

The following is a list of amendments to the Residential Site Improvement Standards, N.J.A.C. 5:21, adopted in 2011. The Notice of Adoption of these changes appeared in the New Jersey Register on May 16, 2011. (Additions to the text of the rule are shown in boldface and underlined. Deletions are indicated in brackets.) The full text of the Residential Site Improvement Standards appears on the Department's website at:

http://www.state.nj.us/dca/divisions/codes/codreg/pdf_regs/njac_5_21.pdf

Summary of the 2011 Changes

- N.J.A.C. 5:21-4 Streets and Sidewalks: Figures 4.2 through 4.5 on pavement thickness are replaced with re-labeled figures to be consistent with the April 2010 edition of the *Asphalt Handbook* published by the New Jersey Society of Municipal Engineers. Hot asphalt mix is addressed through footnotes indicating the aggregate mix must be 9.5 mm. The corresponding minimum thickness of the surface course is 1.5 inches. The terminology in the notes is corrected. The notes to the figures also are revised to reference the updated source. Table 4.8 is revised to fix an error and make it consistent with the *Asphalt Handbook*.
- N.J.A.C. 5:21-6.2 Sanitary Sewers: New language was added to allow for another type of plastic pipe for sanitary sewers: corrugated polypropylene. This change expands pipe material options for designers. New language is added on the use of polypropylene pipe use.
- N.J.A.C. 5:21-7.3 and 7.4 Stormwater: New language was added to allow for the use of corrugated polypropylene pipe material for storm drains. This change expands pipe material options for designers. Modified language was adopted that adds the term "inlet" to N.J.A.C. 5:21-7.4. The added language makes it clear the standards apply to inlets.
- N.J.A.C. 5:21-8 Referenced Standards: Changes were adopted to update the referenced standards.

Streets and Parking:

Revised Figures 4.2 through 4.5 follow. The notes to Figures 4.2 through 4.5 also were revised and are the same for all for figures, so appear only once below as "NOTES."

NOTES:

¹Materials for the [asphalt concrete] **hot mix asphalt (HMA)** surface **course** shall be [Hot Mix Asphalt (HMA)] **HMA 9.5L64** or **HMA 9.5M64**, conforming to Section 401 of the New Jersey Department of Transportation's *Standard Specifications for Road and Bridge Construction*.

²Materials for the [asphalt concrete] **hot mix asphalt** base **course** shall be [Hot Mix Asphalt (HMA)] **HMA 19L64** or **HMA 19M64**, conforming to Section 401 of the New

Jersey Department of Transportation's *Standard Specifications for Road and Bridge Construction*.

³Thicknesses may have to be constructed in multiple lifts, based on equipment capabilities.

⁴The [granular] **dense graded aggregate** base shall [be dense graded aggregate conforming] **conform** to Section 302 of the New Jersey Department of Transportation's *Standard Specifications for Road and Bridge Construction*.

⁵All subgrades shall be considered "poor," unless the applicant proves otherwise through CBR testing or field evaluation of soil classification. Test results shall be reviewed by the municipal engineer.

⁶Subgrade compaction shall be approved by the municipal engineer.

⁷[Drawings are based on the following assumptions: A 20-year design period with staged construction is used. Base courses are designed to withstand the construction traffic anticipated during a 3-year construction period and have a residual life of 17 years at the end of the 3-year period. The entire pavement section, base course plus finish course, is designed to withstand the traffic loading for the remaining 17 years of the 20-year design period]. **Pavement thickness designs assume a staged construction process. The life of the road is 20 years. The pavement base course is designed to withstand construction traffic during an assumed 3-year construction period, throughout which time the hot asphalt surface course has not been placed. At the end of the construction period, the base course must have an expected remaining life of 17 years. During the time when the surface course is not in place, the base course must carry the entire imposed traffic loading.**

TABLE 4.8 PER-INCH STRUCTURAL VALUE FOR VARIOUS PAVING MATERIALS		
Layer Material	Structural Value Per-Inch Thickness	Minimum Thickness
Asphalt concrete surface course, Hot Mix Asphalt (HMA) 9.5L64 or HMA [19M64] 9.5M64 ¹	0.44	[2] 1.5 inches
Asphalt concrete base course [HMA 9.5L64] HMA 19L64 or HMA 19M64 ¹	0.44	3 inches
Dense graded aggregate base course ²	0.14	4 inches
Soil aggregate base course ²	0.11	4 inches
Subbase	0.08	6 inches
Notes: ¹ Materials for asphalt concrete surface and base courses shall conform to Section 401 of the New Jersey Department of Transportation's <i>Standard Specifications for Road and Bridge Construction</i> .		
² Materials for aggregate base shall conform to Sections 302 of the New Jersey Department of Transportation's <i>Standard Specifications for Road and Bridge Construction</i> .		

Sanitary Sewers:

5:21-6.2 System planning, design and placement

(a) – (b) (No change.)

(c) System design and placement shall comply with the following specifications:

1. – 5. (No change.)

6. Pipe materials used in the construction of gravity sanitary sewers shall be reinforced concrete, ductile iron, PVC, **corrugated polypropylene**, or clay pipe. All pipe and appurtenances shall comply with AWWA and ASTM standards referenced in this paragraph, which are incorporated herein by reference. Where PVC **or polypropylene** pipe is installed, a metallic locator tape shall also be installed adjacent to the pipe.

7.

i. (No change.)

ii. (1)-(3). (No change.)

(4) The pipe shall be installed as specified in ASTM D2321 and as specified in Figure 6.1. [When installing pipe in unstable soil or excessive ground water, a determination regarding special precautions, such as poured concrete slabs, shall be made by the municipal engineer or utility authority engineer.] **If used in unstable soil or areas of excessive ground water, the designer will take special precautions, such as poured concrete slabs.**

(5) (No change.)

iii.-iv (No change.)

v. Corrugated polypropylene sanitary sewer pipe shall have bell and spigot ends and O-ring rubber, gasket joints. Polypropylene pipe and fittings shall conform to ASTM F2764 or ASTM F2736, depending on size. Polypropylene pipe 12 to 60 inches shall meet or exceed the designated pipe stiffness of PS-46 when tested in accordance with ASTM D2412, *Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.*

- (1) **Plastic material shall conform to ASTM D4101, *Standard Specification for Polypropylene Injection and Extrusion Materials.***
- (2) **Joints shall conform to ASTM D3212, *Standard Specification for Joints for Drain and Sewer Plastic Pipe Using Flexible Elastomeric Seals.* Rubber ring gaskets must meet ASTM F477, *Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.***
- (3) **Installation shall be in accordance with ASTM 2321, *Standard Specification for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.* Generally, plastic pipe should not be used in conditions that expose it to constant hydrostatic pressure. If used in unstable soil or areas of excessive groundwater, the designer will take special precautions, such as poured concrete slabs.**
- (4) **Bedding, haunching, and initial backfill material shall be placed in six-inch lifts and be Class IA, IB, or II embedment material conforming with ASTM D2321, unless otherwise approved by the municipal or utility authority engineer. Soil aggregate I-8 conforming to Article 901.09, Table 901-2 of the New Jersey Department of Transportation's *Standard Specifications for Road and Bridge Construction* when compacted to 95 percent maximum dry density, and stone crushing conforming with AASHTO designation M43-88 (ASTM designation D448) size no. 8, 1/8 inch to 3/8 inch (2.36**

mm to 9.25 mm) meet this requirement. All material shall be clean and free flowing, and shall meet all ASTM C33 specifications for quality and soundness.

7.– 12. (No change.)

Stormwater:

5:21-7.3 Design of Runoff Collection Systems

(a) – (g) (No change.)

(h) Materials used in the construction of storm sewers shall be constructed of reinforced concrete, ductile iron, [or] corrugated polyethylene, **or corrugated polypropylene** or, when approved by the municipal engineer, corrugated metal. The most cost-effective materials shall be permitted that conform to local site conditions and reflect the relevant operations, maintenance, and system character of the municipal stormwater system. In unpaved areas, design engineers shall have the option to use inline drains and catch basins made from polyvinylchloride (PVC). Installation shall conform to manufacturers' specifications. Specifications referred to, such as ASTM or AWWA, shall be the latest revision in effect at the time of application.

1.-2. (No change.)

3. Corrugated polyethylene pipe shall conform to AASHTO M252 for 3 through 10 inches, and AASHTO M294 for size 12 inches and larger. [The use of corrugated polyethylene pipe greater than 36 inches in diameter shall be subject to approval by the municipal engineer.] All pipes greater than 12 inches in diameter shall be Type S, unless conditions dictate otherwise. Materials shall conform to ASTM D3350, *Standard Specification for Polyethylene Plastic Pipe and Fittings Materials*. Pipe joints and fittings shall be compatible with the pipe material and shall conform to the same standards and specifications as the pipe material. Pipe couplers shall not cover less than one full corrugation on each section of pipe. Installation shall be in accordance with ASTM D2321, *Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications*. Backfill material shall be placed in six-inch lifts and compacted to 95 percent minimum dry density, per AASHTO T99. In areas of high ground water tables, design engineers shall check for flotation.

4. Corrugated polypropylene pipe shall conform to ASTM D4101 *Standard Specification for Polypropylene Injection and Extrusion Materials*. Polypropylene pipe and fittings shall conform to ASTM F2764 or ASTM F2736, depending on size. Pipe joints and fittings shall be compatible with this material and conform to the same standard.

Installation shall be in accordance to ASTM D2321, *Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications*. Backfill material shall be placed in six-inch lifts and compacted to 95 percent minimum dry density per AASHTO T99. In areas of high ground water tables, design engineers shall check for flotation.

[4.] **5.** (No change in text.)

(i) – (j) (No change.)

5:21-7.4 Inlets, Catch Basins, Manholes, and Outlets

(a) – (f) (No change.)

(g) If precast manholes **and inlets** are used, the top riser section shall terminate less than one foot below the finished grade and the manhole cover **or inlet grate** shall be flush with the finished grade.

(h) – (k) (No change.)

Referenced Standards:

5:21-8.1 Referenced standards

The following is a list of the standards referenced in this chapter. The standards are listed by the promulgating agency of the standard, the standard identification, the edition of the standard, the title of the standard, and the section(s) of this code that references the standard. The standards listed in this chapter are not adopted or to be used in their entirety unless the rules specifically so state. The use of the standards included in this chapter is limited to those specific areas of the standard for which this chapter directs the user to the standard.

1. American Association of State Highway and Transportation Officials (AASHTO), Suite 249, 444 North Capitol Street, N.W., Washington, D.C. 20001. Tel. (202) 624-5800 or (800) 231-3475.

Standard Reference number	Title	Referenced in N.J.A.C. section number
M33-93	Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)	Figure 4.1 (Concrete Vertical Curb)
M43-88	Standard Specification for Sizes of Aggregate for Road and Bridge Construction	Figure 6.1 5:21-6.2(c)6v(4)
M114-91	Building Brick (Solid Masonry Units Made from Clay or Shale)	5:21-6.2(c)11.vii(1)
M213-92	Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)	Figure 4.1 (Concrete Vertical Curb)
M252-07	Standard Specification for Corrugated Drainage Pipe	5:21-7.3(h)3
M294-07	Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm Diameter	5:21-7.3(h)3
T99-94	Standard Method of Test for the Moisture-Density Relations of Soils Using a 5.5-lb. (2.5 kg) Rammer and a 12-in. (305 mm) Drop	5:21-7.3(d)3 5:21-7.3(d)4
2001 Edition	A Policy on Geometric Design of Highways and Streets	5:21-4.19(b)6 5:21-4.20(a) 5:21-4.20(b)

AASHTO continued		
Standard Reference number	Title	Referenced in N.J.A.C. section number
1999 Edition	AASHTO Guide for the Development of Bicycle Facilities	5:21-4.2(e) Table 4.3 5:21-4.18(b)
1993 Edition	Guide for Design of Pavement Structures	Figure 4.2 Figure 4.3 Figure 4.4 Figure 4.5 Table 4.9

3. American Society for Testing and Materials (ASTM), 100 Barr Harbor, West Conshohocken, Pennsylvania 19428. Tel. (610) 832-9500.

Standard Reference number	Title	Referenced in N.J.A.C. section number
A48-92	Standard Specification for Gray Iron Castings	5:21-6.2(c)11v 5:21-7.4(f)
A536-84	Standard Specification for Ductile Iron Castings	5:21-6.2(c)11v

N.J.A.C. 5:21-8.1

ASTM continued		
Standard Reference number	Title	Referenced in N.J.A.C. section number
C33-93	Standard Specification for Concrete Aggregates	Figure 6.1 5:21-6.2(c)6v(4)
C76-90	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe	5:21-6.2(c)6i 5:21-7.3(d)1i
C150-92	Standard Specification for Portland Cement	5:21-6.2(c)11vii(2)
C443-85a (1990)	Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets	5:21-6.2(c)11.iv 5:21-7.3(d)1iii
C478-90b	Standard Specification for Precast Reinforced Concrete Manhole Sections	5:21-6.2(c)11iv 5:21-7.4(d)
C507-90	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe	5:21-7.3(d)1ii
C700-91	Standard Specification for Vitriified Clay Pipe, Extra Strength, Standard Strength, and Perforated	5:21-6.2(c)6iv
C877-91	Standard Specification for External Sealing Bands for Noncircular Concrete Sewer, Storm Drain, and Culvert Pipe	5:21-7.3(d)1iv
C923-89	Standard Specification for Resilient Connectors between	5:21-6.2(c)11vi 5:21-7.4(d)

	Reinforced Concrete Manhole Structures, Pipes, and Laterals	
ASTM continued		
Standard Reference number	Title	Referenced in N.J.A.C. section number
D448-86	Standard Classification for Sizes of Aggregate for Road and Bridge Construction	Figure 6.1 5:21-6.2(c)6.v(4)
D1784-90	Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds	5:21-6.2(c)6ii(1)
D1785-91	Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120	5:21-6.2(c)8 Table 7.6
D2241-89	Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)	5:21-6.2(c)8 Table 7.6
D2321-[05] 09	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications	5:21-6.2(c)6ii(2) 5:21-6.2(c)6ii(4) 5:21-6.2(c)6ii(5) 5:21-6.2(c)6v(3) 5:21-7.3(h)3 5:21-7.3(h)4
D2412-10	Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading	5:21-6.2(c)6.v
D2444-92	Standard Test Method for Determination of the Impact	5:21-6.2(c)6ii(2)

	Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)	
D3034-89	Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings	5:21-6.2(c)6ii
ASTM continued		
Standard Reference number	Title	Referenced in N.J.A.C. section number
D3139-89	Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals	5:21-5.3(j)3
D3212-[92] 07	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals	5:21-6.2(c)6ii(3) 5:21-6.2(c)6v(2)
D3350-05	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials	5:21-7.3(h)3
D4101-10	Standard Specification for Polypropylene Injection and Extrusion Materials	5:21-6.2(c)6v(1) 5:21-7.3(h)4
F477-[90] 10	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe	5:21-6.2(c)6ii 5:21-6.2(c)6v(2)
F679-89	Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings	5:21-6.2(c)6ii
F789-89	Standard Specification for Type PS-46 and Type PS-115 Poly(Vinyl Chloride) (PVC) Plastic Gravity-Flow Sewer Pipe	5:21-6.2(c)6ii

	and Fittings	
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ASTM continued		
Standard Reference number	Title	Referenced in N.J.A.C. section number
F794-91	Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter	5:21-6.2(c)6ii
F949-92	Standard Specification for Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings	5:21-6.2(c)6ii
F2736-10	Standard Specification for 6 to 60 in. (152 to 762mm) Polypropylene (PP) Corrugated Single Wall and Double Wall Pipe	5:21-6.2(c)6v 5:21-7.3(h)4
F2764-10	Standard Specification for 30 to 60 in. (750 to 1500 mm) Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications	5:21-6.2(c)6v 5:21-7.3(h)4

12. New Jersey Department of Transportation (NJDOT), PO Box 600, 1035 Parkway Avenue, Trenton, New Jersey 08625-0600. Tel. (609) 530-2000.

Standard Reference number	Title	Referenced in N.J.A.C. section number
[November 2001] 2007	Standard Specifications for Road and Bridge Construction	5:21-4.17(b) Figure 4.2 Figure 4.3 Figure 4.4 Figure 4.5 Table 4.8 5:21-6.2(c)6ii(5) 5:21-7.3(h)1v 5:21-7.4(a) 5:21-6.2(c)6.v(4)
November 2001	Roadway Design Manual	5:21-7.2(c)2ii(2) 5:21-7.2(c)3 Figure 7.1 Figure 7.2
April 1996	Bicycle-Compatible Roadways and Bikeways Planning Design Guidelines	5:21-4.18(b)1 5:21-7.4(b)1

13. New Jersey Society of Municipal Engineers (NJSME), 196 West State Street, Trenton, New Jersey 08608. Tel. (609) 393-0102.

Standard Reference number	Title	Referenced in N.J.A.C. section number
[Second Edition November 1991] Fourth Edition April 2010	Asphalt Handbook for County and Municipal Engineers	Table 4.7 Table 4.8 Figures 4.2 through 4.5
