

(g) These rules are intended to ensure the public health, safety, and welfare insofar as they are affected by site improvement work, and shall be so construed.

Administrative correction.

See: 29 N.J.R. 1296(a).

Amended by R.1998 d.399, effective August 3, 1998.

See: 30 N.J.R. 1660(a), 30 N.J.R. 2861(a).

In (b), inserted "Except as otherwise required by rules or other permit requirements of the Department of Environmental Protection regarding storm water management, the" at the beginning of the second sentence.

Amended by R.2000 d.480, effective December 4, 2000 (operative June 3, 2001).

See: 32 N.J.R. 2670(b), 32 N.J.R. 4277(a).

In (f), inserted "but not more than four".

New Jersey State Library

Case Notes

Department of Community Affairs' insignificant deviations from Model Subdivision and Site Plan Ordinance to be adopted pursuant to Residential Site Improvement Standards Act were within its incidental powers. *New Jersey League of Municipalities v. Department of Community Affairs*, 158 N.J. 211, 729 A.2d 21 (N.J. 1999).

Storm water management regulation promulgated by Department of Community Affairs (DCA), which conflicted with storm water management regulation promulgated by the Department of Environmental Protection, was invalid. *New Jersey State League of Municipalities v. Department of Community Affairs*, 310 N.J.Super. 224, 708 A.2d 708 (A.D.1998).

5:21-1.6 Development over limestone geologic formations

(a) A number of areas in northern New Jersey are underlain by solution-prone carbonate rocks (limestone, dolomite, and marble) which pose unusual and complex problems in relation to development activities. As such, these areas are quite sensitive to development improvements and may require special investigative, design, and construction techniques to protect both the eventual property owner as well as those in the immediate surroundings. It is not the intention of these site improvement standards to address such unusual subsurface conditions or to attempt to supersede definitive local ordinances addressing such concerns.

(b) Any proposed revisions to the standards established by the Site Improvement Advisory Board may be submitted for Board consideration by any municipality shown on the list set forth in the Appendix to this subchapter, incorporated herein by reference, or by any municipality where those materials are found to be present. Proposed revisions to the within standards shall be reviewed by the technical committee and recommended to the Site Improvement Advisory Board for approval.

Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).

See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).

In (b), substituted a reference to Board consideration for a reference to consideration, and substituted a reference to the Appendix for a reference to Appendix 1-A.

5:21-1.7 Administration and enforcement

(a) Wherever a municipality has enacted an ordinance which requires subdivision and/or site plan approval pursuant to N.J.S.A. 40:55D-37, then the planning board of such municipality shall ensure that the plans and plats for any residential development subject to review under such ordinance comply with the requirements of these rules before issuing a preliminary or final approval.

(b) Whenever a zoning board of adjustment created pursuant to N.J.S.A. 40:55D-69 grants subdivision or site plan approval pursuant to the provisions of N.J.S.A. 40:55D-76(b), then that board shall ensure that any plans and plats comply with the requirements of these rules before issuing a preliminary or final approval.

Administrative correction.
See: 29 N.J.R. 1296(a).

5:21-1.8 Approval

(a) All materials, equipment, and devices required to be approved by a board or official pursuant to N.J.A.C. 5:21-1.7 shall be constructed and installed in accordance with such approval.

(b) The standards referenced in these rules and listed in N.J.A.C. 5:21-8 shall be considered a part of the requirements of these rules to the prescribed extent of each reference. Where differences occur between provisions of these rules and referenced standards, the provisions of these rules shall apply, except as provided in N.J.A.C. 5:21-1.5(e).

Administrative correction.

See: 29 N.J.R. 1296(a).

Administrative change.

See: 33 N.J.R. 691(b).

5:21-1.9 Violations

(a) Where any site improvement is required to meet any part of these rules pursuant to the requirements of any ordinance adopted pursuant to N.J.S.A. 40:55D-37, Subdivision and Site Plan Review and Approval, or N.J.S.A. 40:55D-62, Zoning, then any failure of any person to construct such site improvements in accordance with the requirements of these rules shall constitute a violation of the Municipal Land Use Law (N.J.S.A. 40:55D-1 et seq.). Any person responsible for such failure shall be subject to such penalties and enforcement procedures as are provided by that law and by any valid ordinance adopted pursuant thereto which may be initiated by the administrative officer designated by the ordinance (N.J.S.A. 40:55D-18).

(b) In addition to any remedy provided by (a) above, any failure to comply with the requirements of these rules, where compliance is required, shall constitute a failure to meet the conditions of the construction permit and/or certificate of occupancy issued pursuant to the State Uniform Construction Code Act (N.J.S.A. 52:27D-119 et seq.). Notification from the approving authority or from the municipal engineer acting on behalf of the approving authority that any of the requirements of these rules that are conditions of the Construction Permit and/or Certificate of Occupancy have not been met shall subject any person responsible for such failure to the remedies provided under the State Uniform Construction Code Act.

Administrative correction.

See: 29 N.J.R. 1296(a).

5:21-1.10 Operative date

(a) These rules shall be operative on June 3, 1997. The requirements of any municipal ordinances or rules adopted by any instrumentality deriving authority therefrom in effect on that date which establish rules or requirements for any matter within the scope of these regulations shall be deemed to have been repealed and of no further force or effect.

(b) Any project for which preliminary subdivision or site plan approval has been given prior to June 3, 1997 shall continue to be subject to the municipal development ordinance under which it was approved.

(c) Any project for which application is made after June 3, 1997 shall be governed by these rules.

(d) These rules shall not be construed as requiring the revision or amendment of any application for site plan or subdivision approval which is pending on June 3, 1997. Such pending applications may, however, be amended provided that any such amendments shall meet the requirements of these rules.

1. For any project for which a completed application has been submitted on or before the operative date of these rules, but which has not yet received preliminary approval, the applicant shall have the option of amending the application in its entirety to comply with these rules or of requesting that the municipality continue to review the application under the municipal ordinances in effect at the time of application.

5:21-1.11 Validity

If any provision of these rules or the application thereof to any person or circumstances is held invalid, the invalidity shall not affect other provisions or applications of the rules which can be given effect, and to this end the provisions of the rules are severable.

APPENDIX

**NEW JERSEY MUNICIPALITIES
LIMESTONE AREAS**

<u>County</u>		<u>Municipality</u>
Hunterdon	Alexandria Township Bethlehem Township Bloomsbury Borough Califon Borough Clinton Township Clinton Town	Hampton Borough Holland Township Lebanon Township Tewksbury Township Union Township
Morris	Chester Township Jefferson Township Mendham Township Mendham Borough Minehill Township Montville Township Morris Township	Mount Olive Township Mt. Arlington Borough Randolph Township Rockaway Township Roxbury Township Washington Township Wharton Borough
Passaic	Bloomington Borough Ringwood Township	Wanaque Borough West Milford Township
Somerset	Bedminster Township Far Hills Borough	Peapack/Gladstone Borough
Sussex	Andover Township Andover Borough Branchville Borough Byram Township Frankford Township Franklin Borough Fredon Township Green Township Hamburg Borough Hampton Township Hardyston Township	Lafayette Township Montague Township Newton Town Ogdensburg Borough Sandyston Township Sparta Township Stillwater Township Vernon Township Walpack Township Wantage Township
Warren	Allamuchy Township Alpha Borough Belvidere Township Blairstown Township	Independence Township Knowlton Township Liberty Township Lopatcong Township

<u>County</u>	
	Franklin Township Frelinghuysen Township Greenwich Township Hackettstown Town Hardwick Township Harmony Township Hope Township

<u>Municipality</u>
Mansfield Township Oxford Township Phillipsburg Township Pohatcong Township Washington Township Washington Borough White Township

† Listing established by the Department of Environmental Protection, Division of Science and Research (April 1995)

Administrative correction.
See: 29 N.J.R. 2816(a).

SUBCHAPTER 2. APPLICATION AND REVIEW PROCEDURES

5:21-2.1 Application and review procedures

The procedure for municipal review and action on applications for residential subdivisions and/or site plans shall not be affected by anything contained in these rules, and shall continue to be as set forth in the Municipal Land Use Law (MLUL), N.J.S.A. 40:55D-1 et seq. and in municipal ordinances adopted pursuant to the MLUL. This review shall include a review for compliance with these rules.

5:21-2.2 Application form and checklist (Reserved)

SUBCHAPTER 3. EXCEPTIONS, WAIVERS, AND SPECIAL AREA STANDARDS

5:21-3.1 Exceptions

(a) The municipal approving authority may grant such de minimis exceptions from the requirements of the site improvement standards as may be reasonable and within the general purpose and intent of the standards if the literal enforcement of one or more provisions of the standards is impracticable or will exact undue hardship because of peculiar conditions pertaining to the development in question.

(b) An application for an exception pursuant to this section shall be filed in writing with the municipal approving authority and shall include:

1. A statement of the requirements of the standards from which an exception is sought;
2. A statement of the manner by which strict compliance with said provisions would result in practical difficulties; and
3. A statement of the nature and extent of such practical difficulties.

Amended by R.2003 d.187, effective May 5, 2003.

See: 34 N.J.R. 4248(a), 35 N.J.R. 1939(c).

Rewrote the section.

Amended by R.2003 d.216, effective May 19, 2003.

See: 35 N.J.R. 16(a), 35 N.J.R. 2203(a).

Rewrote the section.

Case Notes

Zoning permit may be required pursuant to Municipal Land Use Law but not Uniform Construction Code Act. *Acqua Development Corp. v. Township of Holmdel*, 287 N.J.Super. 578, 671 A.2d 636 (L.1995).

Compliance with former N.J.A.C. 5:23-2.5 requirements for permit to non-contractor owner to perform repairs. *Winn v. Margate City*, 204 N.J.Super. 114, 497 A.2d 928 (Law Div.1985).

Requirement of architect's or engineer's seal on plans does not broaden scope of engineering practice into architecture; engineer's plan limitations. *State Board of Architects v. North*, 197 N.J.Super. 349, 484 A.2d 1297 (Ch.Div.1984).

Prior-approval rule discussion; zoning matters involved in construction must be resolved before issuance of permits. *Bell v. Twp. of Bass River*, 196 N.J.Super. 304, 482 A.2d 208 (Law Div.1984).

Construction permit application and fee requirements under former N.J.A.C. 5:23-2.5; municipal requirement for payment of property taxes before issuance of permit invalid as preempted by legislation. *Home Builders League of South Jersey, Inc. v. Evesham Twp.*, 174 N.J.Super. 252, 416 A.2d 81 (Law Div.1980).

Construction permit applicant must provide assurances that prior approvals obtained. *Riggins v. Pinelands Commission*, 8 N.J.A.R. 441 (1985).

5:23-2.16 Construction permits—procedure

(a) Action on application: The construction official or the appropriate subcode official in the case of construction involving only one trade or subcode, shall examine or cause to be examined all applications for permits and amendments thereto, and approve or deny in whole or in part the application, within 20 business days. If the application is denied in whole or in part, the enforcing agency shall set forth the reasons therefor in writing. If an enforcing agency fails to grant, in whole or in part, or deny an application within 20 business days, such failure shall be deemed a denial of the application for purposes of an appeal to the Construction Board of Appeals, unless such period of time has been extended with the consent of the applicant. Whenever plans have been rejected and are thereafter revised and resubmitted, the revised plans shall be released if the deficiencies that were stated as grounds for rejection have been corrected and code compliance has been demonstrated. In that case, a written notice of release shall be given to the applicant not later than seven business days after the resubmission of the revised plans. When the grounds for rejection have not been corrected or when code compliance has not been demonstrated, a written notice of rejection stating the grounds for rejection shall be given to the applicant not later than seven business days after the resubmission of the revised plans.

1. Exception: Where the Department or local enforcing agency has released a prototype or master plan which is to be used for the work covered by the permit application, a permit shall be issued within three business days.

(b) Suspension of permit: Any permit issued shall become invalid if the authorized work is not commenced within 12 months after issuance of the permit, or if the authorized work is suspended or abandoned for a period of six months after the time of commencing the work.

(c) Previous approvals: The rules shall not require changes in the plans, construction or designated use of a building for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which shall have been actively prosecuted within six months after the operative date of the rules and completed with dispatch. This six months provision shall also apply to subsequent amendments.

(d) Signature to permit: The construction official shall attach his signature to every permit; or he may authorize a subordinate to affix such signature thereto. By doing so he shall certify that each responsible subcode official shall have reviewed and approved the application for permit.

(e) Released plans: The construction official shall stamp or endorse in writing both sets of plans released, and one set of such released plans shall be retained and the other set shall be kept at the building site, open to inspection of the construction official or the construction official's authorized representative at all reasonable times.

(f) Revocation of permits: The construction official may revoke a permit or approval issued under the provisions of this code in case of any false statement or misrepresentation of fact in the application or on the plans on which the permit or approval was based.

(g) Approval of part: The construction official shall issue a permit for the construction of foundations or any other part of a building or structure before the entire plans and specifications for the whole building or structure have been submitted, provided adequate information and detailed statements have been filed complying with all the pertinent requirements of this code. The holder of such permit for the foundations or other part of a building or structure shall proceed at his own risk with the building operation and without assurance that a permit for the entire structure will be granted.

(h) Posting of permit: A true copy of the construction permit shall be kept on the site of operations open to inspection during the entire time of prosecution of the work and until the completion of the same.

(i) Notice of start: At least 24 hours notice of start of work under a construction permit shall be given to the construction official.

(j) Conditions of permit: The issuance of the construction permit shall be conditioned upon the following:

1. The payment of appropriate fees;

2. That work will conform to the requirements of the code applicable to the work for which the permit has been issued including prior approvals and any approved amendments thereto;

3. That the permit is a license to proceed with the work and shall not be construed as authority to violate, cancel or set aside any of the provisions of the regulations;

4. That the owner, his agent, contractor or other employees will assist the enforcing agency in its inspection work, if requested.

(k) Upon request of the local health department, the construction official shall supply copies of permits issued for lead abatement work.

Amended by R.1993 d.420, effective September 7, 1993.

See: 25 N.J.R. 2158(a), 25 N.J.R. 4072(a).

Amended by R.1995 d.381, effective July 17, 1995.

See: 27 N.J.R. 970(a), 27 N.J.R. 2715(a).

Amended by R.1995 d.544, effective October 16, 1995.

See: 27 N.J.R. 2827(a), 27 N.J.R. 3933(a).

Amended by R.1997 d.409, effective October 6, 1997.

See: 29 N.J.R. 2736(a), 29 N.J.R. 4281(a).

Amended by R.1998 d.36, effective January 5, 1998.

See: 29 N.J.R. 4214(a), 30 N.J.R. 193(a).

Deleted (k); recodified existing (l) as (k).

Amended by R.2003 d.216, effective May 19, 2003.

See: 35 N.J.R. 16(a), 35 N.J.R. 2203(a).

Rewrote the section.

Case Notes

Construction permit could be voided by developer suspending construction for period of more than six months. *Palatine I v. Planning Bd. of Tp. of Montville*, 133 N.J. 546, 628 A.2d 321 (1993).

5:23-2.17 Demolition or removal of structures; abandoned wells

(a) Service connections: Before a structure can be demolished or removed, the owner or agent shall notify all utilities having service connections within the structure, such as water, electric, gas, sewer and other connections. A permit to demolish or remove a structure shall not be issued until releases are obtained from all utilities that provided service to the property, stating that their respective service connections and appurtenant equipment, such as meters and regulators, have been removed or sealed or plugged in a safe manner.

(b) Abandoned wells:

1. In the event that there is a well on the property that has been abandoned, or that will be abandoned in conjunction with the proposed demolition, a permit to demolish or remove a structure on that property shall not be issued until a certification has been obtained from a well driller licensed by the Department of Environmental Protection indicating that the well has been sealed in accordance with N.J.A.C. 7:9-9. If such certification is not presented within 15 days of the application for the permit, the construction official shall give notice of the absence of such certification to the Bureau of Water Allocation, Department of Environmental Protection, PO Box 029, Trenton, NJ 08625-0029.

2. Notice shall also be given by the construction official to the Bureau of Water Allocation in the event of any demolition activity found to have been undertaken without a permit at a building or premises currently or previously served by a well and in any other case in which no permit application for demolition has been made but the construction official becomes aware that a well has been, or is about to be, abandoned without having been sealed by a licensed well driller.

(c) Notice to adjoining owners: Only when written notice has been given by the applicant to the owners of adjoining lots and to the owners of wired or other facilities, of which the temporary removal may be necessitated by the proposed work, shall a permit be granted for the demolition or removal of a building or structure.

(d) Lot regulation: Whenever a structure is demolished or removed, the premises shall be maintained free from all unsafe or hazardous conditions by the proper regulation of the lot, restoration of established grades and the erection of the necessary retaining walls and fences in accordance with the provisions of the appropriate subcodes.

(e) Asbestos abatement: Before a structure can be demolished or removed, the owner or agent shall document that the requirements of USEPA 40 CFR 61 subpart M have been or shall be met. A permit to demolish or remove the structure shall not be issued until the owner or agent notifies the enforcing agency that all friable asbestos or asbestos-containing material that will become friable during demolition or removal has been or will be properly abated prior to demolition.

Amended by R.1993 d.198, effective June 7, 1993.

See: 24 N.J.R. 1422(a), 25 N.J.R. 2519(b).

Amended by R.1993 d.420, effective September 7, 1993.

See: 25 N.J.R. 2158(a), 25 N.J.R. 4072(a).

Amended by R.1997 d.409, effective October 6, 1997.

See: 29 N.J.R. 2736(a), 29 N.J.R. 4281(a).

Amended by R.1998 d.36, effective January 5, 1998.

See: 29 N.J.R. 4214(a), 30 N.J.R. 193(a).

Added (b); and recodified existing (b) through (d) as (c) through (e).

5:23-2.17A Minor work

(a) The issuance of a permit shall not be required before minor work may proceed. The owner, or an architect or contractor acting on behalf of the owner, shall, however, provide notice of the work to the enforcing agency before work begins.

(b) Notice of work; application:

1. Notice of minor work shall be a personal or telephoned oral notice before work commences. This oral notice shall be provided to the enforcing agency between 9:00 A.M. and 5:00 P.M., Monday through Friday, except holidays. In those cases where the local enforcing agency is not open and available to receive notice at those times then notice shall be provided to the municipal clerk;

2. In addition to oral notice, the owner or his agent shall be required to file an application. The completed application with the fee shall be delivered in person or by mail to the enforcing agency, within five business days from the date of the oral notice.

(c) Minor work:

1. Minor work shall mean and include:

i. The construction or total replacement of any porch or stoop which does not provide structural support for any roof or portion of a building;

ii. Renovation or alteration work in an existing one or two-family dwelling, provided that no primary structural members are altered in any way, and further provided that the work does not constitute reconstruction; and

iii. The removal and replacement of more than 25 percent of the exterior siding of a one or two-family dwelling;

2. Minor work shall also mean and include the replacement of any existing plumbing piping work with new and approved material of like capacity; the installation of drinking fountains and condensate drains in existing structures; the replacement of existing low pressure hot water heaters with new ones of like capacity; and the new installation of lavatories, water closets, tubs, showers, washers or dishwashers, and garbage disposers in existing space of one and two-family dwellings where the new installation of additional fixtures can be accommodated with no increase in the size of the water distribution system, water service or house drain;

3. Minor work shall also mean and include new electrical work incidental to the installation of air conditioning, equipment, clothes dryers, and ranges or ovens in one and two-family dwellings; the installation of five or less 110 or 220 volt receptacles or fixtures where existing circuits and/or available space circuits and service are adequate to support the load; the replacement of existing wiring with new wiring of the same capacity provided that the new wiring shall be of a type approved for the use by the code;

4. Minor work shall also mean and include the installation of any fire detection or suppression device in any one- or two-family dwelling; installation of a radon mitigation system in an existing detached one or two-family dwelling; the installation of a burglar alarm or security system in any structure and the installation of a low voltage communication system in any structure other than a one- or two-family dwelling;

5. Minor work shall not include lead abatement.

6. Minor work on elevator devices shall also mean and include work as outlined below and not involving any structural modification to a building and as scoped within

the applicable sections of Part XII of ASME A17.1 referenced in the building subcode:

i. Alteration to hoistway enclosures (ASME A17.1 Part XII, Rule 1201.1a, 1203.1a);

ii. Alteration to construction at top of hoistways (1201.1c) and at bottom of hoistways (1201.1d);

iii. Alteration to hoistways which affects control of smoke and hot gases (1201.1e);

iv. Construction and alteration of machine room and machinery spaces (1201.2, 1203.1b);

v. Installation and alteration of electrical equipment, wiring, pipes and ducts in hoistway and machine rooms (1201.3, 1203.1c);

vi. Alteration to pits (1201.6, 1203.1f);

vii. Alteration to bottom and top car counterweight clearances and runbys (1201.7, 1203.1g, 2508);

viii. Alteration to horizontal car and counterweight clearances (1201.8, 1203.1h);

ix. Additions, alterations or replacements of hoistway entrances (1201.10, 1203.1j);

x. Installation or alteration of hoistway door locking devices, access switches, parking devices and unlocking devices (1201.11, 1203.1k);

xi. Alteration or addition of power operation of hoistway doors (1201.12, 1203.1m);

xii. Alteration of spring buffers and bumpers (1202.2, 1203.2b);

xiii. Alteration of counterweights (1202.3; 1203.1d and 1203.2c);

xiv. Alteration of car frames and platforms (1202.4a, 1203.2d);

xv. Alteration of car enclosures, car doors, gates, and illumination of cars (1202.5 except installation of new cars, 1203.2e);

xvi. Use of freight elevators to carry passengers, hydraulic elevators only (1203.2j);

xvii. Relocation of power unit (1203.3f);

xviii. Replacement of tanks (1203.6);

xix. Addition or alteration of top-of-car operating devices (1202.12a, 1203.8a);

xx. Addition or alteration or car-leveling or truck-zoning devices (1202.12b, 1203.8b);

xxi. Alteration of anti-creep leveling devices (1203.8c);

xxii. Change of power supply, hydraulic elevators only (1203.8d);

xxiii. Addition of rope equalizers (1202.14c, 1203.9c);

xxiv. Addition of auxiliary rope-fastening devices (1202.14d);

xxv. Alteration of manual operating devices which are provided to manually operate elevators in case of power failure;

xxvi. Alteration of handrails on escalators and moving walks (1207.6, 1208.6);

xxvii. Alteration or addition of lighting and access to interiors and related electrical work (1207.14, 1208.14); and

xxviii. Alteration of entrances or egresses on escalators (1207.15).

(d) Inspection of minor work:

1. Inspections shall be required for minor work and the enforcing agency shall inspect any such work within 30 days of the request for inspection;

2. The construction official shall issue a certificate of approval stating that the work performed under a Minor Work Permit substantially complies with the UCC. The inspection shall be based upon what is visible at the time of said inspection and the certificate of approval shall so indicate.

Amended by R.1991 d.509, effective October 7, 1991.

See: 23 N.J.R. 2236(a), 23 N.J.R. 3001(a).

Stylistic changes.

Amended by R.1993 d.580, effective November 15, 1993.

See: 25 N.J.R. 3692(a), 25 N.J.R. 5145(c).

Amended by R.1993 d.663, effective December 20, 1993.

See: 25 N.J.R. 4546(a), 25 N.J.R. 5927(a).

Amended by R.1995 d.381, effective July 17, 1995.

See: 27 N.J.R. 970(a), 27 N.J.R. 2715(a).

Amended by R.1995 d.476, effective September 5, 1995 (operative January 1, 1996).

See: 27 N.J.R. 1846(a), 27 N.J.R. 3325(b).

Rewrote (d).

Amended by R.1995 d.564, effective November 6, 1995 (operative March 1, 1996).

See: 27 N.J.R. 2829(a), 27 N.J.R. 4281(b).

N.J.A.C. 5:23-2.17A(c)6xxv through xxvii, as added by R.1995 d.564, operative May 1, 1996.

Amended by R.1998 d.28, effective January 5, 1998.

See: 29 N.J.R. 3603(a), 30 N.J.R. 129(a).

Amended (c)1i through (c)1iii.

Amended by R.2000 d.166, effective April 17, 2000.

See: 31 N.J.R. 4151(a), 32 N.J.R. 1376(a).

In (c)6, inserted a reference to 2508 in vii, inserted a new xxv, and recodified former xxv through xxvii as xxvi through xxviii.

Amended by R.2003 d.473, effective December 15, 2003.

See: 35 N.J.R. 2421(a), 35 N.J.R. 5543(a).

In (c)6, substituted "modification" for "alteration".

5:23-2.18 Inspections

(a) Preliminary inspection: Before issuing a permit, the construction official and appropriate subcode official shall, where necessary, examine or cause to be examined all buildings, structures and sites for which an application has been filed for a construction permit.

(b) Inspections during the progress of work: The construction official and appropriate subcode officials shall carry out periodic inspections during the progress of work to ensure that work inspected conforms to the requirements of the code.

1. Inspections of one-and two-family dwellings for which construction must cease until the inspection is made shall be limited to the following:

i. The bottom of footing trenches before placement of footings, except that in the case of pile foundations, inspections shall be made in accordance with the requirements of the building subcode;

ii. Foundations and all walls up to grade level prior to covering or back filling;

(1) For new construction, a foundation location survey showing all building corners of the foundation shall be submitted to the construction official as soon as possible after the installation of the foundation wall. A land surveyor licensed in the State of New Jersey shall prepare the survey. The proposed foundation location as shown on the original plot plan shall also be shown on the foundation location survey.

(A) Exception: A foundation location survey shall not be required for additions, decks, swimming pools, sheds as described in N.J.A.C. 5:23-9.9 or similar structures.

(2) For new construction and additions, the foundation location survey for a building that is located in a flood plain shall include flood hazard certificates as required by section 1612.5 of the building subcode or section R301.2.4 of the one-and two-family dwelling subcode.

iii. Utility services, including septic;

iv. Mid-point inspections shall include the following:

(1) Building Subcode: All structural framing, connections, wall and roof sheathing, and insulation.

(A) The framing inspection shall take place after the rough electrical and plumbing inspections and after the installation of the heating, ventilation and/or air conditioning duct system.

(B) For buildings containing roof or other truss systems, a truss system and permanent truss bracing inspection shall be performed prior to the installation of any interior roof truss covering material. Where the truss design utilizes the interior finish as bracing for the bottom cord, that portion of the bracing shall be part of the final inspection and shall be in addition to the components of the final inspection in (d) below.

TABLE 4.3

CARTWAY AND RIGHT-OF-WAY WIDTHS

Street type ^a	Total avg daily traffic 1,500† † (loop—750 each half)	Traveled way	No. of parking lanes ^b	Parking lane width	Cartway width	Curb or shoulder ^h	Sidewalk or graded area ^j	Right-of-way width
Residential access								
a. Parallel parking								
Low intensity		20 ft	1	8 ft	28 ft	None	1 SW GA	50 ft
Medium intensity		20 ft	1	8 ft	28 ft	Curb	2 SW	50 ft
High intensity (on-street parking)		20 ft	1	8 ft	28 ft	Curb	2 SW	50 ft
b. Nonparallel parking (all intensities)								
One-side parking		24 ft	1	18 ft		Curb	2 SW ⁿ	54 ft
Two-side parking		24 ft	2	36 ft		Curb	2 SW ⁿ	72 ft
c. No parking								
High intensity (off-street parking)		20 ft	0	0 ft	20 ft	Curb	2 SW	50 ft
Neighborhood (all intensities)	1,500	14 ft	2	16 ft	30 ft ^c	curb	2 SW	50 ft
Minor Collector ^l	3,500							
Low intensity ^d with no parking		20 ft	0	0 ft	20 ft	none	1 SW 1GA	50 ft
Low with one parking lane		20 ft	1	8 ft	28 ft	curb	1 SW 1 GA	50 ft
Medium and High intensity								
With one parking lane		20 ft	1	8 ft	28 ft	curb	2 SW	50 ft
With two parking lanes		20 ft	2	16 ft	36 ft	curb	2 SW	60 ft
With off-street parking		22 ft	0	0 ft	22 ft	curb or shoulder	2 SW	50 ft
Major Collector ^l	7,500							
Low intensity		24 ft	0	0 ft	24 ft	none	2 SW	50 ft
Medium								50 ft if curb, 54 ft if shoulder
and High Multifamily access cul-de-sac ^m	1,000	24 ft	0	0 ft	24 ft	curb or shoulder	2 SW	
Multifamily court ^o	Note ^p							
Special Purpose Streets								
Rural street ^k	500	20 ft	0	0 ft	20 ft	none	2 GA	40 ft
Rural lane ^k	200	18 ft	0	0 ft	18 ft	none	2 GA	40 ft
Alley (one way)					9 ft			11 ft
Alley (two way)		18 ft	0	0 ft	18 ft	none	2 GA	22 ft
Cul-de-sac (stem) ^e	250							
Marginal access street ^f								

Divided street^g

NOTES:

^aSee Table 4.2 for definitions of street hierarchy and N.J.A.C. 5:21-4.2 for definitions of low, medium, and high intensity of development.

^bParking lane refers to parallel parking, except in the case of residential access streets with nonparallel parking, which have perpendicular parking.

^cThe 30 foot cartway would accommodate two eight foot parking lanes and one 14 foot moving lane.

^d20 foot minor collector cartways are permitted only when there is no direct building lot access to or from the street in question.

^eCartway widths of cul-de-sac stems and right-of-way requirements should conform to the applicable street type. Right-of-ways for cul-de-sac stems shall extend a minimum of eight feet beyond the cartway. Cul-de-sacs shall provide for a cartway turning radius of 40 feet and a right-of-way line eight feet beyond the edge of the cartway.

^fCartway and right-of-way widths of marginal access streets and right-of-way requirements should conform to standards of either residential access or minor collector streets, as dictated by average daily traffic. If the classification is a minor collector requiring a 36 foot cartway, cartway width may be reduced to 28 feet, since frontage is restricted to one side of the street.

^gCartway widths of divided streets should conform to standards of street classification, as dictated by anticipated average daily traffic, and be applied as aggregate dimensions of two street segments. Divided streets shall be provided with cut-throughs at a maximum of 1,200 foot intervals.

^hSee N.J.A.C. 5:21-4.3(c) for additional requirements.

ⁱRight-of-way width applies only to streets proposed for dedication as shown on approved plans.

^jSee N.J.A.C. 5:21-4.5(b) for additional requirements.

^kRural streets and rural lanes are permitted only within developments which do not exceed an average daily traffic count of 500 and 200, respectively.

^lMunicipalities may require additional cartway width for major or minor collectors which are part of a designated bicycle route as indicated in the circulation part of the municipal master plan to make them consistent with the AASHTO guidelines for bicycle-compatible streets.

^mCartway and right-of-way widths of multifamily cul-de-sac stems should conform to the applicable residential access street type. Cul-de-sacs shall provide for a cartway turning radius of 40 feet or other suitable means for vehicles to turn around, such as hammerheads. Where not located on private property, a right-of-way line eight feet beyond the edge of the cartway shall be provided.

ⁿSidewalks provided for streets with nonparallel parking shall be placed in accordance with N.J.A.C. 5:21-4.5(e).

^oCartway and right-of-way widths for multifamily courts shall comply with the design criteria for residential access streets, based on the parking configuration. Multifamily courts need not be provided with a means for turning around; however, their length shall not exceed 300 feet.

^pThere is no ADT limit for multifamily courts; however, the length of a multifamily court is limited to 300 feet.

Administrative correction.

See: 29 N.J.R. 1296(a).

Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).

See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).

In Table 4.3, combined Medium and High Intensity Street Types, changed Parking Loop Right-of-Way Widths, rewrote Note e, added "as shown on approved plans" at the end of Note i, and added Note l. Amended by R.2000 d.480, effective December 4, 2000 (operative June 3, 2001).

See: 32 N.J.R. 2670(b), 32 N.J.R. 4277(a).

In (b), substituted "8" for "15" under Dwelling Units per Gross Acre; inserted (e); and in Table 4.3, inserted footnote "m" and all references thereto in the body of the table.

Public Notice: Special area standards.

See: 33 N.J.R. 897(a).

Amended by R.2002 d.399, effective December 16, 2002.

See: 34 N.J.R. 2615(a), 34 N.J.R. 4412(a).

Rewrote Table 4.3.

Public Notice: Notice regarding the Publication of two Notices of Adoption in the December 16, 2002 New Jersey Register.

See: 34 N.J.R. 4343(a), 4412(a), 35 N.J.R. 219(b).

5:21-4.3 Curbs or curbs and gutters

(a) Curbs or curbs and gutters shall be used for drainage purposes, safety, and delineation and protection of pavement edge. Where, based on stormwater management system design, there is determined to be a problem with runoff, curbs or curbs and gutters shall be used.

(b) Curb requirements shall vary according to street hierarchy and intensity of development, in accordance with the requirements set forth in Table 4.3 in N.J.A.C. 5:21-4.2. Generally, curbs shall be required on streets with on-street parking.

(c) Where curbing is not required, edge definition and stabilization shall be furnished for safety reasons, and to prevent pavement unraveling. Curbing may be required for: stormwater management, road stabilization, delineation of parking areas, 10 feet on each side of drainage inlets, intersections, corners, and tight radii.

(d) Curb requirements may be waived by the appropriate municipal approving agency, and shoulders and/or drainage swales used when it can be shown that: shoulders are required by CAFRA; soil and/or topography make the use of shoulders and/or drainage swales preferable; and/or the community desires to preserve its rural character by using shoulders and/or drainage swales instead of curbs. In cases of medium development intensity, the curbing requirement may be waived where front setbacks exceed 40 feet and it can be demonstrated that sufficient on-site parking exists.

(e) A municipality may designate a curb type by ordinance. Where curb type is not established by municipal ordinance, flexibility regarding curb type shall be permitted as long as the curb type accommodates the system of drainage proposed. Generally, curbs should be constructed of concrete or granite block. Curbing materials shall accommodate the purposes set forth in (c) above.

(f) Curbs shall be constructed according to the specifications set forth in N.J.A.C. 5:21-4.17.

(g) Curbing shall be designed to provide a curb ramp in compliance with the Americans with Disabilities Act or the Barrier Free Subcode of the New Jersey Uniform Construction Code (N.J.A.C. 5:23-7) at street intersections, as applicable.

(h) Where curbs and gutters are used and where the street is part of a designated bike route as indicated in the bicycle circulation part of the municipal master plan, the municipality may require that the cartway width be increased by one foot on each side of a street that uses a curb and gutter.

Amended by R.2000 d.480, effective December 4, 2000 (operative June 3, 2001).

See: 32 N.J.R. 2670(b), 32 N.J.R. 4277(a).

Added (h).

5:21-4.4 Shoulders

(a) Shoulders should be used instead of curbs when:

1. Shoulders are required by CAFRA;
2. Soil and/or topography make the use of shoulders preferable; and/or
3. To preserve rural character.

(b) Shoulders shall be provided in accordance with the requirements in Table 4.3 in N.J.A.C. 5:21-4.2.

(c) Shoulders shall be four feet wide, except for minor collector streets of high intensity with off-street parking, which shall be six feet wide on each side for all streets, and major collector streets of medium and high intensity, which shall be eight feet wide on each side for all streets. Shoulders shall be located within the right-of-way as shown in the following street illustrations.

(d) Shoulders shall be constructed of materials such as stabilized earth, gravel, crushed stone, bituminous treatment, or other forms of pavement which provide for vehicle load support. Shoulders along major collectors and shoulders along streets that are part of a designated bike path as indicated in the bicycle circulation portion of the municipal master plan shall be paved with asphalt pavement.

Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).

See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).

Rewrote (c).

Amended by R.2000 d.480, effective December 4, 2000 (operative June 3, 2001).

See: 32 N.J.R. 2670(b), 32 N.J.R. 4277(a).

In (a) and (a)2, deleted "and/or drainage swales" preceding "preferable"; and in (d), inserted the last sentence.

Public Notice: Notice regarding the Publication of two Notices of Adoption in the December 16, 2002 New Jersey Register.

See: 34 N.J.R. 4343(a), 4412(a), 35 N.J.R. 219(b).

5:21-4.5 Sidewalks and graded areas

(a) Sidewalks and/or graded areas shall be required, depending on road classification and intensity of development, in accordance with the requirements set forth in Table 4.3 in N.J.A.C. 5:21-4.2.

(b) Sidewalks shall be provided where graded areas are specified in Table 4.3 when the conditions described in (b)1 or 2 below exist:

1. The minimum lot size in the development is smaller than one acre; and

i. The development or project is located within 2,500 feet of a train station, public or school bus route;

ii. The development or project is located within 2,500 feet of an existing recreational, business or retail use or a site where such use is permitted by existing zoning; or

iii. Where the proposed streets connect to or extend existing streets which have sidewalks on both sides; or

2. The minimum lot size in the development is smaller than two acres and the development is located within two miles of a school.

(c) Notwithstanding (b)1 and 2 above, sidewalks shall only be required on one side of rural streets or rural lanes and shall not be required in alleys.

(d) Sidewalks shall be placed parallel to the street, as shown in the street profile figures, unless an exception has been permitted to preserve topographical or natural features, or if required to provide visual interest, or unless the applicant shows that an alternative pedestrian system provides safe and convenient circulation (for example, in planned development).

(e) Sidewalks along streets with nonparallel parking shall be placed parallel to the street, and shall be placed so that sidewalks do not lead pedestrians between parked vehicles and the traveled way. This subsection shall not apply to driveways.

(f) Pedestrian-way easements at least 10-foot wide may be required by the municipal approving authority through the center of blocks more than 600-foot long. In providing circulation or access to schools, playgrounds, shopping, adjoining residential areas, or other community facilities, the municipality shall consider and may require pedestrian-way easements.

(g) Sidewalk width shall be four feet; wider widths may be necessary near pedestrian generators and employment centers. Where sidewalks abut the curb and cars overhang the sidewalk, widths shall be six feet. In high-density residential areas when sidewalks abut the curb, a sidewalk/graded area of at least six feet in width shall be required.

(h) Sidewalks and graded areas shall be constructed according to the specifications set forth in N.J.A.C. 5:21-4.18.

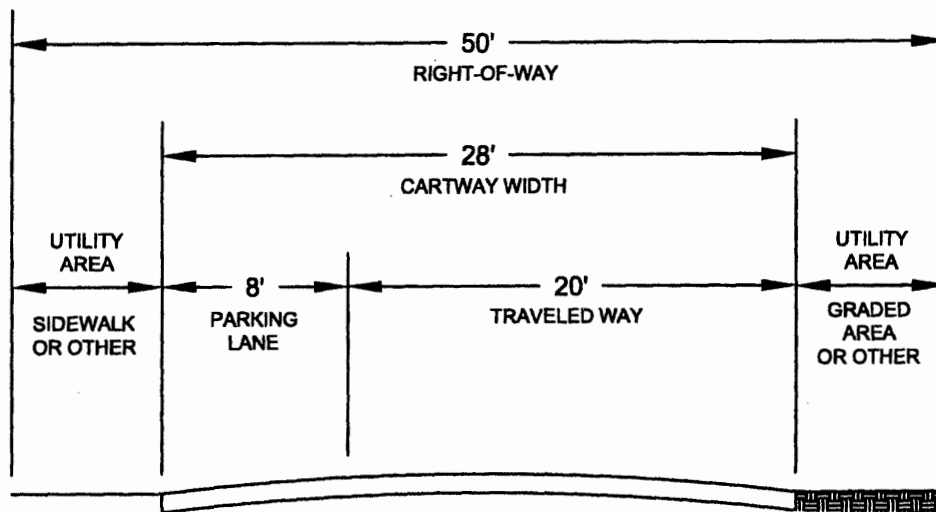
ILLUSTRATIONS OF STREET LAYOUTS FOLLOW:

Note: The individual components shown in the non-travel-way portion of the right-of-way such as utility areas, sidewalks, and graded areas are indicated for illustrative purposes only. Municipalities may vary the placement and

dimensions of these individual items, depending on utility company requirements and local practice and preferences. In addition, items such as shade trees may be accommodated within the total right-of-way widths indicated for each street type. Several street types are not illustrated because of the limited or various, as the case may be, design possibilities.

RESIDENTIAL ACCESS
(low intensity)

Illustration 1 of 14

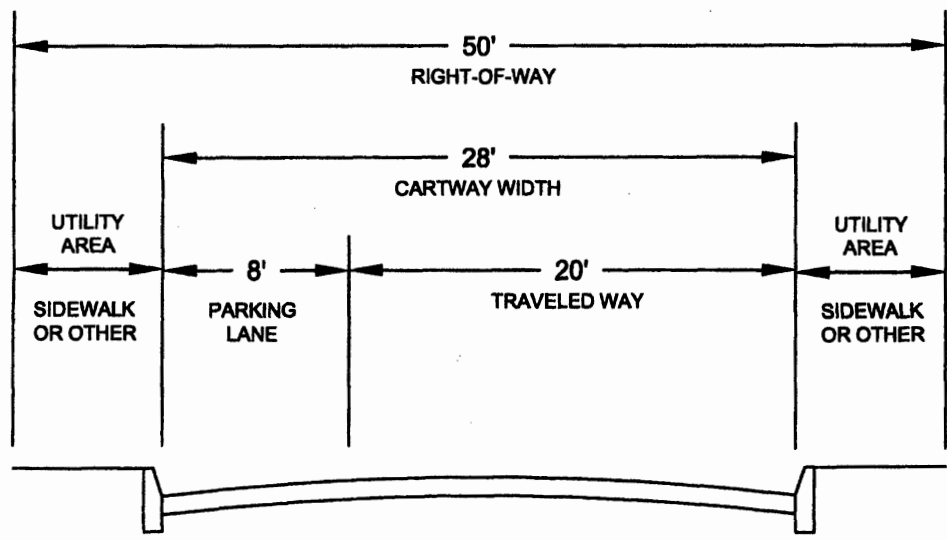


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	20 FEET
NUMBER OF PARKING LANES:	1
PARKING LANE WIDTH:	8 FEET
CARTWAY WIDTH:	28 FEET
CURB OR SHOULDER:	NONE
SIDEWALK OR GRADED AREA:	1 SW 1 GA
RIGHT-OF-WAY:	50 FEET

RESIDENTIAL ACCESS
(high intensity with on-street parking
and medium intensity)

Illustration 2 of 14

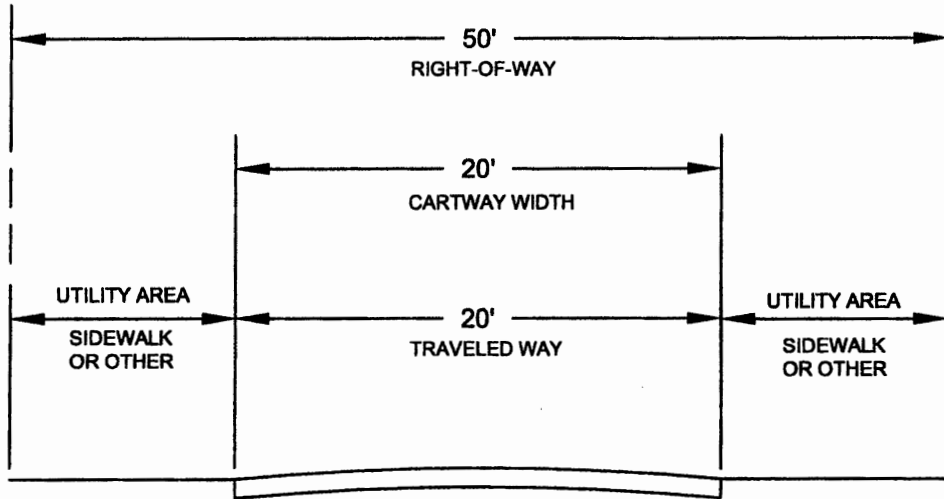


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	20 FEET
NUMBER OF PARKING LANES:	1
PARKING LANE WIDTH:	8 FEET
CARTWAY WIDTH:	28 FEET
CURB OR SHOULDER:	CURB
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

RESIDENTIAL ACCESS
 (high intensity with off-street parking)

Illustration 3 of 14

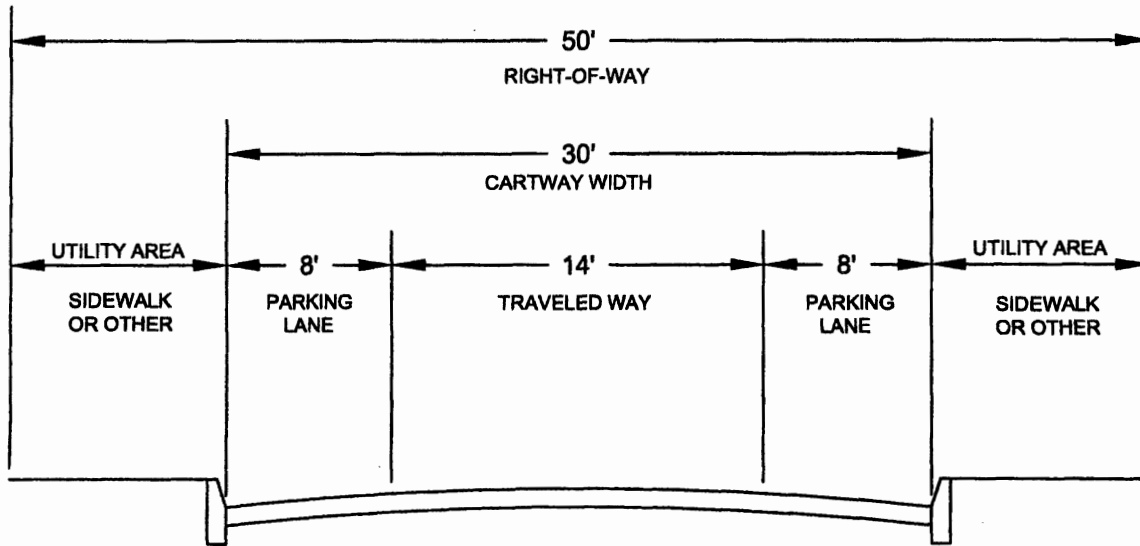


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	20 FEET
NUMBER OF PARKING LANES:	0
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	20 FEET
CURB OR SHOULDER:	NONE
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

NEIGHBORHOOD
(all intensities)

Illustration 4 of 14

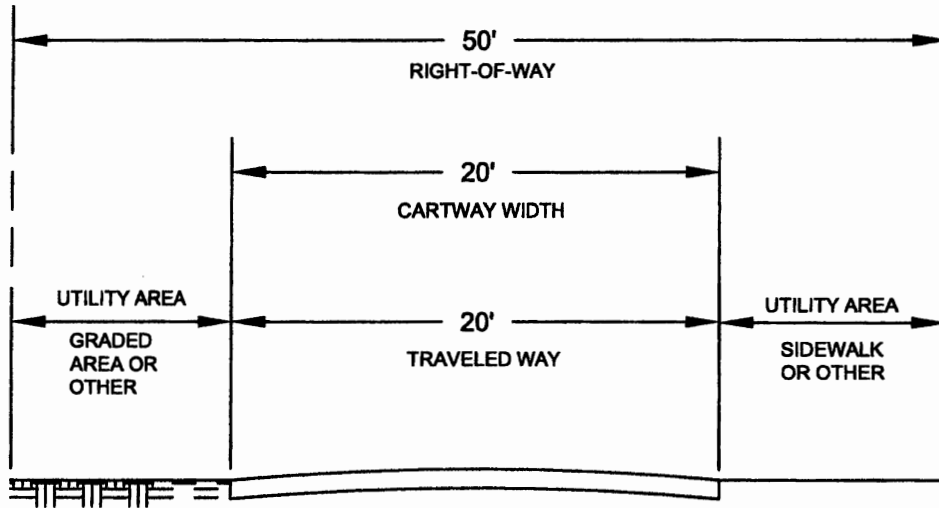


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	14 FEET
NUMBER OF PARKING LANES:	2
PARKING LANE WIDTH:	16 FEET
CARTWAY WIDTH:	30 FEET
CURB OR SHOULDER:	CURB
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

MINOR COLLECTOR
 (low intensity with no parking)

Illustration 5 of 14

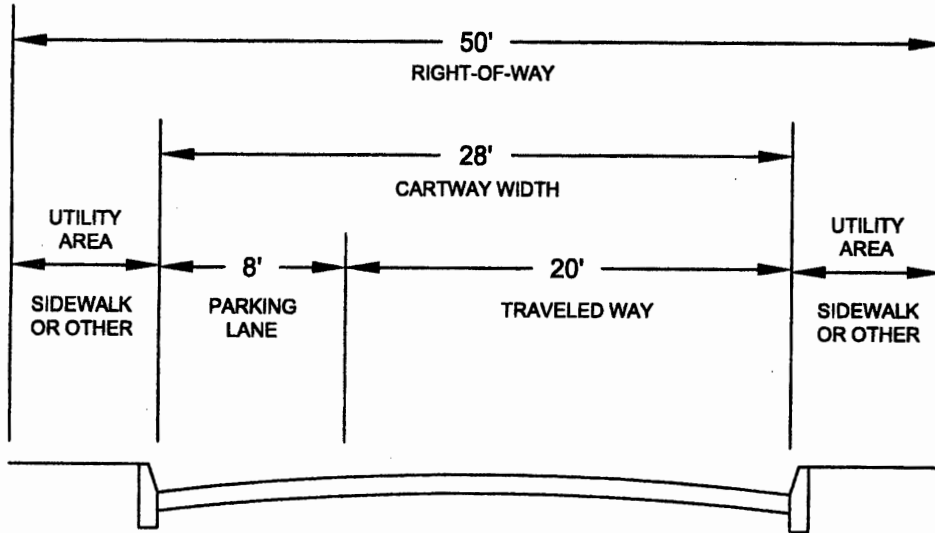


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	20 FEET
NUMBER OF PARKING LANES:	0
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	20 FEET
CURB OR SHOULDER:	NONE
SIDEWALK OR GRADED AREA:	1 SW 1 GA
RIGHT-OF-WAY:	50 FEET

MINOR COLLECTOR
 (low, medium, and high intensity
 with one parking lane)

Illustration 6 of 14

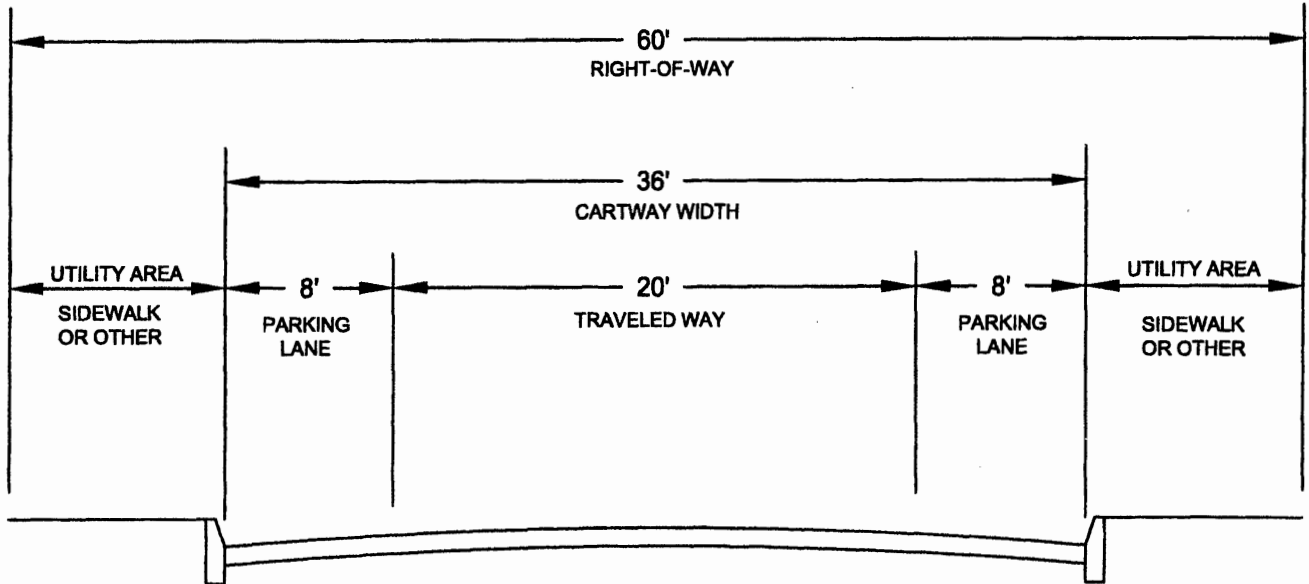


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	20 FEET
NUMBER OF PARKING LANES:	1
PARKING LANE WIDTH:	8 FEET
CARTWAY WIDTH:	28 FEET
CURB OR SHOULDER:	CURB
SIDEWALK OR GRADED AREA:	
low, one parking lane:	1SW, 1GA
medium, one parking lane:	2 SW
high, one parking lane:	2 SW
RIGHT-OF-WAY:	50 FEET

MINOR COLLECTOR
 (medium and high intensities
 with two parking lanes)

Illustration 7 of 14

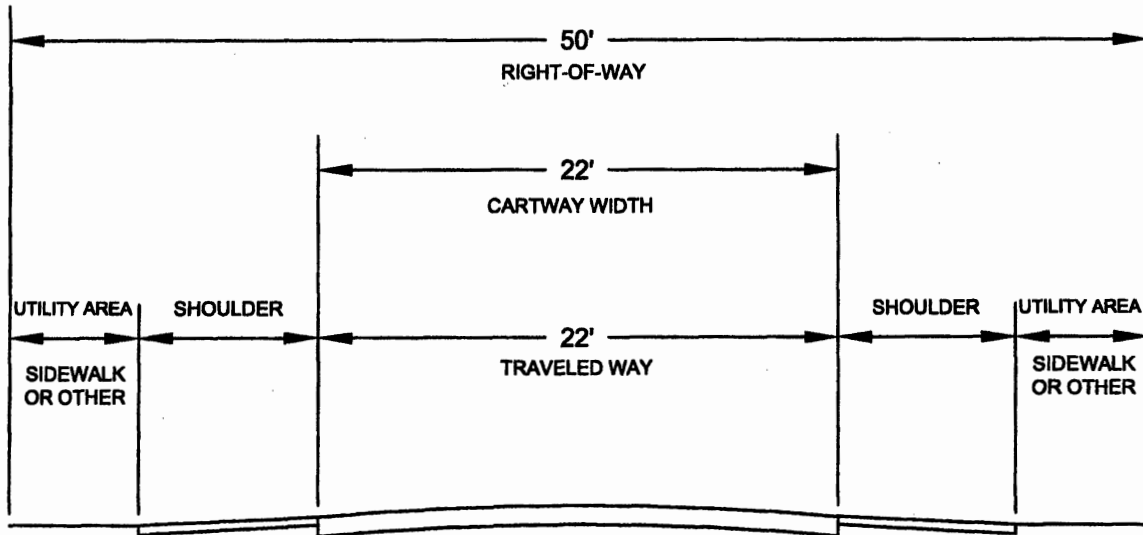


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	20 FEET
NUMBER OF PARKING LANES:	2
PARKING LANE WIDTH:	16 FEET
CARTWAY WIDTH:	36 FEET
CURB OR SHOULDER:	CURB
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	60 FEET

MINOR COLLECTOR
 (medium and high intensity
 with off-street parking
 and shoulders)

Illustration 8 of 14

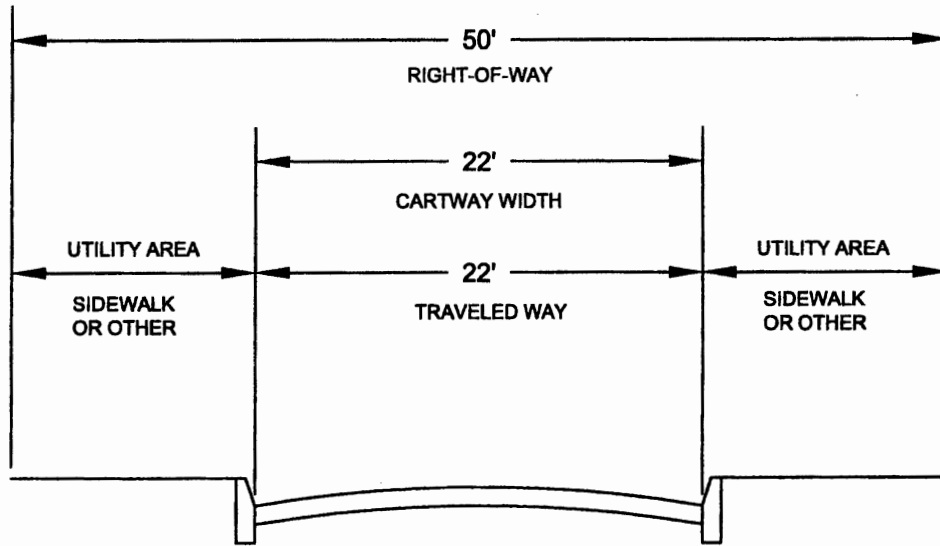


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	22 FEET
NUMBER OF PARKING LANES:	0
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	22 FEET
CURB OR SHOULDER:	SHOULDER
medium intensity:	4 FEET
high intensity:	6 FEET
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

MINOR COLLECTOR
 (medium and high intensity
 with off-street parking and curb)

Illustration 9 of 14

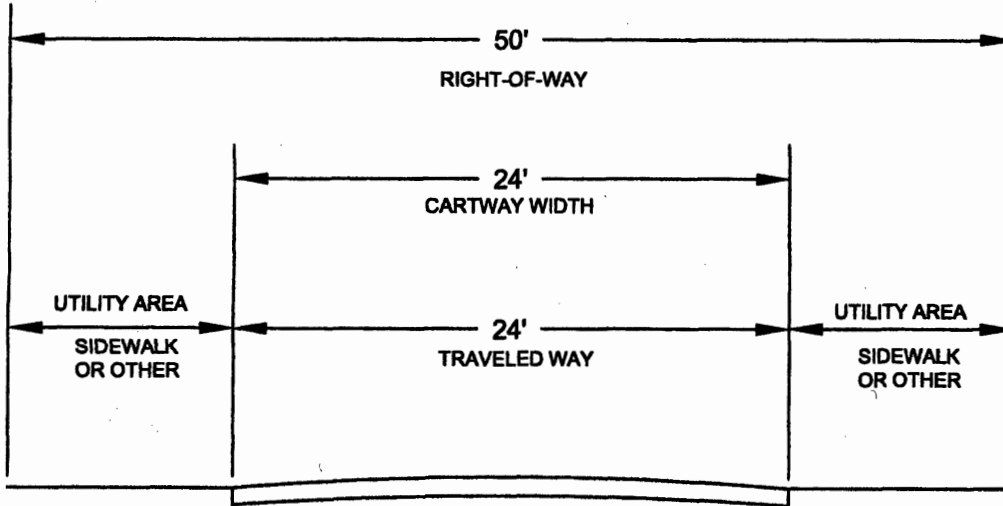


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	22 FEET
NUMBER OF PARKING LANES:	1
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	22 FEET
CURB OR SHOULDER:	CURB
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

**MAJOR COLLECTOR
(low intensity)**

Illustration 10 of 14

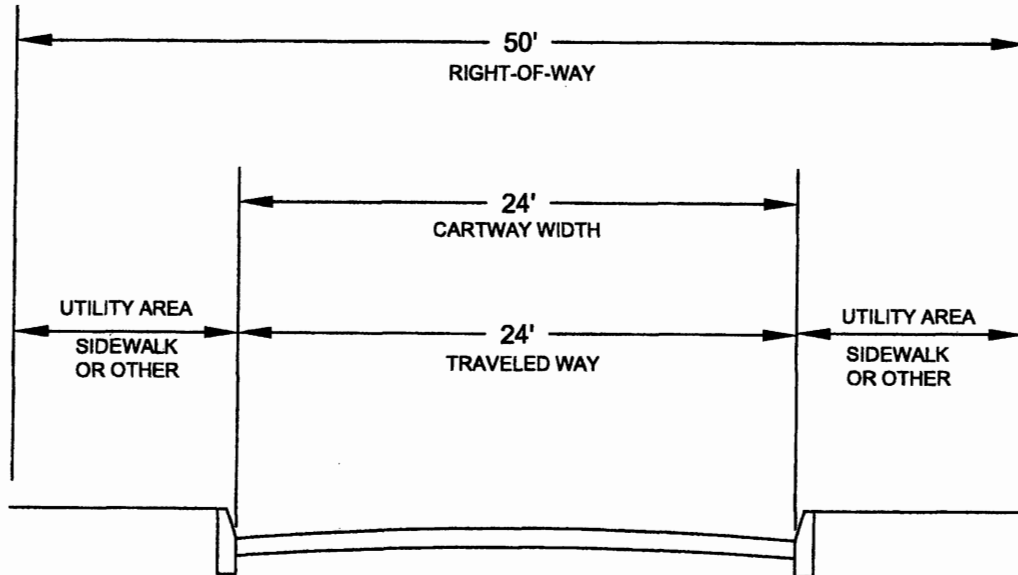


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	24 FEET
NUMBER OF PARKING LANES:	0
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	24 FEET
CURB OR SHOULDER:	NONE
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

MAJOR COLLECTOR
 (medium and high intensity with curb)

Illustration 11 of 14

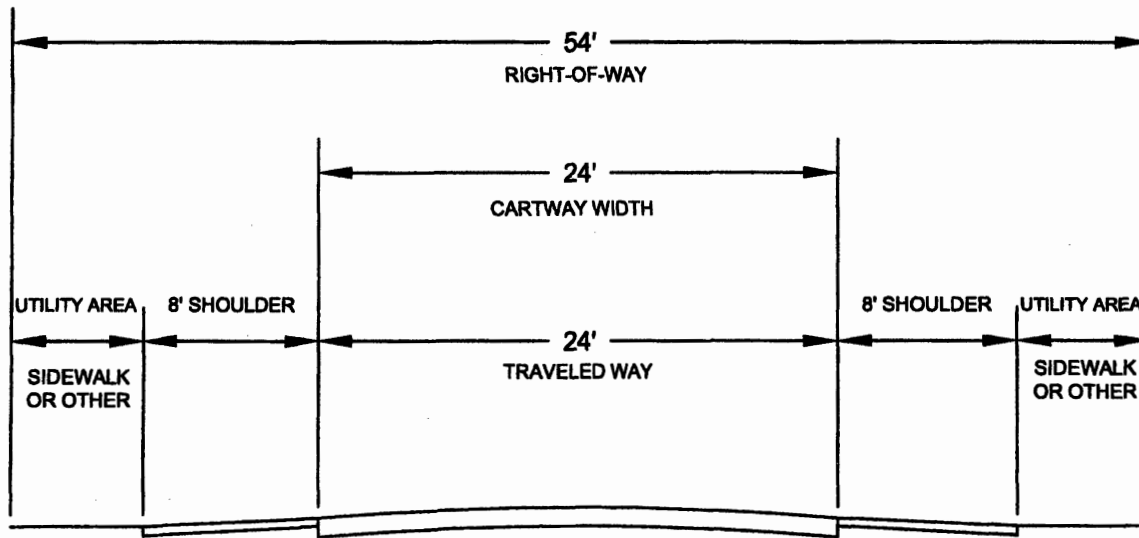


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	24 FEET
NUMBER OF PARKING LANES:	0
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	24 FEET
CURB OR SHOULDER:	CURB
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	50 FEET

MAJOR COLLECTOR
 (medium and high intensity
 with shoulders)

Illustration 12 of 14

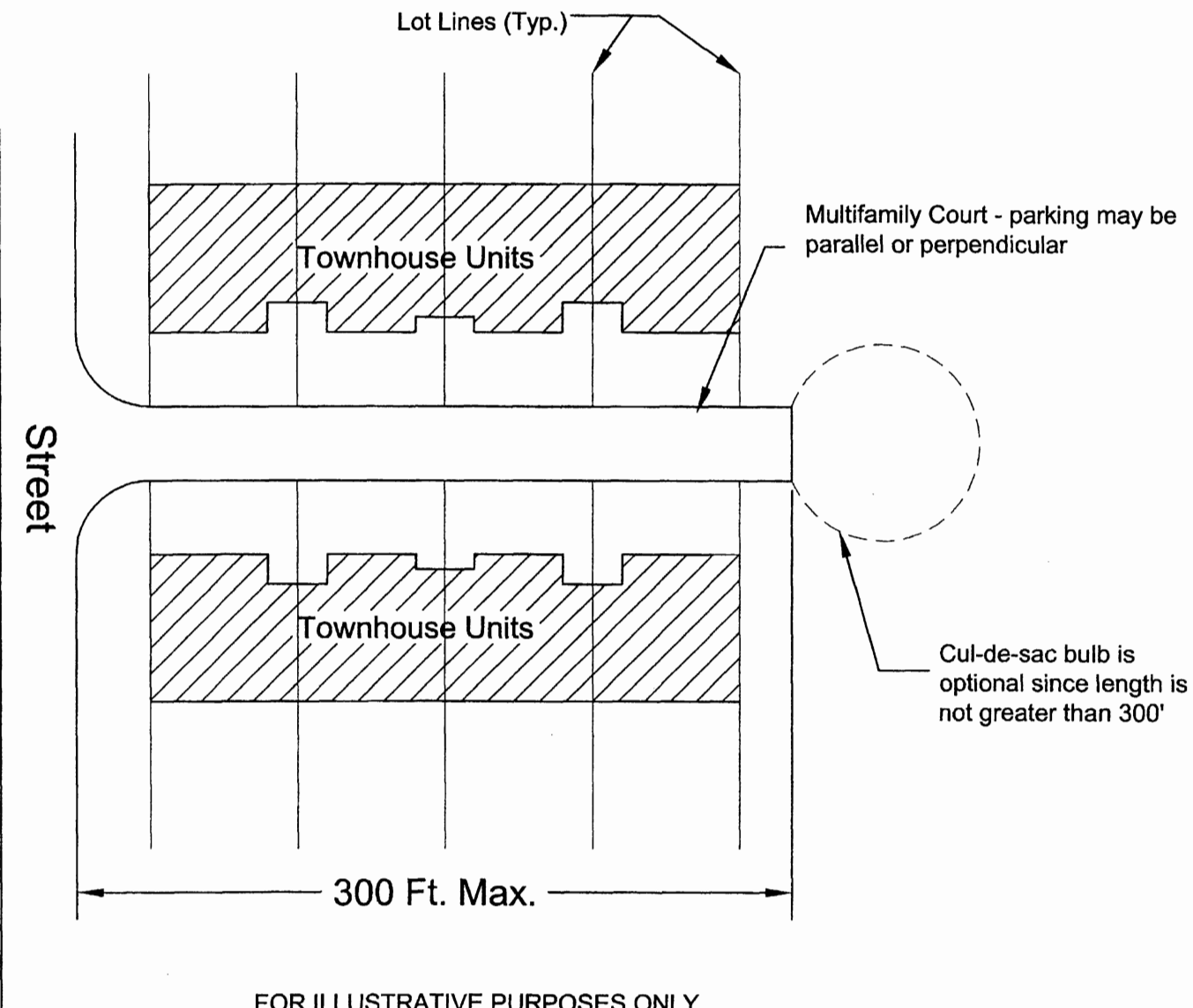


FOR ILLUSTRATIVE PURPOSES ONLY

TRAVELED WAY:	24 FEET
NUMBER OF PARKING LANES:	0
PARKING LANE WIDTH:	0 FEET
CARTWAY WIDTH:	24 FEET
CURB OR SHOULDER:	SHOULDER
SIDEWALK OR GRADED AREA:	2 SW
RIGHT-OF-WAY:	54 FEET

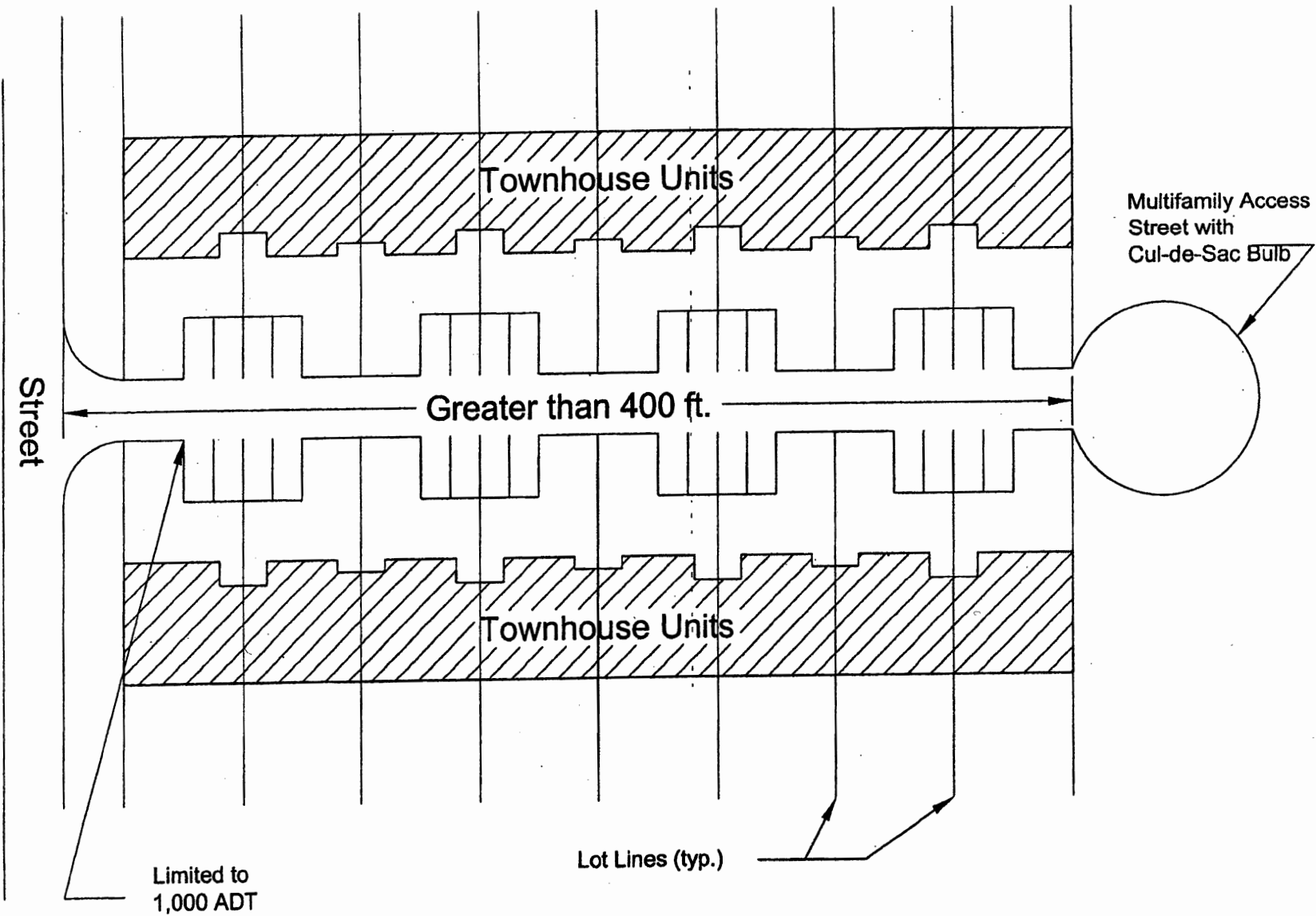
MULTIFAMILY COURT

Illustration 13 of 14



MULTIFAMILY
CUL-DE-SAC

Illustration 14 of 14



FOR ILLUSTRATIVE PURPOSES ONLY

Administrative correction.

See: 29 N.J.R. 1296(a).

Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).

See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).

Public Notice: Special area standards.

See: 33 N.J.R. 897(a).

Amended by R.2002 d.399, effective December 16, 2002.

See: 34 N.J.R. 2615(a), 34 N.J.R. 4412(a).

Rewrote (b)1; added new (e); recodified former (e) through (g) as new (f) through (h); added Illustrations 13 and 14.

Public Notice: Notice regarding the Publication of two Notices of Adoption in the December 16, 2002 New Jersey Register.

See: 34 N.J.R. 4343(a), 4412(a), 35 N.J.R. 219(b).

Public Notice: Notice of Public Hearing and Recommended Special Area Standards for Street Design within the TDR Receiving Area of Chesterfield Township, Burlington County.

See: 35 N.J.R. 4132(a).

5:21-4.6 Bikeways

(a) Separate bicycle paths and lanes shall be required only if such paths and lanes have been specified as part of a municipality's adopted master plan and/or official map.

(b) Bicycle lanes, where provided, shall be placed in the outside lane of a roadway, adjacent to the curb or shoulder. When on-street parking is permitted, the bicycle lane shall be between the parking lane and the outer lane of moving vehicles. Lanes shall be delineated with markings, preferably striping. Raised reflectors or curbs shall not be used.

(c) The construction of bikeways shall comply with the specifications set forth in N.J.A.C. 5:21-4.18.

5:21-4.7 Utility areas

(a) Utility mains shall be located within the right-of-way or within utility easements outside the right-of-way.

(b) Utility areas shall be planted with grass, ground cover, or treated with other suitable cover material.

Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).

See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).

Rewrote (a).

5:21-4.8 Right-of-way and cartway

(a) The right-of-way shall be measured from lot line to lot line. Right-of-way requirements are shown in Table 4.3 in N.J.A.C. 5:21-4.2 and displayed graphically in the street illustrations in N.J.A.C. 5:21-4.5.

(b) The municipal approving authority may require the right-of-way and cartway widths of a new street that is a continuation of an existing street to be at least the same widths as the existing street.

(c) The right-of-way shall be of sufficient width to accommodate future development, as indicated by the municipal master plan.

(d) Where turning lanes are needed based on safety or capacity, additional right-of-way width, not to exceed the width and length of the turning lanes, may be required.

5:21-4.9 Street grade and intersections

Street grade and intersection design shall be constructed according to the specifications set forth in N.J.A.C. 5:21-4.19.

5:21-4.10 Pavement

(a) Street pavement thickness shall vary by street hierarchy, subgrade properties, and pavement type.

(b) Pavement design for rural, residential access, neighborhood, minor collector, and major collector streets shall conform to the specifications in N.J.A.C. 5:21-4.19.

5:21-4.11 Street and site lighting (Reserved)

5:21-4.12 Underground wiring

(a) All electric, telephone, television, and other communication facilities, both main and service lines servicing new developments, shall be provided by underground wiring within easements or dedicated public rights-of-way, installed in accordance with the prevailing standards and practices of the utility or other companies providing such services.

(b) Lots that abut existing easements or public rights-of-way, where overhead electric or telephone distribution supply lines and service connections have heretofore been installed, may be supplied with electric and telephone service from those overhead lines, but the service connections from the utilities' overhead lines shall be installed underground.

(c) Overhead lines may be permitted as an exception by the municipal approving authority in areas of severe geological conditions. The placement and alignment of the poles shall be designed to lessen the visual impact of overhead lines.

5:21-4.13 Street and traffic signs

(a) Design and placement of traffic signs included in "Manual on Uniform Traffic Control Devices for Streets and Highways" shall follow the requirements specified in "Manual on Uniform Traffic Control Devices for Streets and Highways," published by the U.S. Department of Transportation and adopted by the N.J. Department of Transportation.

(b) At least two street name signs shall be placed at each four-way street intersection and one at each "T" intersection. Signs shall be placed so as not to obstruct sight distances and under light standards, if present, so that they are clearly visible. The design of street name signs should be: consistent, of a style appropriate to the community, of a

uniform size and color, and erected in accordance with local standards.

(c) At signalized intersections, street signs shall be located on the overhead arm supporting the traffic signal, or otherwise suitably suspended over the intersection. Roadway clearance shall be a minimum of 15 feet from the bottom of any sign or supporting equipment and the top of the paved surface.

5:21-4.14 Parking: number of spaces

(a) An adequate number of on-street and off-street parking spaces shall be required in all developments to accommodate residents and visitors. For projects containing dwelling units required by the New Jersey Uniform Construction Code's Barrier Free Subcode (N.J.A.C. 5:23-7) to be accessible, accessible parking spaces for people with disabilities shall be provided in accordance with the requirements of the Barrier Free Subcode and shall be considered part of the total number of required spaces.

(b) For residential developments, parking shall be provided, as set forth in Table 4.4 below. If applicant does not specify the number of bedrooms per unit, note "c" for each category in Table 4.4 shall apply for the parking requirement.

(c) Alternative parking standards to those shown in Table 4.4 shall be accepted if the applicant demonstrates these standards better reflect local conditions. Factors affecting minimum number of parking spaces include household characteristics, availability of mass transit, urban versus suburban location, and available off-site parking resources .

(d) Garage and driveway combinations shall be counted as follows:

1. Each garage car space shall be counted as 1.0 off-street parking space regardless of the dimensions of the driveway.
2. A one-car garage and driveway combination shall count as 2.0 off-street parking spaces, provided the driveway measures a minimum of 18 feet in length between the face of the garage door and the right-of-way.
3. A two-car garage and driveway combination shall count as 3.5 off-street parking spaces, provided a minimum parking width of 20 feet is provided for a minimum length of 18 feet as specified for a one-car garage and driveway combination.

(e) When housing is included in mixed-use development, a shared parking approach to the provision of parking shall be permitted.

(f) When, in the judgment of the local approving authority, on-street parking is available, then only that proportion of the parking requirement which is not available on the street shall be provided in off-street parking facilities. A length of 23 feet per on-street parking space shall be used in calculating the number of available on-street parking spaces.

TABLE 4.4

PARKING REQUIREMENTS FOR RESIDENTIAL LAND USES^a

Housing unit type/size ^b	Parking requirement per dwelling unit
Single-Family Detached	
2 Bedroom	1.5
3 Bedroom	2.0
4 Bedroom	2.5 ^c
5 Bedroom	3.0
Two Family (Duplex)	"Single-Family Detached" values shall apply to each unit
Garden Apartment	
1 Bedroom	1.8
2 Bedroom	2.0 ^c
3 Bedroom	2.1
Townhouse	
1 Bedroom	1.8
2 Bedroom	2.3 ^c
3 Bedroom	2.4
High Rise	
1 Bedroom	0.8
2 Bedroom	1.3 ^c
3 Bedroom	1.9
Mobile Home	
1 Bedroom	1.8
2 Bedroom	2.0 ^c
Retirement Community	Values shall be commensurate with the most appropriate housing unit type and size noted above that the retirement community resembles.
Recreational Homes (owner occupied)	Values shall be commensurate with the most appropriate housing unit type and size noted above that the recreational homes (owner occupied) resemble.
Mid-Rise Apartment Assisted living	"Garden Apartment" values shall apply 0.50

Notes:

^aWhen determination of the required number of parking spaces results in a fractional space for the entire development, any fraction of one-half or less may be disregarded, while a fraction in excess of one-half shall be counted as one parking space.

^bRequirements for attached units (apartment/condominium/townhouse) include provisions for guest parking (0.5 spaces per dwelling unit). Guest parking must either be provided for on street or in common parking areas.

^cIf applicant does not specify the number of bedrooms per unit, this parking requirement shall apply.

Source: Modified and adapted from U.S. Department of Commerce, Bureau of the Census, Public Use File—New Jersey (cross-tabulation of vehicles by housing unit for units constructed 1975 to 1980).

Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).

See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).

Rewrote (d); and in Table 4.4, deleted "offstreet" preceding "parking" in Note c.

Administrative correction.

See: 32 N.J.R. 684(b).

Amended by R.2000 d.480, effective December 4, 2000 (operative June 3, 2001).

See: 32 N.J.R. 2670(b), 32 N.J.R. 4277(a).

In Table 4.4, added "Two Family (Duplex)" and inserted requirement for assisted living.

Amended by R.2002 d.399, effective December 16, 2002.

See: 34 N.J.R. 2615(a), 34 N.J.R. 4412(a).

In Table 4.4, added "Two Family (Duplex)" and rewrote footnote b. Public Notice: Notice regarding the Publication of two Notices of Adoption in the December 16, 2002 New Jersey Register.

See: 34 N.J.R. 4343(a), 4412(a), 35 N.J.R. 219(b).

Housing unit
type/size^b
Administrative change.
See: 35 N.J.R. 1663(a).

Parking
requirement per dwelling unit

an additional two feet of sidewalk width are provided to accommodate such overhang.

5:21-4.15 Parking space size

Each off-street parking space shall measure nine feet in width by 18 feet in length. Parking spaces for people with disabilities shall be in accordance with the New Jersey Uniform Construction Code (N.J.A.C. 5:23) or the Americans with Disabilities Act, as applicable.

5:21-4.16 Parking lots

(a) Off-street parking lots shall be oriented to, and within a reasonable walking distance of, the buildings they are designed to serve.

(b) Access to parking lots shall be designed so as not to induce queues on travel ways, and to provide adequate pedestrian circulation and safety. There shall be adequate provision for ingress to and egress from all parking spaces to ensure ease of mobility, ample clearance, and safety of vehicles and pedestrians.

(c) The width of all aisles providing direct access to individual parking stalls shall be in accordance with the requirements specified in Table 4.5 below. Only one-way traffic shall be permitted in aisles serving single-row parking spaces placed at an angle other than 90 degrees.

TABLE 4.5

PARKING ANGLES AND AISLE WIDTHS

Parking angle (degrees)	Aisle width (feet)
30	12
45	13
60	18
90	24

(d) Where sidewalks occur in parking areas, parked vehicles shall not overhang or extend over the sidewalk unless

(e) Where sole access to dwelling units is via a parking lot, the following features shall be provided:

1. Designated fire lanes a minimum of 18 feet in width shall be required as provided for in the Uniform Fire Code.

2. Parking lots shall be provided with turning bays or other means of turning at intervals of not greater than 1,200 feet. Turning bays, such as hammerheads or other configurations, shall measure at least 18 feet by 60 feet, or provide equivalent maneuvering space.

3. Parking lots having more than 100 spaces shall have a minimum of two means of ingress and egress, or be provided with a divided-type entrance.

Amended by R.2002 d.399, effective December 16, 2002.
See: 34 N.J.R. 2615(a), 34 N.J.R. 4412(a).

In (a), substituted "lots" for "areas" following "Off-street parking"; added (e).

Public Notice: Notice regarding the Publication of two Notices of Adoption in the December 16, 2002 New Jersey Register.
See: 34 N.J.R. 4343(a), 4412(a), 35 N.J.R. 219(b).

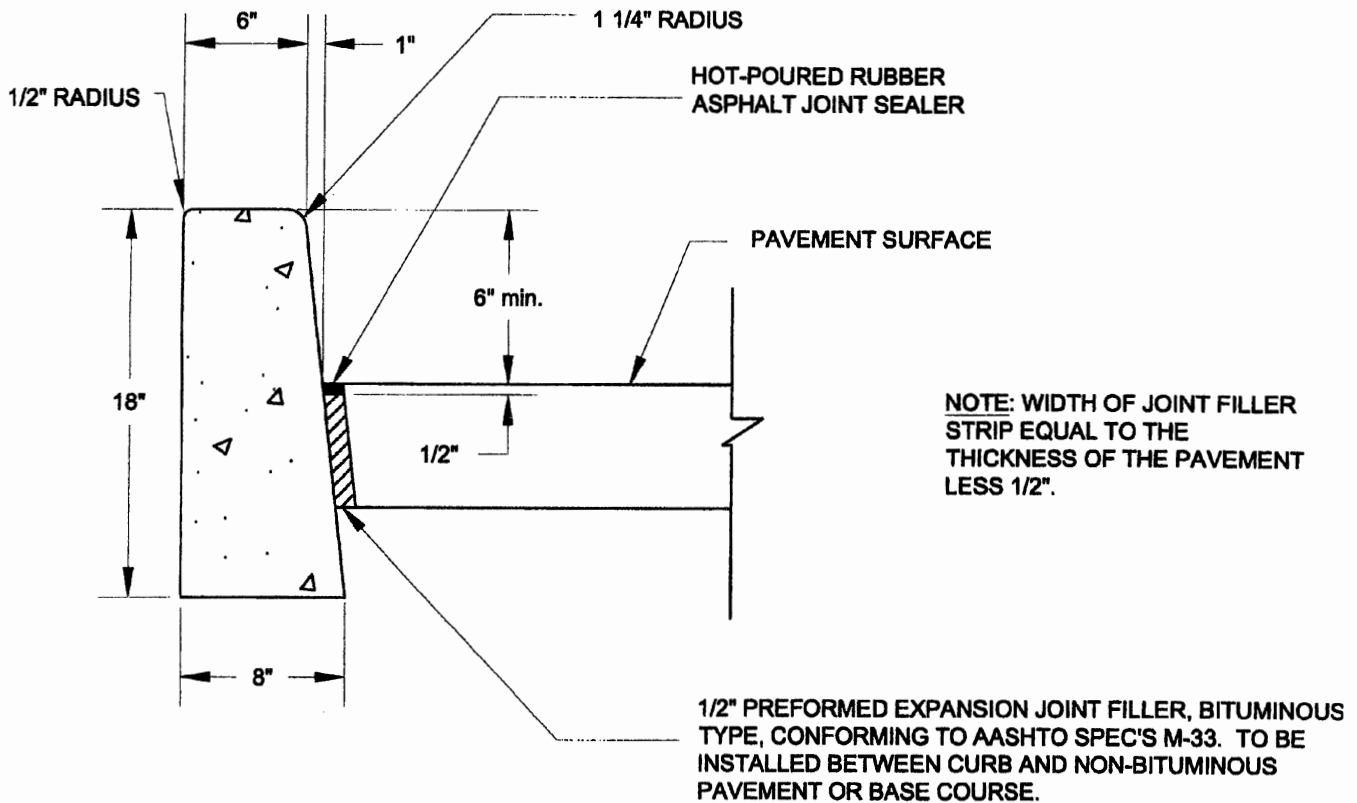
5:21-4.17 Curb construction standards

(a) Construction specifications for acceptable curb types of granite block and concrete are shown in Figure 4.1 below.

(b) The standard concrete curb section used shall be a maximum of 20 feet in length, with a scored joint every 10 feet. All concrete used for curbs or combination curbs and gutters shall be prepared in accordance with the requirements, by class of concrete, of the New Jersey Department of Transportation, *Standard Specifications for Road and Bridge Construction*, effective at the time of preparation. Where bituminous concrete pavement is used for the road surface, the curb and/or gutter shall be constructed first.

(c) Where drainage inlets are constructed but curbs are not required, curbing must be provided at least 10 feet on each side of the inlet, set back one foot from the extension of the pavement edge.

Figure 4.1
(1 of 6)



N.T.S.

NOTES: 1. CONCRETE TO BE NJDOT CLASS "B" (AIR ENTRAINED).

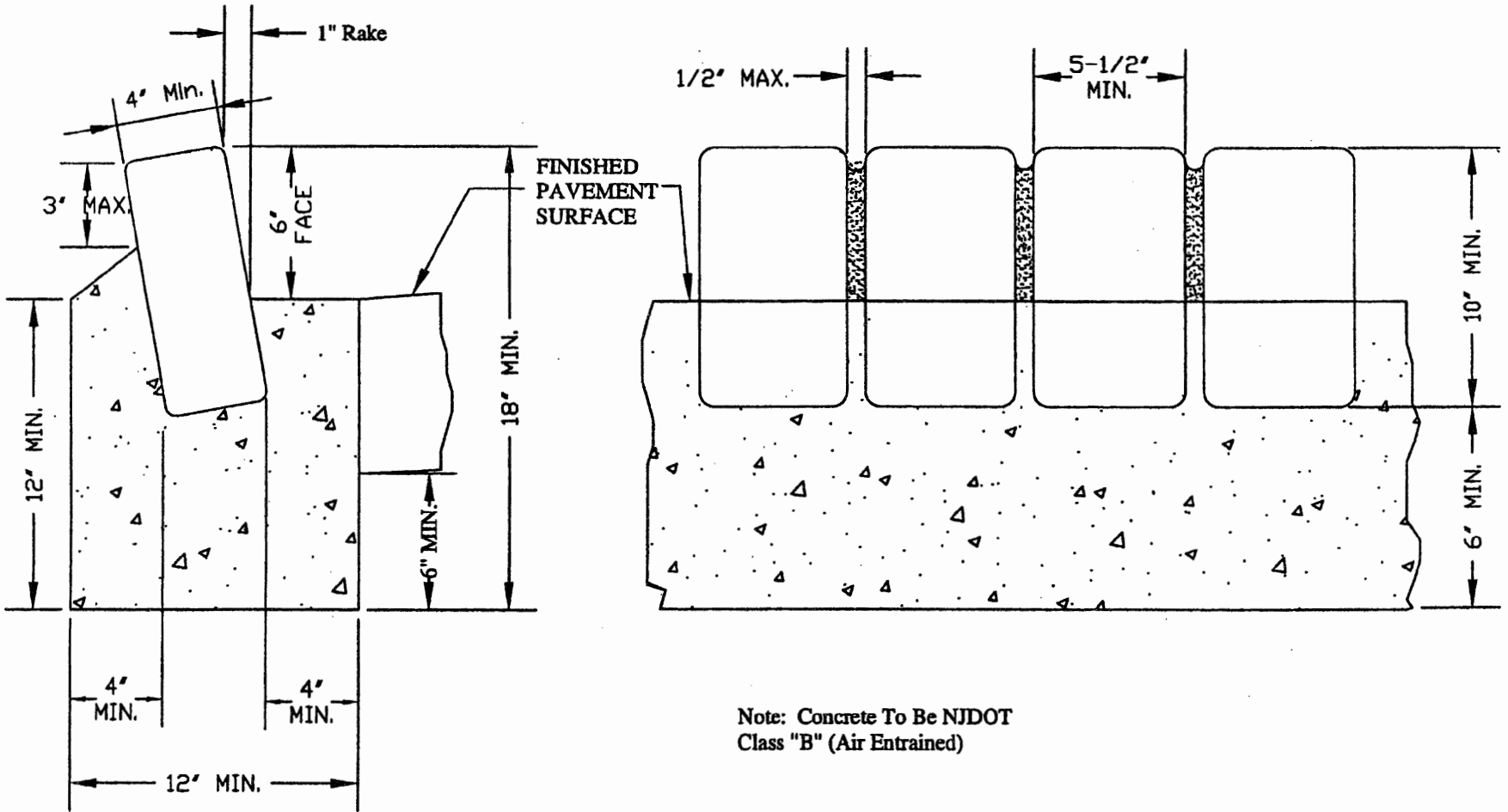
2. TRANSVERSE JOINTS 1/2" WIDE SHALL BE INSTALLED IN THE CURB 20' - 0" APART AND SHALL BE FILLED WITH PREFORMED, BITUMINOUS-IMPREGNATED FIBER JOINT FILLER, COMPLYING WITH THE REQUIREMENTS OF AASHTO M-213, RECESSED 1/4" FROM THE FRONT FACE AND TOP OF THE CURB.

3. DUMMY JOINTS (FORMED) SHALL BE INSTALLED MIDWAY BETWEEN EXPANSION JOINTS.

CONCRETE VERTICAL CURB

Figure 4.1
(3 of 6)

NOTE: JOINTS TO BE 1/2" WIDE USING
I-2 MIX CEMENT MORTAR STRUCK WITH
CONCRETE TOOL

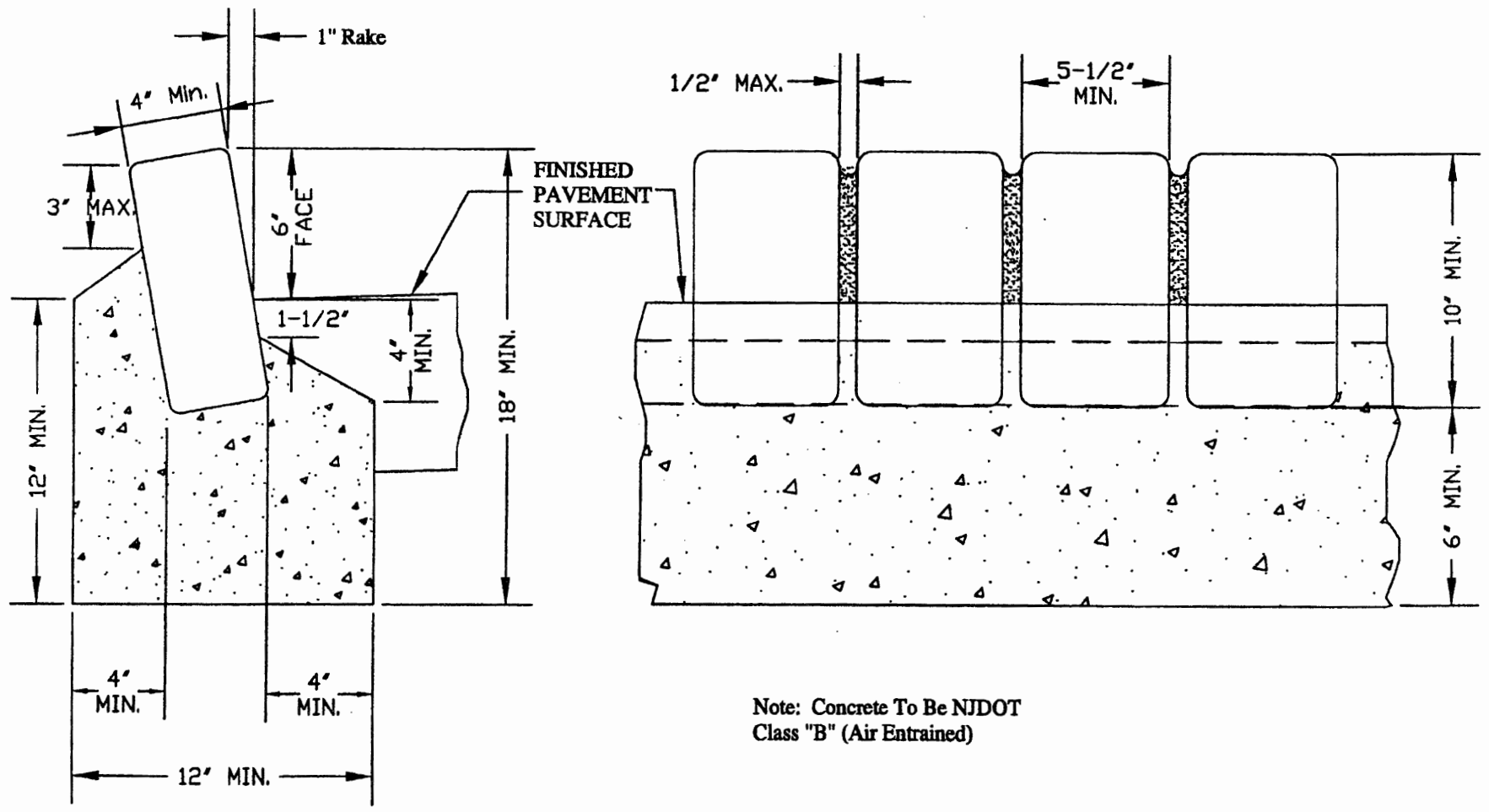


VERTICAL GRANITE BLOCK CURB

(NOT TO SCALE)

Figure 4.1
(4 of 6)

NOTE: JOINTS TO BE 1/2" WIDE USING
1-2 MIX CEMENT MORTAR STRUCK WITH
CONCRETE TOOL



Note: Concrete To Be NJDOT
Class "B" (Air Entrained)

VERTICAL GRANITE BLOCK CURB

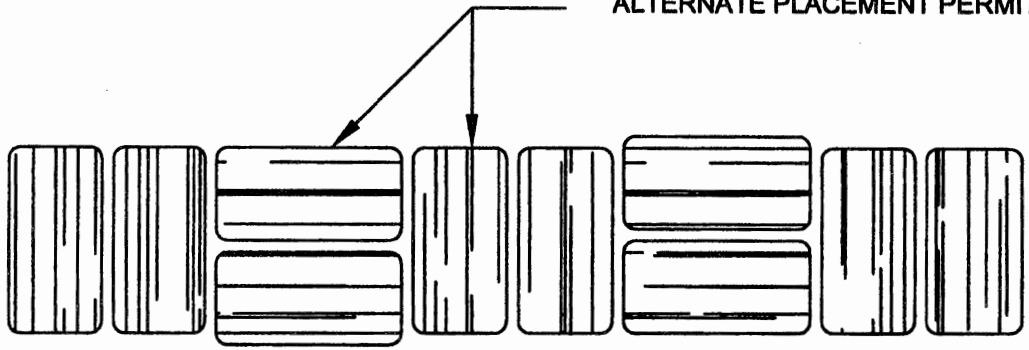
(NOT TO SCALE)

21-43

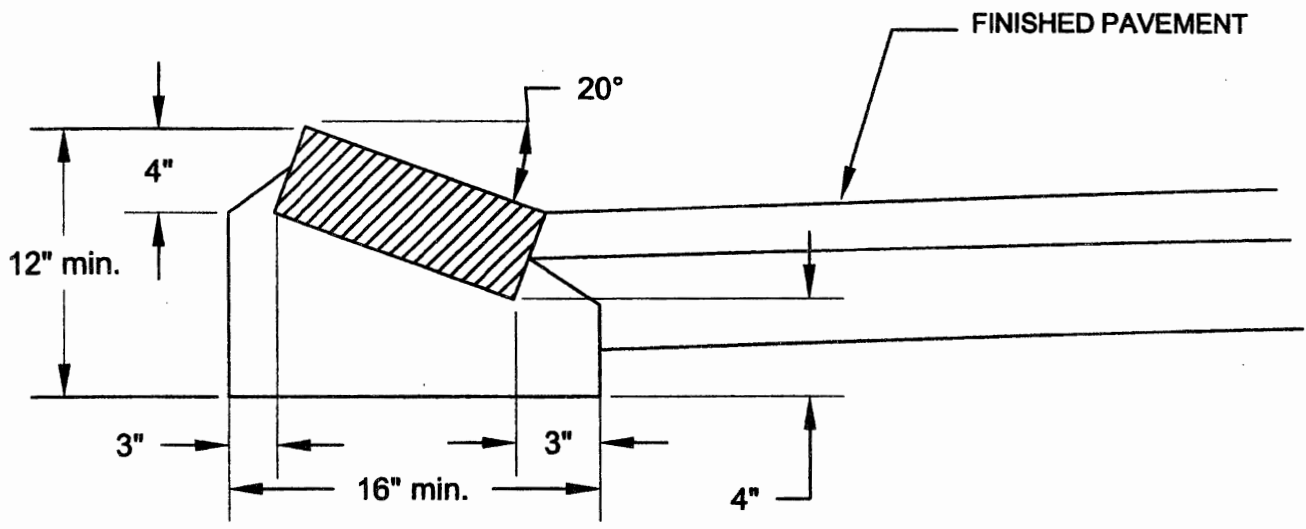
Supp. 1-6-03

Figure 4.1
(5 of 6)

PLACEMENT OF GRANITE BLOCKS
ALTERNATE PLACEMENT PERMITTED



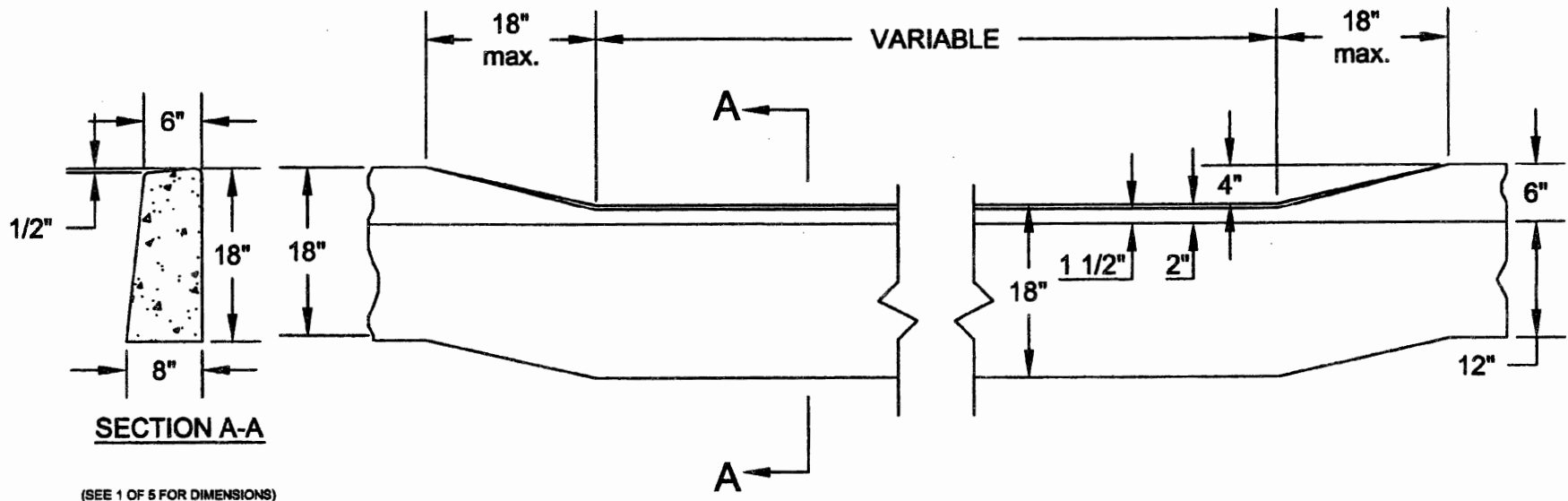
PLAN



SECTION

MOUNTABLE GRANITE BLOCK CURB

Figure 4.1
(6 of 6)



DROP CURB AT DRIVEWAYS

DETAIL SHOWN IS FOR CONCRETE CURB. DETAIL FOR GRANITE BLOCK CURB SHALL FOLLOW SAME DIMENSIONS IN THE DRIVEWAY AREA.

Administrative correction.
 See: 29 N.J.R. 1296(a).
 Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).
 See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).
 Administrative correction.
 See: 32 N.J.R. 684(b).
 Amended by R.2000 d.480, effective December 4, 2000 (operative June 3, 2001).
 See: 32 N.J.R. 2670(b), 32 N.J.R. 4277(a).
 In Figure 4.1, amended (1 of 5), (2 of 5) and (3 of 5).
 Amended by R.2002 d.399, effective December 16, 2002.
 See: 34 N.J.R. 2615(a), 34 N.J.R. 4412(a).
 Added Figure 4.1 (4 of 6); the elements of Figure 4.1 redesignated from "of 5" to "of 6"; amended Figure 4.1 (3 of 6).
 Public Notice: Notice regarding the Publication of two Notices of Adoption in the December 16, 2002 New Jersey Register.
 See: 34 N.J.R. 4343(a), 4412(a), 35 N.J.R. 219(b).

5:21-4.18 Sidewalks and bikeways construction standards

- (a) The following apply to sidewalks and graded areas:
1. Sidewalks of concrete shall be four inches thick except at points of vehicular crossing, where they shall be at least six inches thick. At vehicular crossings, concrete sidewalks shall be reinforced with welded wire fabric mesh or an equivalent.
 2. Concrete, air-entrained sidewalks shall be Class B concrete, having a 28-day verification strength of 4,500 p.s.i. Other materials may be permitted, depending on the design of the development.
 3. Graded areas shall be planted with grass or treated with other suitable ground cover, and their width and cross slope shall correspond to that of sidewalks.

- (b) The following apply to bikeways:
1. The construction of bikeways shall conform to the New Jersey Department of Transportation Planning and Design Guidelines for Bicycle Compatible Roadways and Bikeways (November 1995) and the AASHTO Guide for the Development of Bicycle Facilities (1999), incorporated herein by reference.
 2. Bicycle-safe drainage grates shall be used in the construction of all residential streets.

Administrative correction.
 See: 29 N.J.R. 1296(a).
 Amended by R.2000 d.480, effective December 4, 2000 (operative June 3, 2001).
 See: 32 N.J.R. 2670(b), 32 N.J.R. 4277(a).
 Rewrote (b)1.
 Amended by R.2002 d.399, effective December 16, 2002.
 See: 34 N.J.R. 2615(a), 34 N.J.R. 4412(a).
 In (a)2, substituted "Class B concrete" for "Class C concrete" and substituted "4,500 p.s.i." for "4,000 p.s.i."

Public Notice: Notice regarding the Publication of two Notices of Adoption in the December 16, 2002 New Jersey Register.
 See: 34 N.J.R. 4343(a), 4412(a), 35 N.J.R. 219(b).

5:21-4.19 Street grade, intersections, pavement, and lighting construction standards

- (a) The following apply to street grade:
1. Minimum street grade permitted for all streets shall be 0.5 percent.
 2. Maximum street grade shall vary by road hierarchy with flatter grades required for roads with higher ADTs, in accordance with the requirements shown in Table 4.6. Where terrain makes it necessary, the allowable maximum grade may be increased by up to two percent, but shall not exceed a maximum grade of 16 percent.
- (b) The following shall apply to intersections:
1. Street intersections shall be as nearly at right angles as possible and in no case shall be less than 75 degrees.
 2. New intersections along one side of an existing street shall, if possible, coincide with an existing intersection on the opposite of each street. Where provided, offsets shall be at least 150 feet between right-of-way centerlines.
 3. Intersections shall be rounded at the curblines with the street having the highest radius requirement, as shown in Table 4.6 below, determining the minimum standard for all curblines.
 4. Intersections shall be designed with a flat grade wherever practical.
 5. The minimum centerline radius, minimum tangent length between reverse curves, and curb radii shall be as shown in Table 4.6 below.
 6. Sight triangles shall be in accordance with AASHTO's "A Policy on Geometric Design of Highways and Streets" standards and based on the speed limits established by the government agency having jurisdiction. Sight triangle easements shall be required and shall include the area on each street corner that is bounded by the line which connects the sight or "connecting" points located on each of the right-of-way lines of the intersecting street. The planting of trees or other plantings, or the location of structures exceeding 30 inches in height that would obstruct the clear sight across the area of the easements, shall be prohibited, and a public right-of-entry shall be reserved for the purpose of removing any object, material or otherwise, that obstructs the clear sight.

TABLE 4.6
 STREET GRADE AND INTERSECTION DESIGN CRITERIA
 Street Hierarchy

	Special purpose street: <u>alley</u>	Special purpose street: <u>cul-de-sac</u>	Rural, residential access, and <u>neighborhood</u>	Minor collector	Major collector
Minimum Grade	0.5%	0.5%	0.5%	0.5%	0.5%

	Special purpose street: alley	Special purpose street: cul-de-sac	Rural, residential access, and neighborhood	Minor collector	Major collector
Maximum Grade	15%	12%	12%	10%	8%
Maximum Grade of Secondary Street within 50 feet of Intersection†	5%	5%	5%	5%	5%
Minimum Center-Line Radius	100 ft	100 ft	100 ft	150 ft	300 ft
Minimum Tangent Length between Reverse Curves	0 ft	50 ft	50 ft	100 ft	150 ft
Curb Radii	20 ft	25 ft	25 ft	30 ft	35 ft

Note: †As measured from the nearest right-of-way line.

(c) Pavement shall be designed using either Figures 4.2 through 4.5, the structural number method, or the alternate pavement design methods referenced in (c)3 below.

1. Pavement design using figures: Pavement design for special-purpose streets (cul-de-sac, rural, etc.), residential access, neighborhood, minor collector, and major collector shall follow the specifications shown in Figures 4.2 through 4.5 based on the street type. Subgrade categories are shown in Table 4.7 below.

2. Structural number method: As an alternative to using Figures 4.2 through 4.5, applicants may design

pavement using the structural numbers found in Table 4.9 below.

i. The designated structural number must be achieved by choosing the appropriate layers of bituminous stabilized surface course (Mix I-4, Mix I-5), bituminous stabilized base course (Mix I-2, stone mix), bituminous stabilized base course (Mix I-2, gravel mix), dense graded aggregate base course, soil aggregate base course, and subbase. The structural values and minimum layer thicknesses for the various materials are listed in Table 4.8 below.

TABLE 4.8

PER-INCH STRUCTURAL VALUE FOR VARIOUS PAVING MATERIALS

Layer material	Structural value per-inch thickness	Minimum thickness
Bituminous stabilized concrete surface (Mix I-4, Mix I-5) ¹	0.44	2 inches
Bituminous stabilized base course (Mix I-2, stone mix) ²	0.44	3 inches
Bituminous stabilized base course (Mix I-2, gravel mix) ²	0.37	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 shall conform to Section 404.02 of the New Jersey Department of Transportation's Standard Specification for Road and Bridge Construction (1989).

² Materials for asphalt concrete base shall conform to Sections 301.02 and 304.02 of the New Jersey Department of Transportation's Standard Specification for Road and Bridge Construction (1989).

ii. Thicknesses shall be provided in 0.5 inch increments.

TABLE 4.9

STRUCTURAL NUMBER VALUES AS A FUNCTION OF ADT AND M_r¹

Maximum ADT ²	SN ₀ prior to two-inch asphalt concrete surface course		
	M _r = 3,000 psi Poor Subgrade	M _r = 5,000 psi Medium Subgrade	M _r = 7,500 psi Good/Excellent Subgrade
200	1.60	1.15	0.84
250	1.69	1.23	0.91
500	1.99	1.49	1.14
750	2.17	1.65	1.29
1,000	2.31	1.77	1.40
1,250	2.42	1.87	1.48

1,500	2.52	1.95	1.55
1,750	2.60	2.02	1.61
2,000	2.67	2.08	1.67
2,250	2.73	2.13	1.72
2,500	2.79	2.18	1.76
2,750	2.84	2.23	1.80
3,000	2.89	2.27	1.84
3,250	2.93	2.31	1.88
3,500	2.97	2.35	1.91
3,750	3.17	2.52	2.06
4,000	3.21	2.55	2.09
4,250	3.24	2.58	2.12
4,500	3.28	2.61	2.15
4,750	3.31	2.64	2.17
5,000	3.34	2.67	2.20
5,250	3.37	2.69	2.22
5,500	3.40	2.72	2.24
5,750	3.42	2.74	2.26
6,000	3.45	2.76	2.28
6,250	3.48	2.79	2.30
6,500	3.50	2.81	2.32
6,750	3.52	2.83	2.34
7,000	3.55	2.85	2.36
7,250	3.57	2.87	2.38
7,500	3.59	2.89	2.39

Notes:

¹ All 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.

² ADT ranges for street types listed in the standards are as follows:

Rural Residential Lane	0-200
Cul-de-sac	0-250
Rural Street	0-500
Alley	0-500
Multifamily Access Cul-de-sac	0-1,000
Residential Access	0-1,500
Residential Neighborhood	0-1,500
Minor Collector	1,501-3,500
Major Collector	3,501-7,500

Source: The Table is derived from the AASHTO Guide for Design of Pavement Structures (1993).

3. Alternate pavement design: Alternate pavement design shall be allowed provided it conforms with one of the following: AASHTO Method of Flexible Pavement Design, AASHTO Method of Rigid Pavement Design, Fatigue Strength Method of Design, Multilayer Elastic Analysis, or the National Crushed Stone Association Design, incorporated herein by reference.

(d) Lighting (Reserved)

Amended by R.2000 d.480, effective December 4, 2000 (operative June 3, 2001).

See: 32 N.J.R. 2670(b), 32 N.J.R. 4277(a).

In (c), rewrote 3, inserted last sentence of introductory paragraph to 6, rewrote 6ii(4) and (5), inserted reference to AWWA C909 and inserted last sentence in 8, and rewrote 11v; and amended Figure 6.1.

SUBCHAPTER 7. STORMWATER MANAGEMENT

5:21-7.1 Stormwater management: general system strategy

(a) Stormwater management systems prepared by design engineers shall emphasize a natural, as opposed to an engineered, drainage strategy.

(b) The applicability of a natural approach depends on such factors as site storage capacity, open channel hydraulic capacity, and maintenance needs and resources. N.J.A.C. 5:21-7.6(c)4 references authoritative sources on natural and nonstructural approaches. Applicability of a stormwater approach also can be limited by regulatory constraints that govern certain structures (for example, dams) or areas (for example, development in a floodplain or wetland). (See N.J.A.C. 5:21-7.5(c).)

(c) Where a municipal ordinance requires the control of runoff from a site that is the subject of a site plan or subdivision application, then the runoff shall be estimated in accordance with provisions of this subchapter. Any structures designed to control volume or rate of flow shall be designed and constructed in accordance with these provisions. Where this subchapter does not include provisions for a particular technique or method, then the design and construction shall be in accordance with best management practices listed in N.J.A.C. 5:21-7.6(b)4.

1. All stormwater collection and conveyance structures shall be designed in accordance with the provisions of this subchapter.

(d) Construction practices shall conform to Standards for Soil Erosion and Sediment Control in New Jersey, N.J.A.C. 2:90, as administered by the New Jersey Department of Agriculture.

(e) Design engineers shall determine hydraulic capacity for open-channel or closed-conduit flow based on the Manning equation, or charts/monographs based on this equation. The hydraulic capacity is termed Q and expressed as discharge in cubic feet per second as follows:

$$Q = (1.486/n) AR^{2/3}S^{1/2}$$

where

n = Mannings roughness coefficient

A = Cross-section area of flow in square feet

R = Hydraulic radius in feet, $R = A/P$ where P is equal to the wetted perimeter, measured in feet and

defined as the length of a line of contact between the flowing water and the channel.

S = Slope of energy grade line in feet per foot

The manning roughness coefficients used by design engineers appear in Table 7.1 in N.J.A.C. 5:21-7.2.

1. A direct application of Manning's equation may be used for piped storm sewer systems. As an option, design engineers can use a standard step backwater calculation for storm sewer systems if the use of this approach is deemed appropriate by the designer. For other than pipe storm sewer systems, design engineers shall apply Manning's equation only when there is uniform flow, as defined by the following conditions: the bottom slope of the channel, energy grade line, and water surface (hydraulic grade line) are parallel; where the flow regime is in the turbulent range of Reynolds number; and where the boundaries of the cross section of the channel do not move.

(f) Velocities in open channels, excluding water quality swales, at design flow shall not be less than 0.5 of a foot per second and not greater than a velocity that will begin to cause erosion or scouring of the channel. Design engineers shall determine permissible velocities for swales, open channels, and ditches using methods presented in Standards for Soil Erosion and Sediment Control in New Jersey, N.J.A.C. 2:90, New Jersey State Soil Conservation Committee, Division of Rural Resources, New Jersey Department of Agriculture, revised to date.

(g) Velocities in closed conduits at design flow shall be at least two feet per second but not more than the velocity that will cause erosion damage to the conduit, as per the manufacturer's specifications. Minimum allowable pipe slopes shall produce velocity of at least three feet per second when the flow depth is full or half of the pipe diameter.

(h) Design engineers shall base culvert capacity on inlet/outlet analysis, as specified in *Hydraulic Design of Highway Culverts*, Hydraulic Design Series (HDS) No. 5, Report No. FHWA-IP-85-15, U.S. Department of Transportation, Federal Highway Administration, September 1985, incorporated here in by reference.

Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).

See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).

Inserted a new (c); recodified former (c) through (g) as (d) through (h); in the new (e)1, inserted "there is a uniform flow, as defined by the following conditions:" following "only when" in the last sentence; and in the new (g), substituted a reference to three feet per second for a reference to two feet per second.

Administrative correction.

See: 32 N.J.R. 684(b).

5:21-7.2 Runoff estimation techniques

(a) Watershed stormwater management requires the determination of a watershed runoff hydrograph that displays and compares the peak discharge rate and volume. Both

parameters shall compare pre- and post-development conditions. The design engineer shall determine the status of the drainage area. All significant land features such as ponds, depressions, or hedgerows that increase ponding factors shall be considered by the design engineer to compute pre-development runoff. If the design engineer is able to verify that a given hydrologic condition has existed on the site for a period of at least five years prior to the time of computation, then this existing condition may be used by the design engineer to determine runoff coefficients. As an alternative, however, the design engineer should assume the drainage area in the pre-development condition to be in good hydrologic condition (if the lands are pastures, lawns, or parks), to have good cover (if the lands are woods), or to have had conservation treatment (if the lands are cultivated).

(b) Design engineers shall use the runoff hydrograph peak rate to determine the configuration and sizes of pipes, channels, and other routing or flow-control structures. They also shall use runoff volume calculations generated by the hydrograph to determine the size of detention and retention facilities.

(c) For the runoff peak rate of discharge calculation, design engineers shall have the option to choose the methodology to estimate peak rate of discharge. For relatively small drainage areas of up to one-half square mile (320 acres), the peak rate of runoff may be calculated by the Rational Method, its derivatives, or the referenced methods that follow.

1. For areas greater than 320 acres, design engineers shall calculate peak rate of runoff in accordance with the following procedures and methods, incorporated herein by reference.

i. *Urban Hydrology for Small Watersheds, Technical Release No. 55 (TR-55)*, U.S. Department of Agriculture, Soil Conservation Service, Engineering Division, as supplemented or amended to date;

ii. *Computer Program for Project Formulation—Hydrology, Technical Release No. 20 (TR-20)*, U.S. Department of Agriculture, Soil Conservation Service, Engineering Division, as supplemented or amended to date; or

iii. *The New HEC-1 Flood Hydrograph Package, Technical Paper No. 82*, Hydraulic Engineering Center, U.S. Army Corps of Engineers, used in appropriate conditions with appropriate values.

2. The equation for the Rational Method is:

$$Q_p = C I A$$

where

Q_p = the peak runoff rate in cubic feet per second

C = the runoff coefficient

I = the average rainfall intensity in inches per hour occurring at the time of concentration t_c

t_c = time of concentration in minutes

A = the size of the drainage area in acres

i. Typical C values for 100 year frequency storm events appear in Table 7.2 below. Coefficients for recurrence intervals more frequent than the 100-year storm should be reduced in accordance with Table 7.3 below. Impervious surfaces are not subject to adjustment.

ii. The Rational Method is most accurate when dealing with uniform drainage areas. Design engineers may divide nonuniform drainage areas into "uniform" sub-drainage areas and calculate the runoff from each of these areas separately, or they may use the weighted average technique for a composite drainage area. Design engineers also may use runoff coefficients from the following sources, incorporated herein by reference:

(1) *Design of Roadside Drainage Channels—Hydraulic Design Series No. 4, Report No. FHWA-EPD-86-103*, May 1965, U.S. Department of Transportation, Federal Highway Administration, as supplemented or amended to date; and

(2) *Airport Drainage, AC¹⁵⁰§320-5B*, U.S. Department of Transportation, Federal Aviation Administration, July 1970, as supplemented or amended to date.

3. Design engineers may estimate time of concentration (t_c) with Figure 7.1, Time of Concentration nomograph from *Design Manual—Roadway*, New Jersey Department of Transportation, Division of Roadway Design, Bureau of Roadway Design Standards, May 1992, below. Use of this figure is limited to the design of storm sewer systems. For other purposes, design engineers shall use the procedures outlined in Chapter 3 of *Technical Release No. 55, Urban Hydrology for Small Watersheds (TR-55)*, U.S. Department of Agriculture, Soil Conservation Service, Engineering Division, as supplemented or amended to date.

FIGURE 7.1

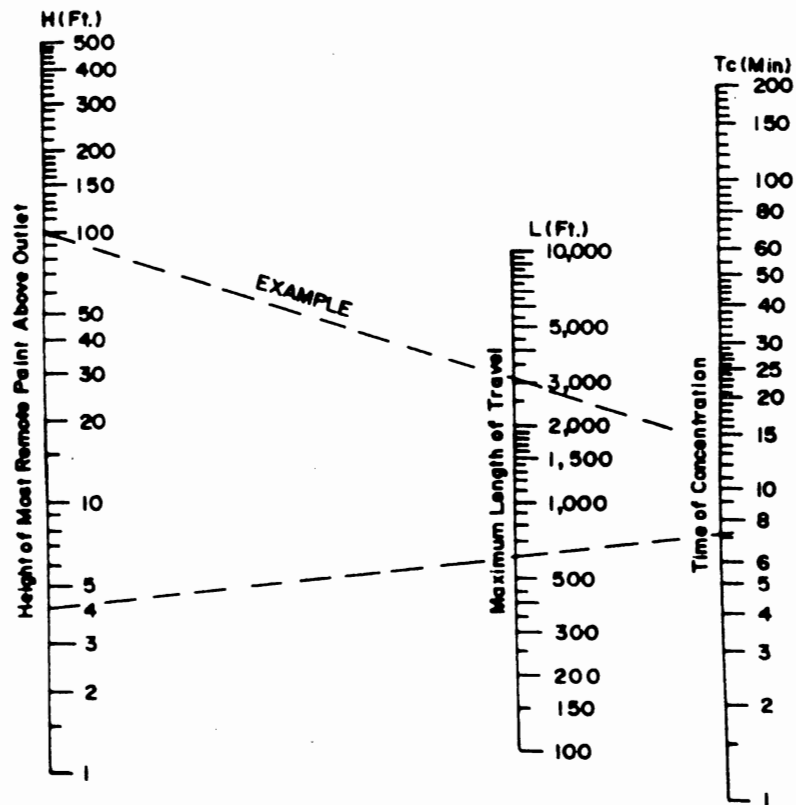
TIME OF CONCENTRATION

Example

Height = 100 ft.

Length = 3000 ft.

Time of Concentration = 14 Min.



NOTE:

Use Nomograph T_c For Natural Basins with well defined Channels, for Overland Flow on Bare Earth, and for Mowed Grass Roadside Channels.

For Overland Flow, Grassed Surfaces, Multiply T_c by 2.

For Overland Flow, Concrete or Asphalt Surfaces, Multiply T_c by 0.4.

For Concrete Channels, Multiply T_c by 0.2.

Based on Study by P.Z. Kirpich Civil Engineering, Vol. 10, No. 6, June 1940, p. 362.

TABLE 7.1
MANNING'S ROUGHNESS COEFFICIENTS

<u>Closed Conduits</u>	<u>Smooth</u>	<u>Normal</u>	<u>Rough</u>
Cast Iron			
Coated	0.010	0.013	0.014
Uncoated	0.011	0.014	0.016
Clay			
Vitrified Sewer	0.011	0.014	0.017
Vitrified sewer with manholes	0.013	0.015	0.017
Common drainage tile	0.011	0.013	0.017
Concrete			
Culvert strait and free of debris	0.010	0.011	0.013
Culvert with bends, connections	0.011	0.013	0.014
Finished	0.011	0.012	0.014
Sewer with manhole inlets	0.013	0.015	0.017
Unfinished steel form	0.012	0.013	0.014
Unfinished smooth wood form	0.012	0.014	0.016
Unfinished rough wood form	0.015	0.017	0.020
Metal, Corrugated			
Subdrain	0.017	0.019	0.021
Storm drain	0.021	0.024	0.030
Polyvinyl Chloride (PVC)	0.010	0.010	0.010
Polyethylene (PE)	0.008	0.009	0.011
Steel			
Lockbar and welded	0.010	0.012	0.014
Riveted and spiral	0.013	0.016	0.017
Wrought Iron			
Black	0.012	0.014	0.015
Galvanized	0.013	0.016	0.017
<u>Lined or Built-up Channels</u>	<u>Minimum</u>	<u>Normal</u>	<u>Maximum</u>
Asphalt			
Smooth	0.013	0.013	
Rough	0.016	0.016	
Brick			
Glazed	0.011	0.013	0.015
In cement mortar	0.012	0.015	0.018
Cement			
Neat surface	0.010	0.011	0.013
Mortar	0.011	0.013	0.015
Concrete			
Trowel finish	0.011	0.013	0.015
Float finish	0.013	0.015	0.016
Finished with gravel on bottom	0.015	0.017	0.020
Unfinished	0.014	0.017	0.020
Gunite (good section)	0.016	0.019	0.023
Gunite (wavy section)	0.018	0.022	0.025
On good excavated rock	0.017	0.020	
On irregular excavated rock	0.022	0.027	
Concrete Bottom Float Finished with sides of			
Dressed stone in mortar	0.015	0.017	0.020
Random stone in mortar	0.017	0.020	0.024
Cement rubble masonry, plastered	0.016	0.020	0.024
Cement rubble masonry	0.020	0.025	0.030
Dry rubble or rip rap	0.020	0.030	0.035
Dressed Ashlar	0.013	0.015	0.017
Gravel Bottom Sides of			
Formed concrete	0.017	0.020	0.025
Random stone in mortar	0.020	0.023	0.026
Dry rubble or rip rap	0.023	0.033	0.036
Masonry			
Cement rubble	0.017	0.025	0.030
Dry rubble	0.023	0.032	0.035
Metal, Corrugated	0.021	0.025	0.030
Steel, Smooth Surface			

	<u>Smooth</u>	<u>Normal</u>	<u>Rough</u>
<u>Closed Conduits</u>			
Unpainted	0.011	0.012	0.014
Painted	0.012	0.013	0.017
<u>Wood</u>			
Planed, untreated	0.010	0.012	0.014
Planed, treated	0.011	0.012	0.015
Unplaned	0.011	0.013	0.015
Plank with battens	0.012	0.015	0.018
Lined with roofing	0.010	0.014	0.017
<u>Vegetal Lining</u>	0.030		0.500
<u>Excavated, Dredged, or Natural Channels</u>	<u>Minimum</u>	<u>Normal</u>	<u>Maximum</u>
<u>Channels Not Maintained and Brush Uncut</u>			
Dense weeds, high flow depth	0.050	0.080	0.120
Clean bottom, brush on sides	0.040	0.050	0.080
Same, highest stage of flow	0.045	0.070	0.110
Dense brush, high stage	0.080	0.100	0.140
<u>Drag Line—Excavated or Dredged</u>			
No vegetation	0.025	0.028	0.033
Light brush or banks	0.035	0.050	0.060
<u>Earth, Straight and Uniform</u>			
Clean, recently completed	0.016	0.018	0.020
Clean, after weathering	0.018	0.022	0.025
Gravel, uniform section, clean	0.022	0.025	0.030
Short grass, few weeds	0.022	0.027	0.033
<u>Earth, Winding and Sluggish</u>			
No vegetation	0.023	0.025	0.030
Grass, some weeds	0.025	0.030	0.033
Dense weeds or aquatic plants	0.030	0.035	0.040
Earth bottom and rubble sides	0.028	0.030	0.035
Stony bottom and weedy banks	0.025	0.035	0.040
Cobble bottoms and clean sides	0.030	0.040	0.050
<u>Rock Cuts</u>			
Smooth and uniform	0.025	0.035	0.040
Jagged and irregular	0.035	0.040	0.050
<u>Minor Streams (top width at flood stage < 100 ft)</u>			
(a) <u>Streams on plain</u>			
1. Clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
2. Same as above, but some stones and weeds	0.030	0.035	0.040
3. Clean, winding, some pools and shoals	0.033	0.040	0.045
4. Same as above, but some weeds and stones	0.035	0.045	0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
6. Same as 4, but more stones	0.045	0.050	0.060
7. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
(b) <u>Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages</u>			
1. Bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
2. Bottom: cobbles with large boulders	0.040	0.050	0.070

TABLE 7.2

RUNOFF COEFFICIENTS (ANTECEDENT MOISTURE CONDITION) AMCII

Land Use Description	Hydrologic Soil Group			
	A	B	C	D
Cultivated land:				
without conservation treatment	0.49	0.67	0.81	0.88
with conservation treatment	0.27	0.43	0.61	0.67
Pasture or range land:				
poor condition	0.38	0.63	0.78	0.84
good condition	NA	0.25	0.51	0.65
Meadow: good condition	NA	NA	0.44	0.61
Wood or forest land:				
thin stand, poor cover, no mulch	NA	NA	0.59	0.79
good cover	NA	NA	0.45	0.59
Open spaces, lawns, parks, golf courses, cemeteries:				
good condition, grass cover on 75% or more of area	NA	0.25	0.51	0.65
fair condition, grass cover on 50-75% of area	NA	0.45	0.63	0.74
Commercial and business areas (85% impervious)	0.84	0.90	0.93	0.96
Industrial districts (72% impervious)	0.67	0.81	0.88	0.92
Residential:				
Average lot size	Average impervious			
1/8 acre	65%	0.59	0.76	0.86
1/4 acre	38%	0.25	0.55	0.70
1/2 acre	30%	NA	0.49	0.67
3/4 acre	25%	NA	0.45	0.65
1 acre	20%	NA	0.41	0.63
Paved parking lots, roofs, driveways, etc.	0.99	0.99	0.99	0.99
Streets and roads:				
paved with curbs and storm sewers	0.99	0.99	0.99	0.99
gravel	0.57	0.76	0.84	0.88
dirt	0.49	0.69	0.80	0.84

Note: NA denotes information is not available; design engineers should rely on another authoritative source.

Source: New Jersey Department of Environmental Protection, Technical Manual for Land Use Regulation Program, Bureau of Inland and Coastal Regulations, Stream Encroachment Permits (Trenton, New Jersey: Department of Environmental Protection, Revised September 1995) p. 12.

TABLE 7.3

ADJUSTMENT FACTORS FOR
RUNOFF COEFFICIENTS

Frequency of Event (years)	Runoff Coefficient Adjustment Factor
2 to 10	0.80
25	0.88
50	0.96
100	1.00

Note: These adjustment factors are from a similar table presented on page 3-61 of *Design of Urban Highway Drainage, The State of the Art*, Report No. FHWA-TS-79-225, U.S. Department of Transportation, Federal Highway Administration, Offices of Research and Development, Implementation Division (HDV-21), August 1979. The values in this table are to be used with the Rational formula, where the runoff coefficient is taken from Table 7.2.

4. When using the Rational Method, rainfall intensity as a function of duration and storm frequency shall be based upon Figure 7.2 Rainfall Intensity Curves below and/or local rainfall frequency data, where available. A copy of Figure 7.2 also appears in the New Jersey Department of Transportation's *Design Manual—Roadway*, May 1992. Figure 7.2 shows rainfall intensity curves for Trenton, New Jersey. Design engineers may use this information for other parts of the State or they may substitute local rainfall frequency data, when available. In all instances, design engineers shall use a minimum time of concentration of 10 minutes. For storm sewer design, a 10-year to 25-year storm frequency consistent with localized circumstances should be considered as a minimum, unless special circumstances are involved such as inadequate downstream stormwater facilities, lack of positive overland relief, or evidence of local flooding. In such special circumstances, design engineers shall design facilities to accommodate, as a minimum, the following storm frequencies:

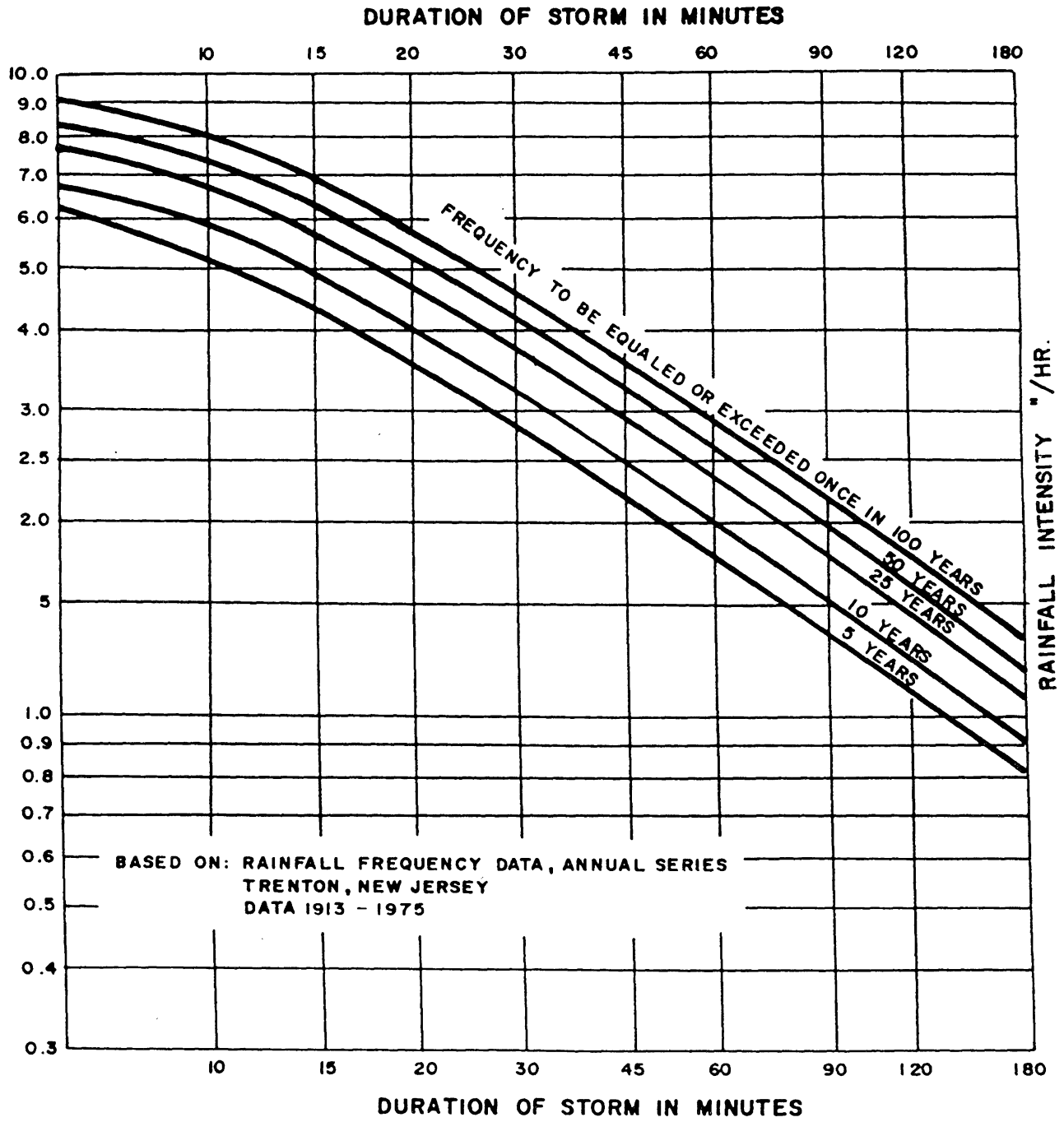
Hydrologic Soil Group

i. Ten-year storm for storm drain systems where excess flow can continue downgrade in the street and not exceed the gutter capacity. Also, ten-year storms shall be used at low points in storm drain systems with overland relief.

ii. Twenty-five-year storm where flow in a storm drain is totally carried by pipe when conditions under (c)4i above do not apply.

FIGURE 7.2

RAINFALL INTENSITY CURVES



iii. Twenty-five-year storm for culvert design where the culvert will be located in streams shown as a blue line on the New Jersey State Atlas or the United States Coast and Geodetic Survey maps. Culverts with an upstream drainage area of 50 acres or more shall be designed to accommodate a 100-year frequency storm in accordance with Flood Hazard Area Control Regulations, N.J.A.C. 7:13-2.16.

iv. Twenty-five-year storms for open channels where the upstream drainage area is less than 50 acres. When the upstream drainage area is 50 acres or more, design engineers shall design open channels to accommodate the 100-year storm, in accordance with Flood Hazard Area Control Regulations, N.J.A.C. 7:13-2.16.

5. The size of the drainage area shall include onsite and offsite lands contributing to the design point.

6. Computer software adaptations of the Rational Method or the S.C.S. TR-55 are acceptable, provided their data and graphic printout allow review and evaluation.

(d) Design engineers shall use a consistent method to calculate peak rate of runoff and volume when computing runoff hydrographs. If either TR-55, TR-20, or HEC-1 is used to calculate peak rate of runoff, then the same method shall be used to determine volume. If the rational method is used for peak flow calculations, the design engineer shall use the Modified Rational method to calculate peak volume to be used for basin routing. A maximum drainage area of 20 acres shall be used for the Modified Rational Method.

Administrative correction.
 See: 29 N.J.R. 1296(a).
 Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).
 See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).
 In (b), substituted "size" for "necessity for, and sizing" in the second sentence; in (c), added a third sentence in 2i, and inserted new third and fourth sentences in the introductory paragraph of 4; in (d), inserted "when computing runoff hydrographs" at the end of the first sentence; and in Table 7.1, added a reference to Minor Streams.
 Administrative correction.
 See: 32 N.J.R. 684(b).

5:21-7.3 Runoff collection system design

(a) Design engineers shall determine pipe size based on design runoff, conduit entrance conditions, and hydraulic capacity.

(b) In general, no pipe size in the storm drainage system shall be less than 15 inches in diameter. Design engineers may use a 12-inch diameter pipe as a cross-drain to a single inlet. Design engineers shall use the Manning equation to determine hydraulic capacity of pipes.

(c) All discharge pipes shall terminate with an appropriate precast concrete or flared-end section or concrete head-wall with or without wingwalls, as conditions require. Design engineers shall consider such site conditions as slope,

soil stability, vegetation, grade, and size of conduit to determine whether or not to use wingwalls.

(d) Materials used in the construction of storm sewers shall be constructed of reinforced concrete, ductile iron, or corrugated polyethylene, 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. Specifications referred to, such as ASTM or AWWA, shall be the latest revision in effect at the time of application.

1. The following apply to reinforced concrete pipe:
 - i. Circular reinforced concrete pipe and fittings shall meet the requirements of ASTM C76.
 - ii. Elliptical reinforced concrete pipe shall meet the requirements of ASTM C507.
 - iii. Joint design and joint material for circular pipe shall conform to ASTM C443.
 - iv. Joints for elliptical pipe shall be bell and spigot or tongue and groove sealed with butyl, rubber tape, rubber ring gaskets, or external sealing bands conforming to ASTM C877.
 - v. All pipe shall be Class III, minimum unless loading conditions call for stronger pipe (that is, higher class).
 - vi. The minimum depth of cover over the concrete pipe shall be as designated by the American Concrete Pipe Association in Table 7.4 below as follows.

TABLE 7.4

MINIMUM DEPTH OF COVERAGE OVER CONCRETE PIPE

Pipe Diameter (in inches)	ASTM Class Pipe	Minimum Cover (surface to top of pipe in inches)
12	III	17
	IV	12
	V	7
15	III	16
	IV	11
	V	7
18	III	16
	IV	10
	V	6
24	III	15
	IV	6
	V	6
30	III	10
	IV	6
	V	6

Pipe Diameter (in inches)	ASTM Class Pipe	Minimum Cover (surface to top of pipe in inches)
36 & above	III	6
	IV	6

Minimum depth of coverage as designated by the American Concrete Pipe Association.

vii. Minimum depth of cover standards for ductile iron and corrugated polyethylene pipe shall conform to manufacturer standards.

2. Ductile iron pipe shall conform to ANSI/AWWA C151/A21.51. Joints shall conform to ANSI/AWWA C111/A21.11 or ANSI/AWWA C115/A21.15 as appropriate. Pipe shall be designed in accordance with ANSI/AWWA C150/A21.50. The outside of the pipe shall be coated in accordance with ANSI/AWWA C151/A21.51, and the inside lined in accordance with ANSI/AWWA C104/A21.4. Ductile iron pipe shall be installed in accordance with AWWA C600.

3. Corrugated polyethylene pipe shall conform to AASHTO M252 for three through 10 inches and AASHTO M294 for sizes 12 inches and larger. 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 Plastics 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, "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 groundwater tables, design engineers shall check for floatation.

4. Corrugated metal pipe, when approved by the municipal engineer, shall meet the requirements and be installed in the manner specified in the subchapter appendix.

(e) Pipe bedding and backfill shall be provided as specified in *Design and Construction of Urban Stormwater Management Systems*, ASCE Manuals and Reports of Engineering Practice No. 77, 1993, incorporated herein by reference. Bedding and backfill for any pipe material not covered by this manual shall be installed in accordance with manufacturer's recommendations. The municipal engineer may require the developer to provide professional certification as to the suitability of backfill material and where such suitability does not exist, any modifications needed to use on-site material and the appropriate methods to install this material. The municipal and/or utility engineer shall rely on this certification.

(f) No pipe shall be placed on private property unless the owner of the land is to own or operate the pipe, or an easement deeded to the municipality is obtained. All easements shall be a minimum of 20-foot wide unless depth of pipe, soil conditions, or additional utilities require wider. Where the easement is located adjacent to a right-of-way, the municipality may approve a narrower easement.

Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).

See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).

In (d), inserted a reference to Table 7.4 in 1vi, rewrote 2, and rewrote the first sentence in 3.

Amended by R.2000 d.480, effective December 4, 2000 (operative June 3, 2001).

See: 32 N.J.R. 2670(b), 32 N.J.R. 4277(a).

Rewrote (f).

5:21-7.4 Inlets, catch basins, manholes, and outlets

(a) Design engineers shall design inlets, catch basins, and manholes in accordance with the New Jersey Department of Transportation's *Standard Specifications for Road and Bridge Construction* (1989). Design engineers shall use bicycle-safe grates. For Type A inlets, they should use a frame and single grate. Type B inlets require a frame, grate, and curb-type inlet with back piece. Type E inlets require a frame and double grate.

(b) Inlet spacing depends on the inlet capacity. Maximum gutter line flow is 400 feet. The maximum capacity of a curb inlet shall be six cubic feet per second. Area inlets in parking lots should be limited to three cubic feet per second.

(c) Manholes shall be precast concrete or concrete block coated with two coats of portland cement mortar outside the manhole. Masonry brick may be used to make vertical adjustment to rims, as long as the adjustments are 12 inches or less. In acidic soils, all manholes shall have two coats of black bitumastic waterproofing applied per manufacturer's instruction.

(d) If precast manhole barrels and cones are used, they shall conform to ASTM Specification C478, with round rubber gasketed joints, conforming to ASTM Specification C923. Both ASTM Specifications are incorporated herein by reference. Maximum absorption shall be eight percent in accordance with ASTM Specification C478, method A.

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

(f) Manhole frames and covers shall be of cast iron, conforming to ASTM Specification A48, Class 30, incorporated herein by reference, and be suitable for H-20 loading capacity. Manhole covers in remote locations may have a locking device.

(g) Outlet grates, fences, and other safety features for stormwater management facilities shall conform with New Jersey Department of Environmental Protection's Stormwater Management Rules, N.J.A.C. 7:8. Safety requirements for detention basin and other stormwater facilities are incorporated in N.J.A.C. 5:21-7.5(f)6.

(h) The channel should be, insofar as possible, a smooth continuation of the pipe. The pipe may be laid through the manhole and the top half removed by saw cut. The completed channel should be U-shaped. The channel height shall be three-fourths of the diameter of the pipe.

(i) The bench should provide good footing for a workman and a place where minor tools and equipment can be laid. It must have a slope of four to eight percent.

Administrative correction.

See: 29 N.J.R. 1296(a).

Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).

See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).

Amended by R.2002 d.399, effective December 16, 2002.

See: 34 N.J.R. 2615(a), 34 N.J.R. 4412(a).

In (b), in second sentence substituted "gutter line flow" for "distance between inlets".

Public Notice: Notice regarding the Publication of two Notices of Adoption in the December 16, 2002 New Jersey Register.

See: 34 N.J.R. 4343(a), 4412(a), 35 N.J.R. 219(b).

5:21-7.5 Detention basins and other stormwater facilities

(a) Development shall use the best available technology to accommodate stormwater management by natural drainage strategies where possible and practicable. Detention facilities, when required or selected, shall be designed, constructed, and maintained according to the following standards.

(b) Design engineers shall coordinate structural detention requirements with nonstructural practices, such as cluster land-use development, open space acquisition, riparian buffers, and flood hazard controls.

(c) Detention and all other stormwater facilities shall conform to the New Jersey Department of Environmental Protection's Stormwater Management Rules, at N.J.A.C. 7:8-3.4. Design engineers shall also adhere to, when applicable, the stormwater design requirements in the following rules:

1. Coastal Zone Management Rules, N.J.A.C. 7:7E;
2. Dam Safety Standards, N.J.A.C. 7:20;
3. Soil Erosion and Sediment Control Standards, N.J.A.C. 2:90-1;
4. Flood Hazard Area Regulations, N.J.A.C. 7:13;
5. Pinelands Regulations, N.J.A.C. 7:50-6.81 through 6.88; and
6. Freshwater Wetlands Protection Act Rules, N.J.A.C. 7:7A.

(d) Where municipalities require the use of detention facilities, design engineers shall design the basins to accommodate site runoff generated from two-year, 10-year, and 100-year storms as routed to the basin, considered individually, unless the detention basin is classified as a dam, in which case the facility must comply with the Dam Safety Standards, N.J.A.C. 7:20.

1. These design storms shall be defined as either a 24-hour storm using Type III rainfall distribution when using U.S. Soil Conservation Service procedures (such as TR-20 or TR-55 tabular method), or the design storm resulting in the greatest storage volume to achieve the required outflow using a design method such as the Modified Rational Method. Runoff greater than that occurring from the 100-year, 24-hour storm will be passed over an emergency spillway.

i. A map of approximate geographic boundaries for S.C.S. rainfall distributions presented on page B-2 of the June 1986 edition of TR-55 shows all of New Jersey in the Type III region. Although the May 1982 version of TR-20 does not include a standard S.C.S. 24-hour, cumulative Type III distribution rainfall table like it does for Type I, IA, and II, there is a test version (Version 2.04TEST) of the program available from the S.C.S. which does. The Type III distribution also can be manually added to a TR-20 model by using a RAINFL table.

2. Detention facilities shall be designed to accommodate runoff from the development of the site for the two-, 10-, and 100-year storm events so that pre-development peak flow rates that impact on downstream properties, watercourses, and/or drainage systems are not increased.

3. Where there is not a regional stormwater plan, as specified below in (d)4, then the design engineer shall design detention facilities such that the post-project construction peak runoff for the two-year storm event is 50 percent of the pre-project construction peak runoff rate. The post-project construction peak runoff rates for the 10 and 100-year storm events shall be 75 and 80 percent, respectively, of the pre-project construction peak runoff rates. It should be noted that these percentages only apply to the portion of the post-project runoff from the site under development. Offsite runoff may be computed at 100 percent of the pre-project rate.

4. If a watershed stormwater management plan for the region or watershed exists, approved and adopted pursuant to the New Jersey Department of Environmental Protection rules at N.J.A.C. 7:8, then the design engineer shall design stormwater management systems to conform to that plan. For some parts of the watershed, this may mean a detention basin is unnecessary.

5. If the development site is not part of a watershed stormwater management plan, then the design engineer may model the watershed to be consistent with regulations administered by the Department of Environmental

Protection and shall design stormwater management facilities to conform to that model. This analysis shall include impacts of existing development and all potential future development in the drainage area. For some parts of the watershed, this may mean detention is unnecessary.

(e) Design engineers shall locate detention facilities (either "wet" or "dry") so as to not interfere with or adversely affect existing surface waters on the site or adjacent to the site. Excavation for detention facilities shall be designed to be the maximum practical distance above seasonally high groundwater elevation. In the case of "wet" detention facilities, storage may only be presumed to be available above the elevation of the seasonal high groundwater. If the facility is designed as an infiltration basin, the bottom of the basin shall be a minimum of two feet above the elevation of the seasonally high water table. The determination of the seasonal high water table shall be made by the applicant's engineer.

(f) The following list of general structural criteria shall be used to design stormwater detention basins.

1. Detention components: principal basin control structure (quantity control), as follows:

i. Principal basin control structures will consist of orifice and/or weir control devices. Design engineers shall design orifices based upon the following equation:

$$Q = C A (2gH)^{0.5}$$

where

Q = the flow rate in cubic feet per second

C = 0.6 (The orifice flow coefficient "C" may vary, depending on entrance conditions. Design engineers may use other coefficients with appropriate references.)

A = cross-section area of flow in square feet

H = the vertical distance in feet between the center of the orifice and the water surface

2g = 64.4 feet per second²

To minimize the chance of clogging, orifices intended solely for runoff quantity control will be at least six inches in diameter (or its equivalent). All joints are to be watertight. In addition, trash racks and/or anti-vortex devices shall be required. When weirs are used alone or in conjunction with orifices, design engineers shall use the following equation:

$$Q = C_w L (h)^{3/2}$$

where

Q = the flow rate in cubic feet per second

C_w = 3.2 (design engineers may use other coefficients with appropriate references)

L = length of the weir in feet

h = the vertical distance in feet between water surface elevation and the crest of the weir.

All weirs shall be constructed as part of a reinforced concrete structure with appropriate grates.

ii. Eight-inch-thick, anti-seep collars are to be installed along outlet pipes when required by the municipal engineer. Reinforcement steel shall be No. 5 bars at 12 inches both ways, with two inches of cover on both faces (minimum).

iii. Where necessary for stability of the outlet pipe, a concrete cradle shall be provided.

iv. All principal basin control structures shall be precast or reinforced concrete. All joints are to be watertight.

v. Suitable lining shall be placed upstream and downstream of principal basin control structures, as necessary, to prevent scour and erosion. Such lining shall conform to Standards for Soil Erosion and Sediment Control in New Jersey, N.J.A.C. 2:90, promulgated by the N.J. State Soil Conservation Committee.

2. Detention components: emergency spillways, as follows:

i. Vegetated emergency spillways shall have side slopes not exceeding three horizontal to one vertical.

ii. Maximum velocities in emergency spillways shall be checked based on the velocity of the peak flow in the spillway resulting from the routed Emergency Spillway Hydrograph. The design of the emergency spillway will be based on the 100-year inflow to the basin, except for class IV dams, which shall comply with the Dam Safety Standards, N.J.A.C. 7:20 The design of the emergency spillway assumes the principal spillway is malfunctioning and will not allow any discharge or flow. Where maximum velocities exceed those contained in Table 7.5 below, suitable lining shall be provided.

iii. Where maximum velocities exceed the allowable velocities for soil stability as determined in the Standards for Soil Erosion and Sediment Control in New Jersey, N.J.A.C. 2:90, promulgated by the N.J. State Soil Conservation Committee, suitable lining should be provided. Design engineers also may check maximum velocities in emergency spillways based on the velocity of the peak flow in the spillway resulting from the routed Emergency Spillway Hydrograph. Where maximum velocities exceed those contained in Table 7.5 below, suitable lining shall be provided. Linings shall meet specifications required in Hydraulic Engineering Circular No. 15—Design of Stable Channels with Flexible Linings, published by the U.S. Department of Transportation, Federal Highway Administration or Standards for Soil Erosion and Sediment Control in New Jersey, N.J.A.C. 2:90, promulgated by the State Soil Conservation Committee, New Jersey Department of Agriculture.

TABLE 7.5

PERMISSIBLE VELOCITIES FOR EMERGENCY
SPILLWAYS WITH UNIFORM STANDS FOR VARIOUS
WELL-MAINTAINED GRASS COVERS

Ground Cover	Slope Percent	Permissible Velocities On:	
		Erosion- resistant soils (fps)	Easily eroded soils (fps)
Kentucky bluegrass	5-10	6	4
Lawn grass mixture	0-5	5	4
	5-10	4	3
Weeping lovegrass			
Alfalfa	0-5	3.5	2.5
Crabgrass			

Note: fps=feet per second

Designs are not limited to the ground covers shown above. Design engineers may use reinforced grass technologies and other types of ground cover in accordance with appropriate authoritative standards.

Source: Soil Conservation Service, U.S. Department of Agriculture (Washington, DC: Government Printing Office, 1959). Cited in ULI-ASCE-NAHB, Residential Storm Water Management: Objectives, Principles, and Design Considerations (Washington, DC: Government Printing Office, 1975).

3. Detention components: dams, as follows:

i. Dam refers to any artificial dike, levee, or other barrier with appurtenant works that is constructed to impound water on a permanent or temporary basis and raises the water level five feet or more above the usual, mean, low-water height when measured from the downstream toe-of-dam to the emergency spillway crest, or, in the absence of an emergency spillway, the top of the dam.

ii. Design engineers shall design all dams in accordance with Dam Safety Standards, N.J.A.C. 7:20, administered by the New Jersey Department of Environmental Protection.

4. Detention basin berms and embankment ponds, as follows:

i. A detention basin berm is a water impoundment made by either constructing an embankment (a facility referred to as an embankment pond), or excavating a pit or dugout that does not qualify as a dam. Detention basin berms constructed by the second method are referred to as excavated ponds.

ii. Site conditions shall be such that runoff from the design storm can safely pass through: a natural or constructed emergency spillway designed to accept the entire 100-year flow; a combination of a principal spillway and the emergency spillway designed to ensure passage of the 100-year flow when either the principal spillway and/or the emergency spillway flows are impeded by debris; or a principal spillway designed so as to allow it to continue to function reliably, passing the 100-year flow, when impeded by debris.

(1) Drainage area of the pond shall be protected against erosion so that expected sediment does not shorten the planned effectiveness of the structure.

(2) When necessary, embankment ponds shall have foundation cutoff walls of relatively impervious material under the berm. The cutoff walls shall extend up to abutments as required and be deep enough to extend into a relatively impervious layer, or provide for a stable structure when combined with seepage control. The cutoff trench shall have a bottom width adequate to accommodate the equipment used for excavation, backfill, and compaction operations. Cutoff wall side slopes shall not be steeper than one horizontal to one vertical. The cutoff walls shall extend up to the normal water line and the minimum depth shall be at least three feet.

(3) Design engineers shall include seepage controls if pervious layers are not intercepted by the cutoff, seepage creates swamping downstream, such control is needed to insure a stable embankment, or special problems may require drainage for a stable berm. Seepage may be controlled by foundation, abutment, or embankment drains; reservoir blanketing; or a combination of these measures.

(4) The minimum top width for a berm shall be six feet. The minimum top width of dams should be 10 feet.

(5) All slopes must be designed to be stable. If needed to protect the slopes of the berm, special measures such as rock rip-rap, sand gravel, fabrics, geofabrics, geomembranes, or special vegetation shall be provided, as specified by the standards in: Guide for Design and Layout of Vegetative Wave Protection for Earth Dam Embankments, Technical Release No. 56, and Riprap for Slope Protection Against Wave Action, Technical Release No. 69. Both reports are published by the U.S. Department of Agriculture, Soil Conservation Service, and are incorporated herein by reference.

(6) The minimum elevation of the top of the settled embankment shall be one foot above the water surface in the detention basin, with the emergency spillway flowing at the design depth. The minimum difference in elevation between the crest of the emergency spillway and the settled top width of the structure shall be two feet for all berms having more than a 20-acre drainage area or more than 20 feet in effective height. Design engineers shall increase the design height of the structure by the amount needed to insure that after settlement the height of the berms equals or exceeds the design height. This increase shall not be less than five percent, except where detailed soil testing and laboratory analysis shows that a lesser amount is adequate.

(7) Design engineers shall place a pipe conduit with needed appurtenances under or through the berm except where rock, concrete, or other types of mechanical spillways are used or where the rate and duration of flow can be safely handled by a vegetated or earth spillway.

iii. The design elevation of the top of all embankments and berms shall be one foot or greater than the maximum water surface elevation in the basin, when stormwater from the 100-year flood passes over the emergency spillway. The design height, defined as the vertical distance from the top to the bottom of the deepest cut, shall be constructed to insure that the top elevation will be maintained following all settlement.

(1) When the design discharge of the principal spillway is considered in calculating peak outflow

through the emergency spillway, the crest elevation of the inlet shall be such that the full flow will be generated in the conduit before there is discharge through the emergency spillway. The inlets and outlets of the principal spillway shall be designed to function satisfactorily for the full range of flow and hydraulic head anticipated. The capacity of the pipe conduit shall be adequate to discharge long-duration, continuous, or frequent flows without flow through the emergency spillways. The pipe diameter shall be no less than six inches. If the pipe conduit diameter is larger than 10 inches, its design discharge may be considered when calculating the peak outflow rate through the emergency spillway.

(2) Pipe conduits under or through the berm shall be capable of withstanding external loading without yielding, buckling, or cracking. Flexible pipe strength shall not be less than that necessary to support the design load with the maximum of five percent deflection. The inlets and outlets shall be structurally sound and made of materials compatible with those of pipe. All pipe joints shall be made watertight by the use of couplings, gaskets, or caulking.

iv. In earthen berms and embankment ponds, acceptable pipe materials are corrugated polyethylene, reinforced concrete, polyvinyl chloride, and ductile iron. When necessary for stability, concrete and ductile pipe shall be laid in a concrete bedding. Corrugated polyethylene pipe exposed to direct sunlight shall be made of ultraviolet-resistant materials and protected by coating or shielding, or provisions for replacement should be made as necessary. Connections of corrugated polyethylene pipe to less flexible pipe or structure must be designed to avoid stress concentrations that could rupture the plastic. Design engineers shall follow specifications in Table 7.6 below for polyvinyl chloride (PVC) pipe. Design engineers shall provide for seepage control if the conduit is of smooth pipe larger than eight inches in diameter.

TABLE 7.6

ACCEPTABLE PVC PIPE FOR USE
IN EARTH BERMS†

Normal pipe size (inches)	Schedule for standard dimension ratio(SDR)	Maximum depth of fill over pipe (feet)
4 or smaller	schedule 40	15
	schedule 80	20
	SDR 26	10
6, 8, 10, 12	schedule 40	10
	schedule 80	15
	SDR 26	10

† Polyvinyl chloride pipe, PVC 1120 or PVC 1220, conforming to ASTM D1785 or ASTM D2241.

Design engineers shall provide for seepage control if the conduit is of smooth pipe larger than eight inches in diameter.

v. Seepage control along pipes extending through embankments shall be controlled by use of a filter and drainage diaphragm, unless it is determined that anti-seep collars will adequately serve the purpose.

(1) The drain is to consist of sand meeting fine concrete aggregate requirements (at least 15 percent passing through the No. 40 sieve, but no more than 10 percent passing through the No. 100 sieve). If unusual soil conditions exist, design engineers shall make a special design analysis. The drain shall be a minimum of two-feet thick and extend vertically upward and horizontally at least three times the pipe diameter, and vertically downward at least 18 inches beneath the conduit invert. The drain diaphragm shall be located approximately parallel to the centerline of the embankment. The drain shall be outletted at the embankment downstream toe, preferably using a drain backfill envelope continuously along the pipe where it exits in the embankment. Protecting drain fill from the surface erosion will be necessary.

(2) When antiseep collars are used in lieu of a drainage diaphragm, they shall have watertight connection to the pipe. Maximum spacing shall be approximately 14 times the minimum projection of the collar measured perpendicular to the pipe. Collar material shall be compatible with the pipe materials. The antiseep collar(s) shall increase by 15 percent the seepage path along the pipe. When antiseep collars are used in lieu of the drainage diaphragm, the design engineers shall use the following criteria to determine the size and number of antiseep collars.

Let V = vertical projection and minimum horizontal projection of the antiseep collar in feet.

Let L = length in feet of the conduit within the zone of saturation, measured from the downstream side of the riser to the toe drain or point where the phreatic line intercepts the conduit, whichever is shorter.

Let n = number of antiseep collars.
The ratio of the length of the seepage (L+2nV) is to be at least 1.15. Antiseep collars should be equally spaced along part of the barrel within the saturated zone at distances of not more than 25 feet.

vi. Closed circuit spillways designed for pressure flow must have adequate antivortex devices. To prevent clogging of the conduit, an appropriate trash guard shall be installed at the inlet or riser.

vii. Emergency spillways convey the design flow safely past earth embankments when the principal or auxiliary spillway is disabled. Design engineers shall provide for an emergency spillway for each basin.

(1) Emergency spillways shall provide for passage of the design flow at a safe velocity to a point downstream where the berm will not be endangered. The maximum permissible velocity in the exit channel shall be four feet per second, where only sparse vegetative cover can be expected; where excellent vegetative cover and a vigorous sod can be expected and maintained, the maximum permissible velocity is 6 feet per second.

(2) If chutes or drops are used for the principal or emergency spillways, they shall be designed according to standards in the U.S. Department of Agriculture, Soil Conservation Service's *Engineering Manual for Conservation Practices* (1984), or the U.S. Department of Agriculture's *National Engineering Handbook*, section 5, "Hydraulics;" section 11, "Drop Spillways;" and section 14, "Chute Spillways," incorporated herein by reference. The minimum capacity of a structural spillway shall be that required to pass the peak flow expected from the design storm.

viii. For excavated basins, provisions shall be made where needed for a principal spillway, emergency spillway, and embankment in accordance with the embankment and berm criteria described in this section.

(1) Where soil conditions and safe maintenance practices allow, side slopes of the excavated basin shall be stable and no steeper than three horizontal to one vertical.

ix. The material placed in the fill shall be free of detrimental amounts of sod, roots, frozen soil, stones more than six inches in diameter (except rock fills), and other objectionable material.

(1) Drainfill shall be kept from being contaminated by adjacent soil materials during placement by either placing it in a cleanly excavated trench, or by keeping the drain at least one foot above the adjacent earthfill.

(2) Selected drainfill and backfill material shall be placed around structures, pipe conduits, and antiseep collars at about the same rate on all sides to prevent damage from unequal loading. Fill material shall be placed and spread beginning at the lowest point in the foundation and then bringing it up in continuous horizontal layers thick enough that the required compaction can be obtained. The fill shall be constructed in continuous horizontal. If openings or sectionalized fills are required, the slope of the bonding surfaces between the embankment in place and the embankment to be placed shall not be steeper than the ratio of three horizontal to one vertical. The bonding surface shall be treated the same as that specified for the foundation to insure a good bond with the new fill.

(3) The distribution and gradation of materials shall be such that no lenses, pockets, streaks, or

layers of material shall differ substantially in texture or gradation from the surrounding material. If it is necessary to use materials of varying texture and gradation, the more impervious material shall be placed in the center and upstream parts of the fill. If zoned fills of substantially differing materials are specified, the zones shall be placed according to lines and grades shown on the drawings. The complete work shall conform to the lines, grades, and elevations shown in the drawings or as staked in the field.

(4) The moisture content of the fill material shall be adequate for obtaining the required compaction. Material that is too wet shall be dried to meet this requirement, and material that is too dry shall be wetted and mixed until the requirement is met. Construction equipment shall be operated over each layer of fill to insure that the required compaction is obtained. Special equipment shall be used if needed to obtain the required compaction. If a minimum required density is specified, each layer of fill shall be compacted as necessary to obtain that density.

(5) Fill adjacent to structures, pipe conduits, and drainfill or antiseep collars shall be compacted to a density equivalent to that of the surrounding fill by hand tamping or by using manually directed power tampers or plate vibrators. Fill adjacent to concrete structures shall not be compacted until the concrete has had time to gain enough strength to support the load.

x. All permanent and temporary stabilization should be applied pursuant to the Standards for Soil Erosion and Sediment Control in New Jersey, N.J.A.C. 2:90.

xi. In a principal spillway, pipe materials shall conform to the appropriate specifications. Antiseep collars shall be made of materials compatible with that of the pipe and shall be installed according to the manufacturer's instructions. It may be firmly and uniformly bedded throughout its length, and shall be installed to the line and grade shown on the drawings.

xii. The mix design and testing of concrete shall be consistent with the size requirements of the job. Mix requirements or necessary strength shall be specified. The type of cement, air entrainment, slump, aggregate, or other properties shall be specified as necessary. All concrete is to consist of a workable mix that can be placed and finished in an acceptable manner. Necessary curing shall be specified. Reinforcing steel shall be placed as indicated on the plans and shall be held securely in place during concrete placement. Subgrades and forms shall be installed to line and grade, and the forms shall be mortar tight and unyielding as the concrete is placed.

xiii. Foundation and embankment drains, if required, shall be placed to the line and grade shown on the drawings. Detailed requirements for drain material

and any required pipe shall be shown in the drawing and specifications for the job.

xiv. Concerning excavated basins, the compacted excavation shall conform to the lines, grades, and elevations shown on the drawings or as staked in the field.

xv. Concerning embankment and excavated berms, construction operations shall be carried out so that erosion and air and water pollution are minimized, and held within legal limits. All work shall be conducted in a skillful manner. The completed job shall present a workmanlike appearance.

(1) Measures and construction methods that enhance fish and wildlife values shall be incorporated as needed and practical. Ground cover to control erosion shall be established as needed and practical. Fencing shall be provided as needed.

5. Detention facilities in flood hazard areas, as follows:

i. Detention development must comply with all applicable regulations under the Flood Hazard Area Control Act, N.J.S.A. 58:16A-50 et seq.

6. The following safety provisions shall apply to stormwater management basins and parts thereof:

i. Trash racks shall be installed at the intake to the outlet from the stormwater management basin to ensure proper functioning of the basin outlets.

ii. Trash racks shall be designed to have parallel bars with no greater than six-inch spacing. The spacing shall be designed so as not to adversely affect the hydraulic performance of the outlet pipe or structure.

iii. The average velocity of flow through a clean trash rack is not to exceed 2.5 feet per second under the full range of stage and discharge. Velocity is to be computed on the basis of the net area of opening through the rack.

iv. Any outlet structure with an overflow grate must have the grate secured but removable for emergencies and maintenance. Grate spacing shall be no greater than two inches across the smallest dimension.

v. Trash racks and overflow grates shall be constructed and installed to be rigid, durable, and corrosion resistant and shall be designed to withstand a perpendicular live loading of 300 lbs/ft sq.

vi. Every outlet structure of a basin shall have escape provisions in or on the structure. Free-standing outlet structures may be excluded at the discretion of the approving authority.

vii. Safety ledges shall be constructed on the slopes of all new retention basins with a permanent pool of water deeper than two-and-one-half feet. Ledges shall be comprised of two steps, each four to six feet in width, one located approximately two-and-one-half feet below the permanent water surface, and the second located one to one-and-one-half feet above the permanent water surface.

viii. In new stormwater management basins, maximum interior slopes for earthen dams, embankments, or berms shall not exceed three horizontal to one vertical.

ix. Municipalities or other specified agencies may grant a variance or exception from these safety standards if they determine in writing that such variance or exception will not constitute a threat to the public safety.

7. Stormwater management facilities shall be regularly maintained to ensure that they function at design capacity and to prevent health hazards associated with debris buildup and stagnant water.

i. Maintenance and upkeep responsibility depend on the ownership of the facilities. If the drains, basins and/or other features of the stormwater system in the residential development are part of a public drainage system, then the municipality or an appropriate public entity is responsible for maintenance and upkeep. If part or all of the residential stormwater management system is privately owned, then the privately owned portion of the system must be privately maintained, unless the municipality or other appropriate public agency agrees to assume responsibility for the facilities. The terms of the agreement shall be in a form acceptable to the municipal attorney and may include but are not limited to maintenance easements, personal guarantees, deed restrictions, covenants, and bonds.

ii. In cases where there is common ownership of property that is not part of a publicly owned drainage system, a homeowner's association or similar permanent entity may be established as the agent responsible for upkeep, absent an agreement with the municipality or other appropriate public entity.

Administrative correction.

See: 29 N.J.R. 1296(a).

Administrative correction.

See: 29 N.J.R. 2816(a).

Public Notice: Egg Harbor Township special area standards.

See: 30 N.J.R. 3700(a).

Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).

See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).

Rewrote the section.

Administrative correction.

See: 32 N.J.R. 684(b).

Amended by R.2000 d.480, effective December 4, 2000 (operative June 3, 2001).

See: 32 N.J.R. 2670(b), 32 N.J.R. 4277(a).

In (f)lii, inserted "when required by the municipal engineer" in the first sentence.

5:21-7.6 Stormwater management: water quality

(a) The water quality design storm shall be defined as the one-year frequency S.C.S. Type III, 24 hour storm or 1.25 inches of rainfall falling uniformly in two hours.

(b) Where detention basins, wet basins, ponds, constructed wetlands, infiltration structures, dry wells, or other devices are used to control the quantity or rate of post-development runoff, then they shall incorporate the measures required by this section in order to protect the quality of surface and subsurface waters. The water quality design storm shall be controlled by best management practices. These include, but are not limited to, the following:

1. In "dry" detention basins, provisions shall be made to ensure that the runoff from the water quality design storm is retained such that, 18 hours following the peak storage in the basin, no more than 90 percent of the volume stored will be evacuated. The 18-hour retention time shall be reduced in any case that would require an outlet size diameter of three inches or less. Therefore, three-inch-diameter orifices shall be the minimum allowed. This minimum is only for water quality outlets. If this minimum outlet size does not allow for the detention times required, then additional techniques shall be used to remove total suspended solids.

2. In permanent ponds or "wet" basins, the water quality requirements of this ordinance shall be satisfied where the volume of permanent water is at least three times the volume of runoff produced by the water quality design storm.

3. Infiltration practices such as dry wells, infiltration basins, infiltration trenches, and buffer strips may be used to satisfy this requirement provided they produce zero runoff from the water quality design storm and allow for complete infiltration within 72 hours. Infiltration strategies shall be limited to areas where the soils are suitable to allow infiltration.

4. Suitable best management practices can be found in the following documents:

i. Stormwater and Nonpoint Source Pollution Control, Best Management Practices Manual, State of New Jersey, Department of Environmental Protection, Office of Land and Water Planning.

ii. Technical Manual for Land Use Regulation Program, Bureaus of Inland and Coastal Regulations, Stream Encroachment Permits, Revised September 1995, State of New Jersey, Department of Environmental Protection.

iii. Ocean County Demonstration Study, Stormwater Management Facilities Maintenance Manual, June 1989, State of New Jersey, Department of Environmental Protection, Office of Land and Water Planning.

iv. Any watershed stormwater management plan.

Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).

See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).

Rewrote the section.

Amended by R.2002 d.399, effective December 16, 2002.

See: 34 N.J.R. 2615(a), 34 N.J.R. 4412(a).

Rewrote (b)1.

Public Notice: Notice regarding the Publication of two Notices of Adoption in the December 16, 2002 New Jersey Register.

See: 34 N.J.R. 4343(a), 4412(a), 35 N.J.R. 219(b).

APPENDIX

CORRUGATED METAL PIPE STANDARDS

Corrugated metal pipe, when approved by the municipal engineer, shall meet the requirements and be installed in the following manner. Corrugated metal pipe for drainage structures is allowed in accordance with the map below. In areas with acid waters (shaded area on the map), design engineers may use aluminum alloy, provided the environmental limitations below are met. In neutral/alkaline waters (unshaded on the map), aluminum, aluminum-coated steel type 2, and polymeric-coated steel may be used, provided the environmental limitations below are met. Water pH and resistivity values must fall within the ranges shown below. Samples should be measured in accordance with ASTM G51 and G57. Avoid sampling water during storm events or for two days following a storm to insure more typical readings. If there are severe corrosive conditions (pH <4), fiber-bonded steel pipe should be used.

ENVIRONMENTAL LIMITS FOR CORRUGATED METAL PIPE

Pipe type	pH	Resistivity values (ohm-cm)
aluminum	4-9	> 500
aluminum-coated type 2	5-9	>1500
polymeric coated	5-9	>1500
fiber bonded	<4	—

If the design velocity is greater than 10 feet per second, a one-half bituminous coating and paved invert in accordance with ASTM A849 (AASHTO M190) is required.

Minimum depth of coverage shall be as follows:

MINIMUM DEPTH OF COVERAGE FOR CORRUGATED METAL PIPE

Pipe diameter (inches)	Minimum cover (inches) from top of pipe to bottom of flexible payment or top of rigid pavement
12 inches to 48 inches	12 inches
54 inches of more	Per manufacturer's recommendations

Corrugated aluminum pipe shall conform to the requirements of ASTM B745 (AASHTO M196) for types I, II, IR, IIR, and III.

Corrugated aluminum-coated steel type 2 pipe shall conform to the requirements of ASTM A760 (AASHTO M36) for types I, II, IR, IIR, and III and have an aluminum-one ounce type 2 coating as specified in ASTM A929 (AASHTO M274).

Corrugated polymeric-coated steel pipe shall conform to the requirements of ASTM A762 (AASHTO M36) for types I and II and have a polymeric ¹⁰/₁₀ coating as specified in ASTM A743 (AASHTO M246).

Corrugated fiber-bonded steel pipe shall conform to the requirements of ASTM A760 (AASHTO M36) for types I and II and have an aramid fiber composite coating as specified in ASTM A885. In addition, the pipe shall be bituminous coated as specified in ASTM A849 (AASHTO M190).

Corrugated metal pipe shall be fabricated with annual corrugations by riveted lap joint construction or with helical corrugations and a continuous weld or lock seam extending from end to end of each length of pipe.

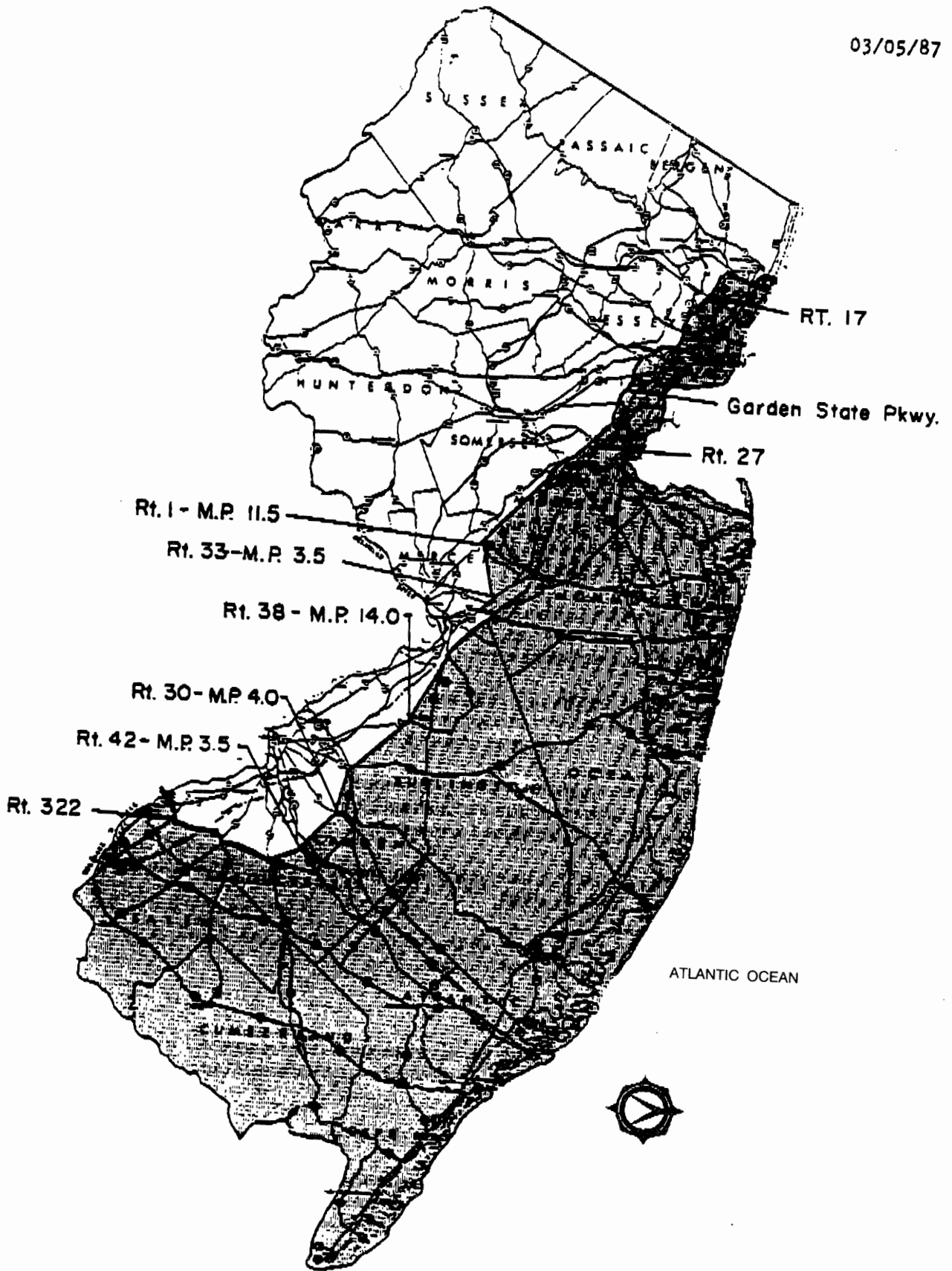
Connecting bands shall be manufactured in accordance with ASTM A760 (steel) or B745 (aluminum) and have the same base metal and coating as the corrugated metal pipe. All pipe ends shall be annularly reformed a minimum of two corrugations.

Fittings and end sections shall be of the same base metal and coating as the corrugated metal pipe.

Corrugated metal pipe shall be installed per ASTM A798 (steel) or ASTM B788.

Maximum cover and structural design of corrugated metal pipe shall be per ASTM A796 (steel) or ASTM B790.

03/05/87



Administrative correction.
See: 29 N.J.R. 1296(a).

SUBCHAPTER 8. REFERENCED STANDARDS

5:21-8.1 Referenced standards

(a) 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 reference 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), 444 North Capital Street, N.W., Suite 249, Washington, DC 20001. Tel. (202) 624-5800 or (800) 231-3475.

<u>Standard reference number</u>	<u>Title</u>	<u>Referenced in N.J.A.C. section number</u>
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
M114-91	Building Brick (Solid Masonry Units Made from Clay or Shale)	5:21-6.2(c)11vii(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)
M252-94	Standard Specification for Corrugated Polyethylene Drainage Tubing	5:21-7.3(d)3
M294-94	Standard Specification for Corrugated Polyethylene Pipe, 12-to 36-in. Diameter	5:21-7.3(d)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
2001 Edition	Standard Specification for 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)
1999 Edition	AASHTO Guide for the Development of Bicycle Facilities	5:21-4.2(e) Table 4.3
1993 Edition	Guide for Design of Pavement Structures	5:21-4.18(b) Figure 4.2 Figure 4.3 Figure 4.4 Figure 4.5

2. American Concrete Pipe Association, Suite 105, 8618 Westwood Center Drive, Vienna, Virginia 22182. Tel. (703) 821-1990. Concrete Pipe Association of New Jersey, Post Office Box 1013, Dover, New Jersey 07802-1013. Tel. (201) 328-8723.

<u>Standard reference number</u>	<u>Title</u>	<u>Referenced in N.J.A.C. section number</u>
Minimum Cover (Minimum Depth of Coverage over Concrete Pipe)	Published in Concrete Pipe Association of New Jersey Newsletter, "The Pipeline," September/October 1985; table derived from information provided by the American Concrete Pipe Association	Table 7.4

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

<u>Standard reference number</u>	<u>Title</u>	<u>Referenced in N.J.A.C. section number</u>
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
C33-93	Standard Specification for Concrete Aggregates	Figure 6.1
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)11iv 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 Vitrified 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 Reinforced Concrete Manhole Structures, Pipes, and Laterals	5:21-6.2(c)11vi 5:21-7.4(d)
D448-86	Standard Classification for Sizes of Aggregate for Road and Bridge Construction	Figure 6.1
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
D2321-89	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) 5:21-7.3(d)3
D2444-92	Standard Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)	5:21-6.2(c)6ii(2)
D3034-89	Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings	5:21-6.2(c)6ii
D3139-89	Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals	5:21-5.3(j)3
D3212-92	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals	5:21-6.2(c)6ii(3)
D3350-93	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials	5:21-7.3(d)3
F477-90	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe	5:21-6.2(c)6ii(3)
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 and Fittings	5:21-6.2(c)6ii
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

4. American Society of Civil Engineers (ASCE), 345 East 47th Street, New York, New York 10017. Tel. (212) 705-7496 or (800) 548-2723.

<u>Standard reference number</u>	<u>Title</u>	<u>Referenced in N.J.A.C. section number</u>
ASCE Manual on Engineering Practice No. 60 1982	Gravity Sanitary Sewer Design and Construction	5:21-6.2(a) 5:21-6.2(c)10 5:21-6.2(c)11
WEF Manual of Practice FD-20 ASCE Manuals and Reports of Engineering Practice No. 77 (1993) ©1992	Design and Construction of Urban Stormwater Management Systems	5:21-7.3(e)

5. American Water Works Association (AWWA), 6666 West Quincy Avenue, Denver, Colorado 80235. Tel. (303) 794-7711 or (800) 926-7337.

Standard reference number	Title	Referenced in N.J.A.C. section number
ANSI/AWWA C104/A21.4-90	American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water	5:21-5.3(j)1 5:21-6.2(c)6iii 5:21-7.3(d)2
ANSI/AWWA C105/A21.5-93	American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems	5:21-5.3(j)1
ANSI/AWWA C110/A21.10-93	American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm) for Water and Other Liquids	5:21-5.3(j)1
ANSI/AWWA C111/A21.11-90	American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings	5:21-5.3(j)1 5:21-6.2(c)6iii 5:21-7.3(d)2
ANSI/AWWA C115/A21.15-88	American National Standard for Flanged Ductile-Iron Pipe with Threaded Flanges	5:21-5.3(j)1 5:21-6.2(c)6iii 5:21-7.3(d)2
ANSI/AWWA C150/A21.50-91	American National Standard for for the Thickness Design of Ductile-Iron Pipe	5:21-5.3(j)1 5:21-7.3(d)2
ANSI/AWWA C151/A21.51-96	American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water and Other Liquids	5:21-5.3(j)1 5:21-6.2(c)6iii 5:21-7.3(d)2
ANSI/AWWA	AWWA Standard for Reinforced Concrete Pressure Pipe, Steel Cylinder Type for Water and Other Liquids	5:21-5.3(j)2
ANSI/AWWA C301-92	AWWA Standard for Prestressed Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids	5:21-5.3(j)2
ANSI/AWWA C303-95	AWWA Standard for Concrete Pressure Pipe, Bar Wrapped, Steel Cylinder Type	5:21-5.3(j)2
ANSI/AWWA	AWWA Standard for Gate Valves for Water and Sewerage Systems	5:21-5.3(e)
ANSI/AWWA C303-95	AWWA Standard for Concrete Pressure Pipe, Bar Wrapped, Steel Cylinder Type	5:21-5.3(j)2
ANSI/AWWA C500-86	AWWA Standard for Gate Valves for Water and Sewerage Systems	5:21-5.3(e)
ANSI/AWWA C502-85	AWWA Standard for Dry-Barrel Fire Hydrants	5:21-5.4(b)1
ANSI/AWWA C504-94	AWWA Standard for Rubber-Seated Butterfly Valves	5:21-5.3(e)
ANSI/AWWA C509-94	AWWA Standard for Resilient Seated Gate Valves for Water Supply Service	5:21-5.3(e)
ANSI/AWWA C600-93	AWWA Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances	5:21-7.3(d)2
ANSI/AWWA C900-89	AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water Distribution	5:21-5.3(j)3
ANSI/AWWA C901-88	AWWA Standard for Polyethylene (PE) Pressure Pipe and Tubing, ½ in. through 3 in., for Water Service	5:21-5.3(j)5
ANSI/AWWA C905-88	AWWA Standard for Polyvinyl Chloride (PVC) Water Transmission Pipe Nominal Diameters 14 in.	5:21-5.3(j)3

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| C909-98 | through 36 in.
Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe, 4 in. through 12 in. (100 mm through 300 mm), for Water Distribution | 5:21-5.3(j)3
5:21-6.2(c)8 |
| ANSI/AWWA
M31
©1992
Second Edition | Manual of Water Supply Practices—Distribution
System Requirements for Fire Protection | 5:21-5.2(e) |
6. Asphalt Institute, Research Park Drive, Post Office Box 14052, Lexington, Kentucky 40512-4052. Tel. (606) 288-4960.
- | | | |
|--|--|---|
| <u>Standard reference number</u>
MS-1, 8th Edition
August 1970 | <u>Title</u>
Thickness Design—Full-Depth Asphalt Pavement Structures for Highways and Streets | Referenced in
N.J.A.C. section
<u>number</u>
Table 4.7 |
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7. Institute of Transportation Engineers (ITE), Suite 410, 525 School Street, S.W., Washington, DC 20024-2729. Tel. (202) 554-8050.
- | | | |
|---|--|--|
| <u>Standard reference number</u>
Pub. No. IR-016C 6th Edition
First Printing 1997 | <u>Title</u>
Residential Street Design and Traffic Control
Trip Generation | Referenced in
N.J.A.C. section
<u>number</u>
5:21-1.5(d)2
5:21-4.1(b)
Table 4.1 |
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8. Insurance Services Office, Inc. (ISO), 7 World Trade Center, New York, New York 10048. Tel. (212) 898-6000.
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| <u>Standard reference number</u>
©1980
Edition 6-80 | <u>Title</u>
Fire Suppression Rating Schedule | Referenced in
N.J.A.C. section
<u>number</u>
5:21-5.2(e) |
|---|--|---|
9. National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, Massachusetts 02269. Tel. (617) 770-3000.
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| <u>Standard reference number</u>
Standard 291-1995
Standard 1963-1993 | <u>Title</u>
Fire Flow Testing and Marking of Hydrants
Fire Hose Connections | Referenced in
N.J.A.C. section
<u>number</u>
5:21-5.4(b)2
5:21-5.4(b)1 |
|---|--|--|
10. New Jersey Department of Agriculture, State Soil Conservation Committee, John Fitch Plaza, PO Box 330, Trenton, New Jersey 08625. Tel. (609) 292-5540.
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| <u>Standard reference number</u>
April 1987 | <u>Title</u>
Standards for Soil Erosion and Sediment Control in New Jersey | Referenced in
N.J.A.C. section
<u>number</u>
5:21-7.5(c)
5:21-7.5(f)3.ii |
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11. New Jersey Department of Environmental Protection (NJDEP), Bureau of Revenue, Maps and Publications Sales Office, 428 East State Street, Trenton, New Jersey 08625. Tel. (609) 777-1038.

<u>Standard reference number</u>	<u>Title</u>	<u>Referenced in N.J.A.C. section number</u>
June 1989	Ocean County Demonstration Study—Stormwater Management Facilities Maintenance Manual	5:21-7.6(c)4
September 1993	Stormwater and Nonpoint Source Pollution Control Best Management Practices Manual	5:21-7.6(c)4
Revised September 1995	Technical Manual for Land Use Regulation Program, Bureaus of Inland and Coastal Regulations, Stream Encroachment Permits	Table 7.2 5:21-7.6(c)4
August 1995	Pinelands Comprehensive Management Plan (New Jersey Pinelands Commission)	5:21-5.3(a) 5:21-6.2(a)

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

<u>Standard reference number</u>	<u>Title</u>	<u>Referenced in N.J.A.C. section number</u>
1989	Standard Specifications for Road and Bridge Construction	5:21-4.17(b) Table 4.8 Figure 4.2 Figure 4.3 Figure 4.4 Figure 4.5 5:21-6.2(c)6ii(5)
May 1992	Design Manual—Roadway (DOT's Division of Roadway Design, Bureau of Roadway Design Standards)	5:21-7.4(a) 5:21-7.2(c)2 5:21-7.2(c)3 Figure 7.1 Figure 7.2
November 1995	Planning and Design Guidelines for Bicycle-Compatible Roadways and Bikeways	5:21-4.18(b)

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

<u>Standard reference number</u>	<u>Title</u>	<u>Referenced in N.J.A.C. section number</u>
Second Edition November 1991	Asphalt Handbook for County and Municipal Engineers	Table 4.7

14. Portland Cement Association, 5420 Old Orchard Road, Skokie, Illinois 60076-0726. Tel. (847) 966-6200

<u>Standard reference number</u>	<u>Title</u>	<u>Referenced in N.J.A.C. section number</u>
©1984	Thickness Design for Concrete Highway and Street Pavements	Table 4.7

15. United States Army Corps of Engineers, Water Resources Support Center, The Hydrologic Engineering Center, 609 Second Street, Davis, California 95616. Tel. (916) 756-1104.

<u>Standard reference number</u>	<u>Title</u>	<u>Referenced in N.J.A.C. section number</u>
†Technical Paper No. 82 May 1981	The New HEC-1 Flood Hydrograph Package	5:21-7.2(c)

16. United States Department of Agriculture (USDoA), Soil Conservation Service, Post Office Box 2890, Washington, DC 20013. Tel. (202) 205-0026.

Standard reference number	Title	Referenced in N.J.A.C. section number
†Technical Release 20 PB83-223768 May 1982	Computer Program for Project Formulation— Hydrology	5:21-7.2(c) 5:21-7.5(d)
†Technical Release No. 55 PB87-101580 2nd Edition June 1986	Urban Hydrology for Small Watersheds	5:21-7.2(c)1 5:21-7.2(c)3 5:21-7.2(c)6 5:21-7.5(d)1 5:21-7.5(f)5ii
†Technical Release No. 56 PB85-239622 December 1974	Guide for Design and Layout of Vegetative Wave Protection for Earth Dam Embankments	5:21-7.5(f)5ii
†Technical Release No. 69 PB85-245165 February 1983	Riprap for Slope Protection Against Wave Action	5:21-7.5(f)5ii
†PB85-175164/LT July 1984	Engineering Field Manual for Conservation Practices	5:21-7.5 (f)5vii
†PB 243 644/LT	National Engineering Handbook	5:21-7.5(f)5vii
†PB 243 645/LT	Section 5 Hydraulics	
†PB 279 759/LT	Section 11 Drop Spillways Section 14 Chute Spillways	

17. United States Department of Commerce (USDOC), Bureau of the Census, Washington, D.C. 20233. Tel. (202) 482-2000.

Standard reference number	Title	Referenced in N.J.A.C. section number
1975-1980 (Data tabulated by Rutgers University)	Public Use File—New Jersey	Table 4.4 Table 5.1

18. United States Department of Transportation (USDOT), Federal Highway Administration (FHWA), 820 First Street, S.E., Washington, DC 20002. Tel. (301) 322-4961.

Standard reference number	Title	Referenced in N.J.A.C. section number
AC150/5320-5B July 1970	Airport Drainage	5:21-7.2(c)1
†Hydraulic Engineering Circular No. 15 Report No. FHWA-EPD-86-111 PB86-184835 October 1975	Design of Stable Channels with Flexible Linings	5:21-7.5(f)3ii
†Report No. FHWA-TS-79-225 PB83-259903 August 1979	Design of Urban Highway Drainage, The State of the Art	Table 7.3
†Hydraulic Design Series No. 4 Report No. FHWA-EPD-86-103 May 1965 (Reprinted March 1983)	Design of Roadside Drainage Channels	5:21-7.2(c)1
†Hydraulic Design Series No. 5 Report No. FHWA-IP-85-15 PB86-196961 September 1985	Hydraulic Design of Highway Culverts	5:21-7.1(h)
‡1988 Edition	Manual on Uniform Traffic Control Devices for Streets and Highways	5:21-4.13(a)

† Documents obtainable from the National Technical Information Service, Springfield, Virginia 22161. Tel. (703) 487-4650.

‡ Documents obtainable from the United States Government Printing Office, Superintendent of Documents, Post Office Box 371954, Pittsburgh, Pennsylvania 15250-7954. Tel. (202) 512-1800.

19. Urban Land Institute, Suite 500 West, 1025 Thomas Jefferson Street, N.W., Washington, D.C. 20007-5201. Tel. (800) 321-5011.

Standard
reference number
ULI-ASCE-NAHB
1975

Title
Residential Storm Water
Management: Objectives, Principles,
and Design Considerations

Referenced in
N.J.A.C. section
number
Table 7.5

† Documents obtainable from the National Technical Information Service, Springfield, Virginia 22161. Tel. (703) 487-4650.

‡ Documents obtainable from the United States Government Printing Office, Superintendent of Documents, Post Office Box 371954, Pittsburgh, Pennsylvania 15250-7954. Tel. (202) 512-1800.

Administrative correction.

See: 29 N.J.R. 1296(a).

Administrative correction.

See: 29 N.J.R. 2816(a).

Amended by R.1999 d.374, effective November 1, 1999 (operative May 1, 2000).

See: 31 N.J.R. 477(a), 31 N.J.R. 3259(a).

Rewrote the section.

Administrative correction.

See: 32 N.J.R. 684(b).

Amended by R.2000 d.480, effective December 4, 2000 (operative June 3, 2001).

See: 32 N.J.R. 2670(b), 32 N.J.R. 4277(a).

Added designation (a) to the main paragraph; amended tables in 1, 3, 5, 7, 12 and 13.

Amended by R.2002 d.399, effective December 16, 2002.

See: 34 N.J.R. 2615(a), 34 N.J.R. 4412(a).

Rewrote the section.

Public Notice: Notice regarding the Publication of two Notices of Adoption in the December 16, 2002 New Jersey Register.

See: 34 N.J.R. 4343(a), 4412(a), 35 N.J.R. 219(b).