

Northeast Ohio Regional Sewer District

Submittal Requirements for Connections to the Combined Sewer System

Guidelines for Review and Approval

Requests for connection approval are required for all new development and redevelopment projects within the NEORSD service area seeking to connect to a combined sewer, combined sewer overflow (CSO) pipe, or separated storm sewer tributary to a combined sewer or CSO pipe.



Version 1.2

Version History

Version	Date	Description of Revisions
0.0	4/10/2011	Official release for distribution.
1.0	1/3/2012	Revised document title; changed all references to “designer” to “applicant”.
1.1	11/01/12	Revised 3.1 Design Criteria language
1.2	9/10/14	Revised Sections 2.2 and 3.1

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1.0 Purpose

The Title IV Combined Sewer Code of the Northeast Ohio Regional Sewer District's (NEORS) Code of Regulations provides the NEORS with the authority to control combined sewer overflows (CSOs) from the combined sewer system and to control peak flows from local combined sewer systems at the point of connection into sewers owned by the NEORS or a member community. Therefore, the NEORS has the authority to review all requests for connection approval within the combined sewer system.

The purpose of this document is to provide guidance to landowners, developers, and design engineers interested in developing land in the combined sewer service area regarding the uniform process for submitting construction plans to the NEORS for review and approval. Design standards and criteria are also provided for use in developing stormwater control measures to provide quantity and water quality benefit.

2.0 Procedures for Submittal Review

Requests for connection approval are required for all new development and redevelopment projects within the NEORSD service area seeking to connect to a combined sewer, CSO pipe, or separated storm sewer tributary to a combined sewer or CSO pipe. This section outlines the procedures that should be followed to ensure a complete submittal package is provided for review.

2.1 General Information

- Landowners, developers, and design engineers on behalf of the owner/developer may request approval to connect by submitting a set of construction plans with associated calculations supporting the stormwater management plan. The term “Applicant” will be used throughout this document to refer to the landowner, developer and/or design engineer working on behalf of the owner/developer.
- Connection requests shall be made prior to the start of construction requiring approval from NEORSD. Construction activities shall only start after District approval has been granted. To avoid project delays, contact NEORSD as early as possible, preferably in the early stages of design.
- As stated in the Title IV Combined Sewer Code, the NEORSD has 15 business days upon receipt of a complete submittal package to review a connection request. The NEORSD will attempt to review these requests in the shortest possible time. The Applicant is encouraged to contact the NEORSD early in the design process to avoid delays in the project schedule. A definition of a complete submittal package is provided in **Section 2.2**. If a submittal package is not complete as determined by NEORSD, the 15 business days will stop accruing until the submittal package is deemed complete by NEORSD.
- Minimum design standards and criteria for designing acceptable stormwater management plans are provided in this document. For development sites upstream of areas with capacity issues, NEORSD may potentially require that more restrictive design criteria are met. The Applicant is encouraged to contact the NEORSD early in the design phase to determine whether the site is located in a critical area of the combined sewer system and subject to stricter design criteria.
- Construction plans showing the layout of the area intended to be developed shall be submitted to the NEORSD by the Applicant. The plans shall be prepared under the direction of and sealed by a registered professional engineer.
- The NEORSD will review the plans for adequacy of stormwater management design to ensure that the proposed stormwater drainage system has the capacity to handle all

contributing flow without diminution of the existing level of service in the combined sewer system.

2.2 Submittal Requirements

Stormwater criteria and design standards shall be used as designated in Section 4.0309 of Title IV. No other stormwater criteria and design standards shall be used unless prior written approval is provided by NEORSD.

A complete submittal package shall include and clearly state, at minimum, the following:

1. Site map(s) showing project site location, total drainage area, land use/cover, amount of impervious area and longest flow paths for existing and proposed conditions.
2. Detailed topographical map showing existing topography and proposed grades of the entire project area, as well as the topography of all adjacent property to the extent that off-site contributing flow can be determined. All off-site contributing flow must be accommodated. All existing watercourses, lakes, wetlands and floodplain shall be included on the map. Specify the horizontal and vertical national datum used.
3. Location, size, and type of all existing storm sewers, channels, and/or stormwater structures located upstream and downstream of project area.
4. Location, size, and type of proposed storm sewers, channels, and/or stormwater structures to be built as part of the site's stormwater management plan.
5. Plans, cross-section views and details of all stormwater control measures (SCMs). If an existing on or off-site SCM will be used, as-built information shall be provided. Please identify drainage area unique to each SCM on plans.
6. Predominant soil type from USDA soil surveys or soil borings found at site.
7. Runoff Calculation Worksheet indicating the number of acres and percent imperviousness contributing to each specific drainage structure or SCM.
8. Design data and criteria used for sizing all drainage structures, channels, and SCMs.
9. Hydrologic and hydraulic calculations, assumptions, and parameters used for quantifying peak flows for existing and post-development conditions. Existing condition is defined as the current land use and impervious area on the subject property at the time of submission to NEORSD. Longest flow paths used in quantifying time of concentration for each shall be shown on a site map.
10. A Long-Term Operation and Maintenance Plan as described below in **Section 3.1**.

11. Complete set of plans (including the stormwater management report) submitted to NEORS D in electronic format (preferred) or single hard copy set.

3.0 Design Criteria and Engineering Standards

The design criteria and engineering standards set forth herein are intended to guide Applicants to develop a stormwater management system that controls the quantity and quality of the stormwater discharge for a development site. The internal drainage for a site as well as the downstream conditions will be reviewed. Every site is part of an overall watershed and the system should be designed with this in mind. These standards are the minimum requirements of the NEORS and should not be construed as all-inclusive. The Applicant should consider many factors when planning the stormwater management system. In particular, Federal, State, and Local standards may be stricter than these standards. In the case where conflicting standards arise, the more stringent requirement will govern.

3.1 Title IV Design Criteria

A proposed stormwater management design for the site must meet the District's Code of Regulations, Title IV - Combined Sewer Code. Title IV is applicable to any development activity in the combined sewer area. The following standards are necessary to show compliance with Title IV.

1. The District will not authorize increases in wet-weather flow at combined sewer overflow (CSO) locations. Post-development peak flows shall not exceed existing condition peak flows, nor shall they result in an increase to CSO volumes and/or typical year activations. Existing condition is defined as the current land use and impervious area on the subject property at the time of submission to NEORS. The District's preferred method to demonstrate these requirements will be met is as follows:
 - Storm events up to the 5-year, 24-hour event: The Applicant shall demonstrate to the District's satisfaction that storage volume shall be provided to ensure that there is no increase in flow to the combined sewer system;
 - Storm events greater than the 5-year and up to the 25-year, 24-hour event: The maximum release rate shall be defined as the existing conditions peak discharge of the corresponding storm frequency evaluated for post-development conditions;

The Applicant shall demonstrate to the District's satisfaction that post-development peak flows will not exceed existing condition peak flows and that proposed post-development peak flows will not create increases in flow at CSO locations. Applicants shall submit a summary of existing and post-development discharge locations and flows, and identify any corresponding impacts the new discharge locations and/or flows have on CSO flows up to the 25-year design event. The applicant may show compliance through use of the District hydraulic/hydrologic InfoWorks ICM sewer models. A copy of the District models and model standards are available upon request from the Permit Program Manager.

The NEORS D reserves the right to require additional peak rate and/or volume controls. A more restrictive allowable discharge rate than that stated above may be required due to downstream capacity issues and/or to ensure no increases in flow at specific CSO locations. The Applicant is encouraged to contact the District early in the project development process to determine if the project is located in a critical CSO area and will be required to meet more restrictive criteria.

2. For connections to the combined sewer system, stormwater shall be managed in accordance to Part III.G.2.e of the Ohio EPA's General Permit OHC000003 or Chapter 3116 of the City of Cleveland's Codified Ordinances, whichever is more restrictive.
3. For separated storm connections to a CSO pipe or receiving water, the District will only accept stormwater control measures that provide water quality treatment for 100% of the project area whether the project is defined as a redevelopment project or new development.
4. A Long-Term Operation and Maintenance Plan shall be managed in accordance to Part III.G.2.e of the Ohio EPA's General Permit OHC000003 and shall include the proposed schedule for the perpetual maintenance of the complete storm drainage system. This plan shall indicate who will be responsible (i.e. municipality, landowner, or association) for this operation and maintenance and the legally binding mechanism which ensures perpetual funding. If there is a maintenance agreement with the City of Cleveland or other applicable local government, a copy of the agreement must be submitted to the District. Approval of the Long Term Operation and Maintenance Plan by the District is necessary prior to plan approval.
5. Stormwater runoff impacts to the local collection system capacity need to be considered. The local community shall be engaged as necessary on this item. Projects in the City of Cleveland shall contact the City of Cleveland's Division of Water Pollution Control (WPC).

The criteria are the minimum design standard accepted by the NEORS D. In addition to the Title IV criteria herein, the Applicant must also abide by the rules, standards, specifications and master plan of the municipality where the site is located. In the case where conflicting standards arise, the more stringent requirements will govern.

3.2 Rainfall Intensity-Duration-Frequency

Rainfall intensity-duration-frequency (IDF) estimates provided in **Appendix A** shall be used in the design of the stormwater management plans. Other sources of rainfall IDF estimates may be used if required by another Federal, State, or local standard applicable to the development site. If a different rainfall IDF source is used to support the stormwater design as dictated by another Federal, State or local authority, it should be clearly documented in the submittal package for review and approval by NEORS D.

3.3 Conveyance of Peak Stormwater Flows

There are no NEORS D restrictions on the type of engineering methodology or software that the Applicant may use to quantify stormwater runoff from the site at this time. It is the responsibility of the Applicant to select an appropriate methodology suitable for the nature of the site. Supporting documentation, clearly stating the methodology, assumptions, parameters, and computations, must be submitted for review and approval. In addition, the basis for selecting critical parameters, i.e., runoff coefficients, curve number, time of concentration, etc., should also be documented and provided for review.

3.4 Maximum Release Rate

As detailed in **Section 3.1**, the District will not authorize increases in flow at combined sewer overflow (CSO) locations. Post-development peak flows shall not exceed existing condition peak flows, nor shall they result in an increase to CSO volumes and/or typical year activations. The preferred release rate is defined as the existing condition 6-month, 24-hour peak flow. As detailed in item 3 of Section 3.1 of this document, there may be cases where a more restrictive allowable discharge rate is required due to downstream capacity issues. In this situation, the Applicant will be required to incorporate a more restrictive release rate criterion into the stormwater management design to protect existing connections by avoiding the increased risk of basement flooding and/or any increase in CSO volume. The Applicant is encouraged to contact the NEORS D early in the project to determine whether the development site is located in a critical area of the combined sewer system that may be subject to stricter release rate limits.

3.5 Stormwater Storage Requirements

It is the responsibility of the Applicant to select an appropriate methodology for site design. Supporting documentation, clearly stating the methodology, assumptions, parameters, and computations, must be submitted for review and approval. Documentation with supporting calculations on the maximum allowable discharge used to determine the required storage volume must be clearly stated and provided for review and approval.

3.6 Stormwater Conveyance

There are no NEORS D restrictions on the type of engineering methodology or software that the Applicant may use to size the stormwater conveyance system at this time. It is the responsibility of the Applicant to select an appropriate methodology for site design. Supporting documentation, clearly stating the methodology, assumptions, parameters, and computations, must be submitted for review and approval.

3.7 Physical Connections

The following general conditions are required by the NEORS D for direct connections to its facilities (NEORS D-owned pipes, manholes, etc.).

Connections to Existing Laterals

- The existing laterals to be used shall be inspected by video camera, and a copy of the video shall be submitted to the NEORS D for review and approval prior to the connections being made. Upon review of the videotape by the NEORS D, if the existing lateral(s) needs to be cleaned and or repaired the work shall be performed at no cost to the NEORS D prior to the connections being made.
- The laterals shall be re-inspected after the cleaning and/or repair and a copy of the video shall be submitted to the NEORS D for review and approval prior to the connection being made. All laterals not approved for use shall be abandoned.
- The contractor shall provide a watertight connection to the existing lateral and encase the connection in concrete.

If an existing lateral cannot be used, a new lateral shall be installed and the contractor shall meet the following conditions. (lay permit)

- Provide pre-construction and post-construction video inspection of the interceptor showing footage measurement from either the upstream or the downstream manhole and extending a minimum of 20 feet past the connection point. The inspection video shall be submitted to the NEORS D for approval prior to the commencement of work.
- The connection shall be made through a properly sized cored hole. If the connection is to a reinforced concrete or vitrified clay pipe, then the lateral shall be concreted to the sewer using a manufactured boot that makes a watertight connection. If the connection is to a brick sewer, then the lateral shall be connected by wrapping a waterstop material, such as Volclay RX101 or equal, around the lateral with two (2) wraps minimum in accordance with the attached detail. If waterstop material is used, the annular space between the sewer wall and lateral shall be filled with hydraulic cement. Either type of connection shall then be encased in concrete. The contractor shall warrant that the connection will be watertight for a period of one year.

The following conditions apply to either the use of an existing lateral or the construction of a new lateral.

- The contractor shall warrant that the connection will be watertight for a period of one year.
- The contractor is responsible for any and all damage to the interceptor as determined by the NEORS D.
- The contractor shall prevent any debris from entering the sewer. Any debris entering the sewer shall be removed by the contractor.
- The contractor is responsible for obtaining any and all permits required for the work.
- A 72-hour notice shall be provided to Sewer System Maintenance and Operation (SSMO) at (216) 641-6000 to schedule a NEORS D inspector for the connection.

Appendix A. NEORS Rainfall Depth/Intensity Data

Table A-1. Rainfall Depth-Duration.

Tc (min)	Rainfall Depth (in)											
	2-Month	3-Month	4-Month	6-Month	9-Month	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
5	0.13	0.15	0.17	0.19	0.22	0.32	0.39	0.46	0.53	0.60	0.67	0.73
10	0.24	0.28	0.30	0.35	0.40	0.50	0.60	0.72	0.81	0.93	1.01	1.10
15	0.30	0.35	0.38	0.45	0.51	0.61	0.74	0.88	1.00	1.14	1.25	1.36
20	0.34	0.39	0.43	0.50	0.57	0.68	0.82	0.99	1.12	1.29	1.42	1.56
25	0.37	0.44	0.47	0.56	0.63	0.74	0.90	1.10	1.25	1.45	1.60	1.76
30	0.41	0.48	0.52	0.61	0.69	0.81	0.98	1.21	1.38	1.61	1.78	1.96
35	0.43	0.50	0.55	0.64	0.72	0.84	1.01	1.26	1.44	1.69	1.87	2.07
40	0.45	0.52	0.57	0.67	0.75	0.87	1.05	1.31	1.51	1.77	1.97	2.18
45	0.47	0.55	0.60	0.70	0.79	0.90	1.09	1.36	1.57	1.85	2.06	2.29
50	0.49	0.57	0.62	0.72	0.82	0.93	1.13	1.41	1.63	1.93	2.16	2.40
55	0.51	0.59	0.65	0.75	0.85	0.96	1.17	1.46	1.69	2.01	2.25	2.51
60	0.53	0.61	0.67	0.78	0.88	0.99	1.21	1.51	1.76	2.09	2.35	2.62
65	0.54	0.62	0.68	0.80	0.90	1.00	1.22	1.53	1.78	2.12	2.39	2.67
70	0.55	0.64	0.70	0.81	0.92	1.01	1.24	1.55	1.81	2.15	2.43	2.72
75	0.56	0.65	0.71	0.83	0.93	1.03	1.25	1.57	1.83	2.18	2.47	2.76
80	0.57	0.66	0.72	0.84	0.95	1.04	1.27	1.59	1.86	2.22	2.51	2.81
85	0.58	0.67	0.74	0.86	0.97	1.05	1.28	1.61	1.88	2.25	2.55	2.86
90	0.59	0.69	0.75	0.87	0.99	1.07	1.30	1.64	1.91	2.28	2.59	2.91
95	0.60	0.70	0.76	0.89	1.00	1.08	1.31	1.66	1.93	2.31	2.63	2.95
100	0.61	0.71	0.78	0.90	1.02	1.09	1.33	1.68	1.96	2.35	2.67	3.00
105	0.62	0.72	0.79	0.92	1.04	1.11	1.34	1.70	1.98	2.38	2.71	3.05
110	0.63	0.74	0.80	0.93	1.06	1.12	1.36	1.72	2.01	2.41	2.75	3.10
115	0.64	0.75	0.82	0.95	1.07	1.13	1.37	1.74	2.03	2.44	2.79	3.14
120	0.65	0.76	0.83	0.96	1.09	1.15	1.39	1.76	2.06	2.48	2.83	3.19
180	0.72	0.84	0.92	1.06	1.21	1.23	1.49	1.89	2.21	2.68	3.06	3.48
360	0.84	0.98	1.07	1.24	1.41	1.45	1.75	2.21	2.61	3.20	3.70	4.25
720	0.97	1.13	1.24	1.43	1.63	1.67	2.01	2.52	2.96	3.61	4.17	4.79
1440	1.12	1.31	1.43	1.65	1.88	1.95	2.33	2.92	3.40	4.09	4.66	5.28

Bolded numbers indicate values taken directly from rainfall atlas references. Rainfall estimates for 2-month through 9-month frequencies were taken from the Illinois State Water Survey's *Rainfall Frequency Atlas of the Midwest (Bulletin 71)* by Huff and Angel dated 1992. Rainfall estimates for the 1-year through 100-year frequencies are based on average estimates obtained from the NOAA Atlas 14 website (http://hdsc.nws.noaa.gov/hdsc/pfds/orb/oh_pfds.html). Two observation sites (Cleveland WSO AP 33-1657 and Cleveland Easterly 33-1651) were used to develop the average estimates shown in the table above. Non-bolded numbers were derived by means of linear interpretation between the two rainfall atlas references for estimates.

Table A-2. Rainfall Intensity-Duration.

Tc (min)	Rainfall Intensity (in/hr)											
	2-Month	3-Month	4-Month	6-Month	9-Month	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
5	1.56	1.80	2.04	2.28	2.64	3.84	4.62	5.52	6.30	7.20	7.98	8.70
10	1.44	1.68	1.80	2.10	2.40	3.00	3.60	4.29	4.83	5.55	6.03	6.57
15	1.20	1.40	1.52	1.80	2.04	2.44	2.94	3.52	3.98	4.54	4.98	5.44
20	1.01	1.18	1.28	1.51	1.71	2.03	2.45	2.97	3.37	3.88	4.27	4.68
25	0.90	1.05	1.14	1.34	1.51	1.78	2.15	2.63	3.00	3.48	3.84	4.22
30	0.82	0.96	1.04	1.22	1.38	1.61	1.95	2.41	2.76	3.21	3.56	3.92
35	0.74	0.86	0.93	1.09	1.24	1.43	1.74	2.15	2.47	2.89	3.21	3.55
40	0.68	0.79	0.86	1.00	1.13	1.30	1.58	1.96	2.26	2.65	2.95	3.27
45	0.63	0.73	0.79	0.93	1.05	1.19	1.45	1.81	2.09	2.46	2.75	3.05
50	0.59	0.68	0.74	0.87	0.98	1.11	1.35	1.69	1.96	2.31	2.59	2.88
55	0.56	0.64	0.70	0.82	0.93	1.04	1.27	1.59	1.85	2.19	2.46	2.74
60	0.53	0.61	0.67	0.78	0.88	0.99	1.21	1.51	1.76	2.09	2.35	2.62
65	0.50	0.57	0.63	0.73	0.83	0.92	1.13	1.41	1.64	1.95	2.20	2.46
70	0.47	0.54	0.60	0.69	0.78	0.87	1.06	1.33	1.55	1.84	2.08	2.33
75	0.45	0.52	0.57	0.66	0.75	0.82	1.00	1.26	1.46	1.75	1.97	2.21
80	0.43	0.50	0.54	0.63	0.71	0.78	0.95	1.20	1.39	1.66	1.88	2.11
85	0.41	0.47	0.52	0.60	0.68	0.74	0.91	1.14	1.33	1.59	1.80	2.02
90	0.39	0.46	0.50	0.58	0.66	0.71	0.87	1.09	1.27	1.52	1.72	1.94
95	0.38	0.44	0.48	0.56	0.63	0.68	0.83	1.05	1.22	1.46	1.66	1.86
100	0.37	0.43	0.47	0.54	0.61	0.66	0.80	1.01	1.17	1.41	1.60	1.80
105	0.35	0.41	0.45	0.52	0.59	0.63	0.77	0.97	1.13	1.36	1.55	1.74
110	0.34	0.40	0.44	0.51	0.58	0.61	0.74	0.94	1.09	1.31	1.50	1.69
115	0.33	0.39	0.43	0.49	0.56	0.59	0.72	0.91	1.06	1.27	1.45	1.64
120	0.33	0.38	0.42	0.48	0.55	0.57	0.70	0.88	1.03	1.24	1.41	1.60
180	0.24	0.28	0.31	0.35	0.40	0.41	0.50	0.63	0.74	0.89	1.02	1.16
360	0.14	0.16	0.18	0.21	0.24	0.24	0.29	0.37	0.43	0.53	0.62	0.71
720	0.08	0.09	0.10	0.12	0.14	0.14	0.17	0.21	0.25	0.30	0.35	0.40
1440	0.05	0.05	0.06	0.07	0.08	0.08	0.10	0.12	0.14	0.17	0.19	0.22