURENCE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LITTELL	CATHERIN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LIU	EVELYN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LIU	KENNETH	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LIU	QIUBING	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LIVELY	WILLIAM H	9POLL	$1.0000	APPOINTED	YES	01/01/21	300

BOARD OF ELECTION POLL WORKERS
FOR PERIOD ENDING 10/01/21

NAME		TITLE NUM	SALARY	ACTION	PROV	EFF DATE	AGENCY
LOHNES	LILLY G	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LOKKE	GEOFFREY	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LOPEZ	EDUARDO	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LOPEZ	MICHELLE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LOPEZ	PATRIZIA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LOPEZ	PRISCILL A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LORA	TISHAILY	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LOWE	DEANNA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LU	AARON	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LU	HUI	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LUENG	EDWARD	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LUGERNER	SINDY	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LUI	IRENE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LUNA	MARIBEL	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LUTTINGER	BETH S	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LUU	BELINDA A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
LYDON	KEVIN C	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MACALOU	FADIMA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MACALOU	SAMBOU	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MACKEY	MEREDITH	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MADDEN	ANDREW	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MADDEN III	THOMAS A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MAHMOOD	AZAD	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MAISONET	AMPARO	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MAJORS	TERRI	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MAKULA	DANIEL	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MALGIERI	JESSE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MALLNER	ANTON	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MANGOLD	CHRISTIN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MANNING	KENNETH	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MANSWELL	LAURELLE C	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MANTEBEA	ADJUA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARCHESE	ANNA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARGALL	KATHERIN W	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARONE	BRIAN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARSHALL	DOMINIQU A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARSHALL	KENYON	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARSHALL	MARIE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARSHALL	MONIE M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARTES	RAFAEL	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARTIN	JASMINE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARTIN	LINDA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARTIN	RYAN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARTINEZ	DORIS	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARTINEZ	MARIA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARTINEZ	STACY	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MARTINEZ	YOHANNA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MASON	MARIE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MATLACK	LAUREN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MATOS	EDWIN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MAYERS	NELSON	9POLL	$1.0000	APPOINTED	YES	01/01/21	300

BOARD OF ELECTION POLL WORKERS
FOR PERIOD ENDING 10/01/21

NAME		TITLE NUM	SALARY	ACTION	PROV	EFF DATE	AGENCY
MCALLEN	KATHLEEN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MCCALL	ANGELA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MCCARTHY	KRISTTIN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MCCORKLE	YASMINA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MCENROE	ANNA S	9POLL	$1.0000	APPOINTED	YES	09/15/21	300
MCGLOSTER	BRIAN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MCKNIGHT	IAN J	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MCMILLAN	CHERYL D	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MCMURRAY	SAMUEL	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MCORMEY	JENNA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MCPHERSON	JOSEPH	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MEADE	DAVID	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MEDINA	GENOVEVA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MEDINA	HECTOR	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MEGGETT	DELORICK	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MEJIA	BRITTANY	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MEJIA	DHAIANA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MELE	CARLA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MENDOZA	CHRISTOP	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MENDOZA	ISIS	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MENDOZA	LAURA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MERCADO	DEBORAH M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MERCURIO	MARIA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MESSINA JR	JOSEPH	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MESTRES	LISA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MEYEROWITZ	MICHAEL	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MIGLIORE	WILLIAM C	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MIGNON	JOSEPH R	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MIKHALEVA	OLGA V	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MILES	PAMELA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MILLER	IAIRD	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MIMMA	NINA O	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MIMMA	WILLY A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MIMS	RHONDA A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MIN	SUNG	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MINGO	TALA C	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MINIHAN SR	LUCIANE M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MINNIFIELD	DEYANAIR L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MISUNAS	KATHLEEN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MITCHELL	BRENDAN R	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MITCHELL	ELIZABET P	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MITCHELL JR	ROBERT	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MOHAMED	HOSSAIN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MONTERO	SHARIBEL M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MONTGOMERY	ANGELA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MONTOYA	MARISOL	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MOON	JADE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MOON	SADIA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MOQUETE	HENRY	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MORALES	WILLIAM	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MORAN-VEGA	MARIA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300

BOARD OF ELECTION POLL WORKERS
FOR PERIOD ENDING 10/01/21

NAME		TITLE NUM	SALARY	ACTION	PROV	EFF DATE	AGENCY
MOSKOWITZ	PAIGE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MOSLEY	DON E	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MUENTES	DEBORAH	8POLL	$1.0000	APPOINTED	YES	01/01/21	300
MUNROE	FIDELLE O	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MURAKAMI	SEIJI	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MURPHY	DORCAS	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MYER	SUSANA F	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MYERS	WILLIAM	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
MYTELKA	GREGORY	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NAARENDROP	JO-ANNE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NANNA	TORITSEN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NAPPER	ZACCEUS J	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NARVAEZ	EMILIA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NAZARIO	LOUIE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NEGRON	JOANNE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NEIL	TAIJAH X	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NEUMAN	MELANIE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NEW	BEE P	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NG	GEORGE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NICHOLAS	LATOYA G	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NICHOLLS JR	SAMUEL	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NIEVES	SOFIA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NIMOCKS	MADGE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NOBLES	NICOLE L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NOOR	ASHREEN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NORMAN	VERONICA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NORRIS	WANDA K	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NOVAS TORRES	DANIEL	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NUNEZ	EMILY	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NUNEZ	JEREMY	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NUREMBURG	STAN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
NUZZO	TRACY	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
O'CONNOR	ANN M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
O'NEAL	DEBRA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
O'NEILL	BRIEN V	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
OBLITAS	MATEO	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
OGIRRI	ALEXIS	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
OKERE- SANDERS	STELLA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
OLIVARES	ABBEY	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
OLIVER	CATHERIN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
OLIVERA	GOTTI	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
OLUWASOLA	OMOBOLAJ O	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ONETO	PETER	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
OPFERMAN	SOPHIA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ORTIGOZA	KATE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ORTIZ	ABIGAIL	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ORTIZ	MICHAEL A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ORTIZ JR	JOSHUA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ORTIZ-ALBURQUER	DAVID	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
OSHA	STEUART	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
OSPINA	SANDRA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300

BOARD OF ELECTION POLL WORKERS
FOR PERIOD ENDING 10/01/21

NAME		TITLE NUM	SALARY	ACTION	PROV	EFF DATE	AGENCY
OTERO	JACQUELI	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
OTHA	MILLER	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
OURADA	TAYLOR	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
OWUSU	AMANI	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PADILLA	MARLON	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PALMER	RENE V	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PALOMO	RICHARD	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PAPA	SANDRA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PARKER	DIANE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PARKER	GAIL	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PATRICK	KELLY	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PATTERSON	TODD	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PAYTON	LATRICE	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PEACOCK	QOUVETTA	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PEAKER	JUSTYN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PEARSON	DONALD	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PELLEGRIN	ANGELA V	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PENA	CHRISTIA A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PERAJ	HADESSA N	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PERAS	CHRISTOP	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PEREZ	EVELYN	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PEREZ	R Y	9POLL	$1.0000	APPOINTED	YES	01/01/21	300

PEREZ	SARAH	Z	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PEREZ JR	REYNOLD		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PERTSOV	ANDREY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PHAIRE	CHANTAL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PHIFER	JUSTINE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PHILLIPS	LAURA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PIH	PETER		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PIMENTEL	ELIAS	R	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PINHEIRO	JOSE	R	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PISCITIELLO	SUSANA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PLACENCIA	SHARINA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PODOLSKY	SOPHIA	P	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
POKUAH	ADWOA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PON	VICKI	I	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
POST	MYRNA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
POTTERBAUM	DAVID		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
POWELL	KAREN	D	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
POWER	HONG	Y	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
POWER	JOHN	J	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PRESIDENT	ERIN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PRINS	MICHAEL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PROBSTEIN-KAZAK	YURI		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PRUITT	DEBORAH	L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PRYOR	ROSETTA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PUGH	MARAZHAN	N	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PUJOL	INGRITE	R	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
PUMAREJO	YOLANDA	J	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
QIN	PETER	J	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
QIU	JI RUI		9POLL	$1.0000	APPOINTED	YES	01/01/21	300

BOARD OF ELECTION POLL WORKERS
FOR PERIOD ENDING 10/01/21

NAME			TITLE NUM	SALARY	ACTION	PROV	EFF DATE	AGENCY
QIU-MCLAMB	PING		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
QUADER	NOWSHIN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
QUIJANO	ANDREA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
QUILES	DEANNA	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
QUINBY	CLAUDIA	V	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
QUINN	SHARDAE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
QUINONES	ESTEBAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
QUIROZ	JANETH		8POLL	$1.0000	APPOINTED	YES	01/01/21	300
QUITCON	IRMA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RAGSDALE	DESTINY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RAICHLE	LAUREN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RAMANATHAN	KEDAR		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RAMIREZ	MELODY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RAMOSEHLANE	NTHABISE	T	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RANDALL	CELESTE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RANDALL	TENISHA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RAZURI	CESAR		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
REDHAIR	ADRIANNA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
REED	MONA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
REEDY	ROSEMARI		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
REGAN	KEVIN	S	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
REGIS	NICOLE	S	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
REIBSTEIN	LARRY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
REID	AMELIA	L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
REIDY	SEAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
REYES	LARIMAR		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RICH	EMILY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RICHARDS	DAVID		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RICHARDS	MARILIA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RILEY	SHANNA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RIMA	JANNAT		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RINZLER	ADIN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RIOS	FREZELL		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RIOS	VILMA	E	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RIPA	KANIJ	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RITZMANN	LUCY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RIVERA	EVE	T	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RIVERA	MELANIE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RIZK	NOUR		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RIZZO	JACK	E	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROA	HEILYN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROBERTS	N	Q	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROBINSON	THERESA	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROCCHIO	AMANDA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROCHE	ERIN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RODNEY	RENEE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RODRIGUEZ	ANA	M	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RODRIGUEZ	ANDERSON		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RODRIGUEZ	CRISTAL	N	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RODRIGUEZ	DAISY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RODRIGUEZ	DEALISE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300

BOARD OF ELECTION POLL WORKERS
FOR PERIOD ENDING 10/01/21

NAME			TITLE NUM	SALARY	ACTION	PROV	EFF DATE	AGENCY
RODRIGUEZ	FRANCISC		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RODRIGUEZ	JOHN	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RODRIGUEZ	MADYSON		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RODRIGUEZ	MIRABEL	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROGERS	JACOB		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROHENA	RICHARD	L	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROJAS-MARIN	MARIA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROMAN	BENJAMIN	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROMAN	DENISE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROMAN	EDWIN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROMAN	KHEIRY		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROMERO	STEPHANI		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RORSCHACH	ELIZABET		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROSARIO	ARACELIA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROSE	WILLIAM	A	9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROSSI	JULIA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROWE	DUANE		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROY	ALAN		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
ROY	NATASHA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300
RUBIN	SHEILA		9POLL	$1.0000	APPOINTED	YES	01/01/21	300

LATE NOTICE

BOROUGH PRESIDENT - MANHATTAN

■ **PUBLIC HEARINGS**

The December 2021 Manhattan Borough Board meeting, public hearing, and vote will be held on Zoom on Thursday, December 16, 2021 at 8:30 A.M. regarding

1) the 175 Park Avenue zoning text amendment (ZR), special permits (ZS), certifications (ZC) and disposition of City-Owned property (PP) to facilitate a new, 1,646' tall, 2.25 million sf, office and hotel development, including approximately 1.9 million sf of office floor area and 300,000 sf of hotel floor area that is being sought by Commodore Owner LLC (for ZR, ZS, ZC actions) and the Department of Citywide Administrative Services (for PP action) at 109 East 42nd Street in East Midtown, CD 5, Manhattan,
2) the 495 Eleventh Avenue (Slaughterhouse) zoning text amendment (ZR), zoning map amendment (ZM), and site selection and acquisition (PC) - to facilitate a new, 581,601 sf mixed-use development with affordable and supportive housing, hotel and office use, retail, and NYPD vehicle storage - are being sought by EDC and 495 11 Avenue Owner Realty LLC (for ZR and ZM actions) and the Department of Citywide Administrative Services and NYPD (for PC action) at 495 11th Avenue in Clinton/Hell's Kitchen, Community District 4, Manhattan,
3) Central Park Exonerated Five memorial exhibit.

To register, please visit zoom.us/webinar/register/WN_dk2DnJO8Rgm-oSpwC7VrGA

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CONFLICTS OF INTEREST BOARD

■ **MEETING**

The Conflicts of Interest Board announces a meeting of the Board on Tuesday, December 14, 2021, at 9:30 A.M. On the public agenda may be the Board's consideration of amendments to Title 53 of the Rules of the City of New York. Due to the ongoing public health emergency, the public agenda will be conducted remotely and may be accessed by Zoom and telephone upon request. For instructions on public participation, contact the Board's Deputy General Counsel, Christopher Hammer, at hammer@coib.nyc.gov, in advance of the open meeting.

ACCESSIBILITY:
The Zoom platform is accessible to screen readers.

Accessibility questions: Christopher Hammer, (212) 437-0721, by: Monday, December 13, 2021 12:00 P.M.

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