

## Chapter XI

# Site Plan Review Resolution

Middlesex County,

New Jersey

Incorporating Amendments and Additions through September 1, 2008

Chapter XI

Site Plan Review Resolution

Middlesex County

New Jersey

Prepared by  
Middlesex County Planning Board Staff  
Middlesex County Engineering Department

Officially adopted by the Middlesex County Board of Chosen Freeholders

December 30, 1969

Effective February 1, 1970

Amended September 21, 1972

Effective December 1, 1972

Second Printing, December 1972

Amended June 3, 1993

Effective July 1, 1993

Amended May 20, 1999

Effective July 5, 1999

Amended December 16, 2004

Effective February 1, 2005

Amended July 24, 2008

Effective September 1, 2008

Rescinded Effective September 1, 2008

Third Printing, February 1981

Fourth Printing, July 26, 1982

Fifth Printing, June 28, 2010

# Table of Contents

<b>Section</b>	<b>Heading</b>	<b>Page</b>
11-1	Short Title	1
11-2	Purpose	1
11-3	Approving Agency	1
11-4	Definitions	1
11-5	Procedure	6
11-5.1	General	6
11-5.2	Performance and Payment Guarantees	8
11-5.3	Dedications and Reservations of Road Right-of Way	10
11-5.4	Appeals	10
11-5.5	Conformance	11
11-5.6	Approval Time Period	12
11-5.7	Application, Inspection and Appeals Fees	12
11-6	Site Plan Details	13
11-7	Design Standards	15
11-7.1	Off Street Parking	15
11-7.2	Off Street Loading Spaces and Areas	16
11-7.3	Customers Areas	17
11-7.4	Driveways	17
11-7.5	Minimum Payment on County Roads	21
11-7.6	Acceleration Lanes and Deceleration Lanes	21
11-7.7	Sidewalks	22
11-7.8	Curbing	23
11-7.9	Sight Triangle at Road intersections	26
11-7.10	Public Utilities	27
11-7.11	Drainage	27
11-7.12	Conformance to Provisions of Traffic Control Plan	34
11-7.13	Drainageways	35
11-7.14	Inspection Fees	35

<b>11-8</b>	<b>Standards and Criteria for Varying or Waiving Requirements</b>	<b>35</b>
11-8.1	Variances	35
11-8.2	Provisions for Waiving Development Review Fees	35
<b>11-9</b>	<b>Validity</b>	<b>36</b>
<b>11-10</b>	<b>Repeal of Conflicting Resolutions</b>	<b>36</b>
<b>11-11</b>	<b>Effective Date</b>	<b>36</b>
<b>Appendix A</b>	<b>Sight Triangle Agreement</b>	<b>37</b>
<b>Appendix B</b>	<b>Design Criteria</b>	<b>38</b>
<b>Appendix C</b>	<b>Coefficient Runoff</b>	<b>39</b>
<b>Appendix D</b>	<b>Rainfall Intensity Duration Curves</b>	<b>40</b>
<b>Appendix E</b>	<b>Hydraulic Computation Table</b>	<b>41</b>
<b>Appendix F</b>	<b>Overland Flow - Time of Concentration</b>	<b>42</b>
<b>Appendix G</b>	<b>Flood Runoff Index Curves and 15 Year Flood Duration</b>	<b>43</b>

# Chapter XI

## Site Plan Review Resolution

### 11-1 Short Title

This resolution shall be known and may be cited as: "The Site Plan Review Resolution of the County of Middlesex, New Jersey."

### 11-2 Purpose

The purpose of this resolution shall be to establish procedures and standards for land development along County roads in the County of Middlesex, New Jersey, in order to promote the public health, safety, convenience and general welfare of the people of the County.

### 11-3 Approving Agency

This resolution shall be administered by the Planning Board of the County of Middlesex in accordance with Chapter 285 of the Laws of 1968. Such Board shall by resolution vest its power to review and approve site plans with the Director of County Planning and a designated committee of members of the County Planning Board which shall include the County Engineer.

### 11-4 Definitions

#### 11-4.1 Acceleration Lane

An auxiliary speed-change lane of a road for use by vehicles entering the adjacent traveled way of the road.

#### 11-4.2 Applicant

Any individual, firm, association, syndicate, co-partnership, corporation, trust, or any other legal entity capable of commencing proceedings under the provisions of a municipal subdivision ordinance and this resolution to effect a subdivision of land for applicant or for another.

## Site Plan

- 11-4.3      Application
- The form provided by a municipality for execution by an applicant seeking issuance of a local building permit and/or a local site plan approval.
- 11-4.4      Building
- A structure having a roof.
- 11-4.5      Building Permit
- A permit obtained from the appropriate official in a municipality before any building or structure may be erected or altered on any land within the municipality or before any new use of land may be commenced.
- 11-4.6      Certificate of Occupancy
- The authorization issued by a municipality which verifies that the applicant has met satisfactorily all building, site plan, or other requirements, and permits the habitation or use of the land development.
- 11-4.7      County Master Plan
- A composite of the Master Plan for the physical development of the County, with the accompanying maps, plats, charts, and descriptive and explanatory matter adopted by the County Planning Board pursuant to Revised Statute 40:27-2.
- 11-4.8      County Planning Board
- This term shall include the designated site plan review committee of the County Planning Board.
- 11-4.9      Curblin Opening
- The overall driveway opening dimension at the curblin (outer edge of shoulder), whether curbing exists or not, measured from the extreme outer edges of the radii.
- 11-4.10     Curb Return
- Curbing along the curved or flared radius of a driveway opening which extends from a point tangent to the adjacent traveled lane,

County of Middlesex

paved shoulder or deceleration lane (whichever is closest to the land development) to a point tangent to the driveway lane.

11-4.11 Deceleration Lane

The auxiliary speed-change lane of a road for use by vehicles leaving the adjacent traveled way of the road.

11-4.12 Driveway

A private way laid out to give vehicular access from a public road to a land development.

11-4.13 Easement for County Road Purposes

An easement to the County for the purpose of installation of utilities, or for construction, reconstruction, widening, or improving a County road including the repair and maintenance of the County road and the construction, reconstruction, or alteration of facilities related to the safety, convenience or carrying capacity of the County road including drainage facilities and traffic control devices and also for the purposes of maintaining a clear sight area.

11-4.14 Land Development

Any use of a lot or plot which requires prior municipal approval through the issuance of a building, zoning or conditioned use permit, variance or site plan approval permit.

11-4.15 Local Building Official Etc.

The municipal official of a city, township, or borough with authority to issue a building permit for the use of any property or the construction, use of occupancy of any structure.

11-4.16 Local Site Plan Approval Authority

The municipal or other local agency or individual with authority to approve a site plan.

11-4.17 Lot or Plot

A designated parcel, tract or area of land to be used, developed or built upon as a unit.

## Site Plan

- 11-4.18 Noncompliance  
Failure to comply with any of the requirements of site plan approval.
- 11-4.19 Official County Map  
The map, with changes and additions thereto, adopted and established, from time to time, by resolution of the Board of Chosen Freeholders of the County pursuant to Revised Statute 40: 27-5.
- 11-4.20 Off-Street Parking Area  
The area outside of the existing or proposed County road Right-of-Way which is used for the temporary or prolonged storage or standing of vehicles.
- 11-4.21 Owner  
Any individual, firm, association, syndicate, co-partnership, corporation, trust, or any other legal entity having sufficient proprietary interest in the land development.
- 11-4.22 Performance Guarantee  
A payment guarantee in a form approved by the County Counsel to be accepted as security to insure the fulfillment of improvements required by the County.
- 11-4.23 Reservation Area  
That land area of a lot which is designated on a site plan to be reserved for future acquisition.
- 11-4.24 Right-of-Way Line  
The outer edge of County roadway property, separating roadway property from abutting properties of others.
- 11-4.25 Road Opening Permit  
The permit issue by the County Road Supervisor or the County Engineer or one of their authorized agents approving the construction or reconstruction of driveways, curbs, gutters or any similar operation involving tearing up, opening, excavating or

County of Middlesex

connecting into any portion of a County road or any portion of a County road Right-of-Way.

11-4.26 Set-Back Line

A line within any lot, parallel to any street line between which and the street line no building, or portion thereof, may be erected except as provided in the local zoning ordinance.

11-4.27 Shoulder

That portion of the highway, exclusive of and bordering the traveled way designed for parking or for emergency use but not ordinarily to be used for vehicular travel

11-4.28 Site Plan

A plan of an existing lot or plot or a subdivided lot on which is shown topography, location of all existing and proposed buildings, structures, drainage facilities, roads, Rights-of-Way, easements, parking areas, together with any other information required by and at a scale specified by the Site Plan Review Resolution.

11-4.29 Site Plan Committee or Committee

A committee designated by the County Planning Board and vested with the power of said Board to review and approve site plans.

11-4.30 Structure

Anything constructed or erected on, or under the ground or upon another structure or building.

11-4.31 Surface Run-Off

Storm water.

11-4.32 Traffic Control Plan

A plan which is adopted by the Planning Board as part of the County Master Plan and which delineates and describes the number, location, and methods of operation of traffic control structures, devices, and regulations, the future installation and operation of which are deemed necessary to handle safely and adequately the present and future traffic and pedestrian flows on a County road. Such traffic flow plan may be developed in

## Site Plan

conjunction with the plan for the widening of an existing County road or in conjunction with the plan for the construction of a new County road. Further, such plan shall be based upon estimates of future traffic flows developed in accordance with accepted traffic engineering and planning techniques.

### 11-4.33 Words and Phrases

Words used in the present tense include the future. The singular number includes the plural and the plural, the singular.

### 11-4.34 Zone District

Any district as defined and described in a municipal zoning ordinance adopted pursuant to 40: 55-30-51 as amended.

## **11-5 Procedure**

### 11-5.1 General

A site plan drawn in accordance with the standards of this resolution shall be submitted to the County Planning Board for review and approval or exemption for any of the following proposed land developments:

- A. Commercial use along a County road or affecting County drainage facilities.
- B. Industrial use along a County road or affecting County drainage facilities.
- C. Multi-family structures of five units or more along a County road or affecting County drainage facilities.
- D. Any land development along a County road requiring an off-street parking area or off-street area for more than five vehicles or affecting County drainage facilities.
- E. Any land development causing storm water to drain either directly or indirectly to County Road or through a drainage way, structure, pipe, culvert or Facility for which the County is responsible for the construction, maintenance or proper functioning and falls within any of the above categories.
- F. Any land development which generates traffic directly onto a County Road and falls within any of the above land uses or affecting County drainage facilities.

## County of Middlesex

Four complete copies of said site plan together with an executed copy of the application for the local building permit and a letter of transmittal shall be submitted to the County Planning Board by the municipal or other local agency or individual with authority to approve the site plan. Also, an application may be submitted by the applicant who shall attach a verification addressed to the County Planning Board attesting that an application for the building permit and site plan have been or is to be duly filed with the municipal official or agency designated to receive such. A verification attesting to a site plan being duly filed with the municipality is not needed if the policy of that municipality is to have County Planning Board action prior to submission to the municipality. Site plans are not required for residential structures containing less than five units, however, developers of such uses are urged to consult with the County Planning Board.

Also, the appropriate fee as determined from the current adopted fee schedule must accompany the site plan. Only checks are acceptable and must be made out to the "Treasurer-Middlesex County". No site plan can be considered a formal submission until the appropriate fee, number of plats, and application is submitted to the Planning Board staff.

The local building official or other agency with authority to approve a site plan shall condition its action on any application requiring County Planning Board Site Plan approval subject to same being submitted to and unconditionally approved by the County Planning Board or exempted as provided below. The local building official shall not issue a building permit until notification by the County Planning Board that said application has received its unconditional site plan approval or exemption.

Site Plans for land development not along a County Road that include less than 1 acre of impervious surfaces are exempt from County Site Plan Review. However, such determination must be made by the County at the time the application is submitted for County Planning Board action. The Subdivision and Site Plan Review Committee shall act on or exempt any site plan submitted to it for review and approval within 30 days after receipt of same. If the Subdivision and Site Plan Review Committee fails to act on or exempt a site plan within the 30 day period, said site plan shall be deemed to have been approved unless, by mutual agreement between the Subdivision and Site Plan Review Committee and the

## Site Plan

local authority, with approval of the applicant or his authorized agent, the 30 day period shall so extend the time period within which a local authority shall be required by law to act thereon.

The Committee shall notify the local agency or individual with authority to approve the site plan or issue a building permit and the municipal engineer in writing of its action on the site plan. A copy of such action shall be forwarded to the applicant.

In the event that the Committee disapproves a site plan application, the reasons for disapproval shall be stated in writing. Copies of the report disapproving said site plan shall be forwarded by certified mail to the local agency or individual with authority to approve the site plan or issue a building permit and to the applicant.

When approval is granted, no changes or alterations shall be made in any portion of the site plan over which the Committee has approval power without approval of the said change by the Committee.

### 11-5.2 Performance Guarantees and Payments

As a condition to the approval of a site plan, the Site Plan Committee may require the developer to submit a performance guarantee and, where deemed appropriate, a maintenance guarantee in a form approved by the County Counsel and in an amount determined by the County Engineer pursuant to statutes to assure the installation and/or maintenance of those improvements that are required for Site Plan Committee approval. No maintenance guarantee shall exceed two years duration.

In fixing the terms for retaining the performance guarantee, the Site Plan Committee specify that upon certification of the County Engineer to the Committee that all improvements required by the resolution have been completed in accordance with the approved site plan and approved construction standards and certification from the Board of Freeholders that improvements to be retained on the County Right-of-Way are acceptable to that Board, the Committee shall authorize return and release of this performance guarantee. The applicant shall assume all liability during construction and until such time as improvements are accepted by the County.

When the provisions of this resolution allow or require a cash contribution to the County to cover a share of the cost of all

## County of Middlesex

improvements, the approval of a site plan shall be further conditioned on the receipt of such contributions in the form of a certified check made out to the "Treasurer-Middlesex County," and deposited in an account reserved for such improvements.

Any monies or guarantees received by the County shall not duplicate bonds or other guarantees required by municipalities for municipal purposes. Any and all monies received by the County to insure performance and to meet the requirements established for subdivisions under this resolution shall be paid to the County Treasurer who shall provide a suitable depository therefore. Such funds shall be used only for County Roads or other facilities for which they are deposited unless such projects are not initiated for a period of ten (10) years, at which time said funds shall be transferred to the General Fund of the County.

Performance guarantee amounts shall be set by the County Engineering Department. The applicant shall provide 10% of the performance guarantee by certified check, and the balance either by certified check, surety bond, letter of credit or other means found acceptable to the County.

The performance guarantee inspection fee shall be deducted from the 10% cash portion of the performance guarantee and the balance returned to the applicant as provided for herein. The applicant must notify the Planning Board by filing a request form stating that the work required is complete and ready for inspection. Any re-inspections performed as the result of unsatisfactory or incomplete work may require an additional fee in each instance.

The County Department in issuing road opening permits for developments acted upon by the Middlesex County Planning Board shall not require the duplication of a performance guarantee already required and accepted by the Middlesex County Planning Board. However, should the County Road Department upon inspection to return the performance guarantee determine that the construction within the County Right-of-Way was unsatisfactory and additional expenses are incurred by the County Road Department as a result of same, the County Road Department may upon presentation of an itemized list of said additional expenses request reimbursement from the 10% cash portion of the performance guarantee being held by the Middlesex County Planning Board. All such reimbursements shall be transferred to

## Site Plan

the County Road Department account by way of the County Comptroller.

### 11-5.3 Dedications and Reservations of Road Right-of-Way

As a condition to the approval of a site plan, the site Plan Committee may require the dedication of additional lands necessary for the provision of Right-of-Way for County roads in accordance with the County Master Plan adopted by the County Planning Board or an Official County Map adopted by the Board of Chosen Freeholders. On an existing road the additional Right-of-Way shall be that portion of the site which abuts a County road and which lies between the existing Right-of-Way and proposed future Right-of-Way line for the County road as set forth in the County Master Plan adopted by the County Planning Board or as set forth on an Official County Map adopted by the Board of Chosen Freeholders.

However, where the proposed future Right-of-Way lines for an existing County road are drawn so that the total additional Right-of-Way is to be secured from just one side of the County road, only one-half of that additional Right-of-Way shall be required to be dedicated as a condition to the approval of a site plan. Also, the Site Plan Committee may require the reservation of the remaining area of future Right-of-Way for future acquisition. The building setback line should be measured from the future Right-of-Way line.

The Site Plan Committee may waive from dedication, the following:

- A. Any area that exceeds 10 percent of the total land area encompassed by the land development.
- B. Any area which includes existing buildings.

In order to effect dedications required by this section, a deed or easement for such lands shall be furnished to the County in a form approved by the County Counsel.

### 11-5.4 Appeals

In the event an applicant for site plan approval is aggrieved by an action taken by the Planning Director and the Site Plan Committee, said applicant may file an appeal in writing to the County Planning Board within ten days after the date of notice by certified mail of

the said action. Any person aggrieved by the action of the County Planning Board in regard to site plan approval may file an appeal in writing to the Board of Chosen Freeholders within ten days after the date of notice by certified mail of such action. The County Planning Board or the Board of Chosen Freeholders to which an appeal is taken shall consider such an appeal at a regular or special public meeting within forty-five days from the date of its filing.

Notice of said hearing shall be made by certified mail at least ten days prior to the hearing to the applicant and to such of the following officials as deemed appropriate for each specified case: the municipal clerk, municipal planning board, board of adjustment, building inspector, zoning officer, Board of Chosen Freeholders, and the County Planning Board. The board to which appeal is taken shall render a decision within 30 days from the date of the hearing.

11-5.5 Conformance

Failure to comply with any of the conditions of County site plan approval subsequent to the receipt of a building permit may be conditions for:

- A. Refusal of the County to issue a road opening permit for said site development;
- B. A request to the local building inspector to revoke or to withhold the local building permit and/or certificate of occupancy for said site development;
- C. Forfeiture of any performance guarantee required by the County to cover the costs of improvements specified in that portion of the site plan over which the County has control;
- D. Appropriate court action initiated by the County Planning Board.

A written notice of noncompliance shall be forwarded by certified mail to the local agency or individual with authority to approve the site plan or issue a building permit and applicant requesting compliance with the conditions of site plan approval within a period of time of not less than five days.

Site Plan

11-5.6 Approval Time Period

Any site plan approved by the Site Plan Committee or County Planning Board under the terms of this resolution shall be valid for the same period of time as the local site plan approval or building permit.

11-5.7 Application, Inspection and Appeals Fees

As directed by the Site Plan Committee, applicants shall pay those costs or fees, required and directly caused by the processing of the applications additionally including but not limited to stenographic costs on appeal, preparation of special studies.

A. Minor

Subdivisions:

Sketch Plats:

\$300.00 + \$10.00 Per Acre (Revisions 33% of Original Fee)

B. Major Subdivisions:

Preliminary:

\$ 500.00 + \$20.00 Per Lot and \$ 20.00 Per Acre

(Revisions 33% of Original Fee)

Final:

\$ 500.00 + \$15.00 Per Lot and \$ 15.00 Per Acre

\*All Revisions Require A New Submission per Sheet

C. Site Plan:

\$ 500.00 + \$0.15 Per Sq. Ft. of Proposed Bldg. Area Industrial  
and \$10.00 Per Proposed Parking Space Non-Industrial

(Revisions 33% of Original Fee)

D. Cap on Application Fees: \$20,000.00

E. Special Meeting: \$ 3,000.00

County of Middlesex

F. Release of Performance Guarantee:

<u>Amount of Guarantee</u>	<u>Fee</u>
\$ 0 - \$ 1,000	\$ 200.00
\$ 1,001 - \$ 10,000	\$ 250.00
\$ 10,001 - \$ 50,000	\$ 500.00
\$ 50,001 - \$100,000	\$ 750.00
\$100,001 - \$ And Up	\$ 1,000.00

\* Additional Inspections Require an Additional Fee

G. Appeal Fee: \$ 150.00

**11-6 Site Plan Details**

Any site plans shall include and show the following information with respect to the subject lot or lots:

A. The sizes of all maps and plans of any proposed land development shall be consistent with the sizes permitted under Chapter 141 of the laws of 1960 known as the New Jersey Map Filing Act as follows:

- 8 ½ x 13 inches
- 15 x 21 inches
- 24 x 36 inches
- 30 x 42 inches

B. The name and address of the applicant and the owner and the name, address and title of the professional person preparing the plan, map and accompanying data. All plans and maps must be signed by a land surveyor and a professional engineer licensed in the State of New Jersey.

C. An appropriate place for the signatures of the County Planning Board, Secretary, and Planning Director.

D. The municipal tax map lot and block numbers of the lot or lots, tax sheet number, key location map, and acreage.

E. A date, scale, and north arrow on any map.

F. The zone district in which the lot or lots are located together with a delineation of the front yard set-back line required in such zone.

## Site Plan

- G. All existing and proposed setback dimensions, landscaped areas, trees over twenty inches in circumference, and fencing within 100 feet of the County Right-of-Way- line.
- H. All existing and proposed signs and lighting standards, utility poles and their size, type construction, and location within twenty-five feet of the County road Right-of-Way line or, where appropriate, proposed County Right-of-Way line.
- I. The existing and proposed principal building or structure and all accessory buildings or structures, if any, and finished grade elevations at all corners of said buildings.
- J. Existing topography based upon U.S.C. & G. datum and proposed grading with a maximum of two foot contour intervals.
- K. The location, type and size of all existing and proposed catch basins, storm drainage facilities, utilities, plus all required design data supporting the adequacy of the existing or proposed facilities to handle future storm flows.
- L. The location, type and size of all existing and proposed curbs, sidewalks, driveways, paved areas, fences , retaining walls, parking space areas and the layouts thereof and all off-street loading areas, together with the dimensions including curve radius of all the foregoing on the site in question and within 100 feet of said site. In addition, the following information shall be appropriately shown on the site plan map:

The estimated average number of the following vehicles that will enter the site each day:

- 1) Single unit trucks or buses with a wheel base of approximately twenty (20) feet and
  - 2) Semi-trailer trucks with a wheelbase of approximately thirty (30) to fifty (50) feet.
- M. The location, size and nature of all existing and proposed Rights-of-Way, easements and other encumbrances which may affect the lot or lots in question, and the location, size and description of any lands to be dedicated to a municipality or to the County of Middlesex. The location,

County of Middlesex

size and nature of the lot or lots in question and any contiguous lots owned by the applicant or in which the applicant has a direct or indirect interest, even though only a portion of the entire property is involved in the site plan for which approval is sought; provided, however, that where it is physically impossible to show such entire lot or lots or contiguous lots on one map, a key map thereof shall be submitted.

- N. Any site plan presented to the Site Plan Committee shall be drawn at a scale not smaller than one inch equals fifty feet and not larger than one inch equals ten feet, except that plans for land developments that will occupy sites of more than forty acres may be drawn at a scale of one inch equals 100 feet.
- O. The location, names and widths of all existing and proposed streets including cross sections and profiles abutting the lot or lots in question and within 200 feet of said lot.
- P. Any and all other information and data necessary to meet any of the requirements of this resolution not listed above.

**11-7 Design Standards**

11-7.1 Off Street Parking

- A. Number of Off Street Parking Spaces:

Each land development subject to County site plan approval shall provide on its lot the number of off-street parking spaces required by any zoning, subdivision, site planning or other ordinance of the municipality in which the land development is to be located.

- B. Design of Off Street Parking Area:

Off-street parking areas shall be designed to prevent the maneuvering of vehicles into or out of parking spaces or the storage of vehicles within any portion of an entrance driveway or driveway or driveway lane that is within the following distance of the Right-of-Way line of the County road.

## Site Plan

Length of Entrance Driveway to be Kept Free of Parking Maneuvers:

<u>Parking Spaces</u>	<u>Distance (in Feet)</u>
1 to 39	20
40 to 99	40
100 to 299	60
300 - 3300 or more	20 additional feet for each 300 additional parking spaces.

In addition, off-street parking areas shall be so designed to permit all vehicles to turn around on the site in order to prevent the necessity of any vehicle backing on to the County road from such site.

No required off-street parking space including adjacent parking access lanes or maneuvering space shall be located within the existing or proposed Right-of-Way of the County road, including the sidewalk area.

### 11-7.2 Off Street Loading Spaces and Areas

Each land development subject to County site plan approval shall provide on its Lot the number of off-street truck loading or unloading spaces required by any zoning, subdivision, site planning or other ordinance of the municipality in which the land development is to be located.

No part of any off-street truck loading or unloading space shall be located within the Right-of-Way of the County road including the sidewalk area. Off-street truck loading and unloading spaces shall be located and designed to permit any truck to maneuver from a driveway into and out of such space without encroaching upon any portion of a County road existing or proposed Right-of-Way including the sidewalk area.

11-7.3 Customer Areas

Any site plan that provides temporary stopping space or maneuvering space for vehicles of customers or patrons seeking service at a roadside business establishment such as a roadside grocery stand, filling station, drive-in bank etc. shall be located so that the stopping or maneuvering space is at least ten feet back of the existing, or where applicable, future Right-of-Way line, of the County road.

11-7.4 Driveways

A. Number of Driveways:

The number of driveways provided from a site directly to any one County road shall be limited as follows:

<u>Length of Site Frontage</u>	<u>Number of Driveways</u>
80 feet or less	1
More than 80 to 800 feet	2
Over 800 feet	To be specified by the Site Plan Committee upon receipt of advice of the County Engineer and the County Planning Director.

B. Location of Driveways:

- 1) All entrance and exit driveways to a County road shall be located to afford maximum safety to traffic on the County road.
- 2) Any exit driveway or driveway lane shall be so designed in profile and grading and shall be so located to permit the following minimum sight distance measured in each direction along the County road; the distance shall be measured from a height of forty-five (45) inches above the pavement as taken from the drivers seat of a standard passenger vehicle standing on that portion of the exit driveway that is

Site Plan

immediately outside the edge of the County road travel way or shoulder:

Allowable Speed on County Road	Required Sight Distance in Feet
25 MPH	150
30 MPH	200
35 MPH	250
40 MPH	300
45 MPH	350
50 MPH	400

- 3) Where a site occupies a corner of two intersecting roads, no driveway curbline opening may be located less than 10 feet from the tangent of the existing or proposed corner curb radius of that site.
- 4) No part of any driveway curbline opening may be located within 5 feet of a side property line, however, upon application to the Site Plan Committee and upon approval of design by the County Engineer, the Committee may permit a driveway serving two or more adjacent sites to be located on or within 5 feet of a side property line between the adjacent site.
- 5) No entrance or exit driveway shall be located on the following portions of a County road: on a rotary; on a ramp of an interchange or jughandle; or within 20 feet of the beginning of any ramp or other portion of an interchange or jughandle.
- 6) Where two or more driveways connect a single site to any one County road, a minimum clear distance of 25 feet measured along the Right-of-Way line shall separate the closest edges of any such driveways.

County of Middlesex

C. Driveway Angle:

1) *Two-Way Operation*

Driveways designed for two-way operation shall intersect the County road at an angle to as near 90 Degrees as site conditions will permit but in no case shall the angle be less than 60 degrees as measured from the County road.

2) *One-Way Operation*

Driveways designed for one-way ingress or one-way egress where the only permitted movement is a right turn may form an angle of no less than 45 degrees measured from the County roads.

D. Driveway Dimensions:

The dimensions of driveways shall be designed adequately to accommodate the volume and character of vehicles anticipated to be attracted daily onto the land development for which a site plan is prepared.

The maximum and minimum widths for driveways are as shown in the table below.

Maximum and Minimum Driveway Widths

		Driveway Width (in feet)	
		One-Way Operation	Two-Way Operation
5-10 Family Residence	One Lane	10-13	----
	Two Lanes	18-26	18-26
10 Family or over	One Lane	11-15	---
	Two Lanes	24-30	24-30
Commercial (including service stations), Industrial and Public and Quasi Public	One Lane	15-20	---
	Two Lanes	24-26	24-26
	Three Lanes	33-36	33-36

Site Plan

E. Driveway Curb Radius

Each driveway shall be so designed to provide a radius of curvature between the edge of said driveway and the outer edge of a paved traveled lane, deceleration lane, acceleration lane or shoulder (whichever is closest to the site) which permits a passenger vehicle to turn into or out of the driveway without encroaching on the lane on the County road that is adjacent to that from which or into which the turn is being made.

However, where a site is designed to accommodate more than 100 off-street parking spaces each driveway shall be designed according to the foregoing standard except that the radius of curvature shall be designed to permit any standard vehicle including trucks using the site to turn into or out of the driveway without encroaching either on an adjacent driveway lane or adjacent lane on the County road from which or into which the turn is being made.

The following table presents the minimum standards in meeting these criteria for passenger vehicles under ordinary conditions.

Minimum Standards for Passenger Vehicles Only

		Curblin Opening (in feet)			
		One-Way Operation		Two-Way Operation	
		A	B	A	B
5-10 Family Residence	One Lane	30	50	---	---
	Two Lanes	---	---	38	58
10 Family or over	One Lane	31	51	---	---
	Two Lanes	44	64	44	64
Commercial (including service stations,)	One Lane	35	55	---	---
	Two Lanes	44	64	44	64
Industrial and Public and Quasi Public	Three Lanes	53	73	53	73

A. Adjacent street lane use for parking.

B. Adjacent street lane used for through lane, shoulder, or deceleration or acceleration lane.

F. Driveway Surfacing:

The surface of any driveway subject to County site plan approval shall be constructed with a permanent pavement of a type specified by standards set by the County Engineer. Such pavement shall extend to the paved travel way or paved shoulder of the County road; and such pavement shall extend throughout the area defined by the required driveway dimensions.

11-7.5 Minimum Pavement On County Roads

Along that portion of a County road that abuts a proposed land development, highway pavement of sufficient width shall be designed and installed to provide for:

- A. A continuation of the number of traveled lanes that exist on the road at the time of application for County site plan review.
- B. A shoulder.

A traveled lane shall be 13 feet in width and a shoulder shall be 13 feet in width. The pavement and shoulders shall be designed and installed in accordance with construction specifications and approvals of the County Engineer.

11-7.6 Acceleration Lanes And Deceleration Lanes

A 13-foot wide\* and 300-foot long acceleration lane and 200-foot long deceleration lane shall be provided in order to accommodate safely and efficiently the vehicles attracted daily onto a lot designed to serve:

- A. A residential use that will accommodate 300 or more dwelling units.
- B. A business or commercial use that covers more than 4 acres of land.
- C. An industrial, manufacturing or warehousing use that covers more than 15 acres of land.

---

\* The width is measured from the outside edge of the travel way of the County road and the length is measured from the centerline of the new driveway.

## Site Plan

- D. A combination of uses on the same lot for which a total of 300 or more parking spaces is provided.

In instances where the lot or plot will have insufficient frontage along the County road to accommodate the required length of the deceleration lane or the acceleration lane, the lane that cannot be accommodated may be substituted by a separate right turn ramp at least 16 feet in width and having an inside turning radius of at least 75 feet. The acceleration and deceleration lanes or ramps shall be designed and installed in accordance with the construction specifications and approvals of the County Engineer.

### 11-7.7

#### Sidewalks

Each land development subject to County site plan approval shall provide a sidewalk within the County road Right-of-Way if such is required by any zoning, subdivision, site planning or other ordinance of the municipality in which the land development is to be located. Where no local ordinance requires a sidewalk, the County Planning Board may require the installation of a sidewalk in the County Right-of-Way in order properly to protect pedestrian traffic.

If a sidewalk is required as a condition of approval under this resolution or is required by a municipality, such sidewalk shall be located in accordance with local specifications. In the event that no local specifications exist, the following shall apply:

- A. Sidewalks shall be constructed of Portland cement air entrained concrete, 4,000 lbs., (Class C) in accordance with the standards and specifications of the New Jersey Department of Transportation. Portland cement concrete sidewalk is hereinafter termed concrete sidewalk.

- B. Sidewalk location:

Sidewalks shall be a minimum of 5 feet in width. The outside edge of the sidewalk shall be one foot inside the Right-of-Way line except in commercial areas.

- C. Sidewalk grade:

In all cases, the sidewalk shall conform to standard slope specifications of sidewalk and sidewalk area which shall be  $\frac{1}{4}$ " per foot rising from the top of standard curb, except

where depressed curb type driveways require a lowering of the sidewalk grade in accordance with the driveway specifications outlined in this resolution.

11-7.8 Curbing

Each land development requiring County site plan approval shall install curbs along the entire property frontage of the County road. These curbs shall be constructed in accordance with the construction specifications of the County Engineer.

A. Alignment and Grade:

The alignment and grade of curbing is to be determined by that established or existing in the area and subject to the approval of the County Engineer.

*Driveway Profile*

Any vertical curve on a driveway shall be flat enough to prevent the dragging of any vehicle undercarriage. The maximum permitted gradients for driveways are shown in Diagrams A to D. The profile dimensions given beyond the sidewalk are maximum for grades and minimum for (unreadable) lengths.

NOTE - All clearances are for a normal load condition.

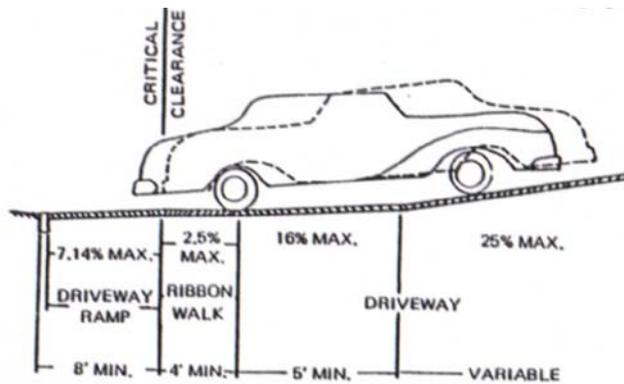
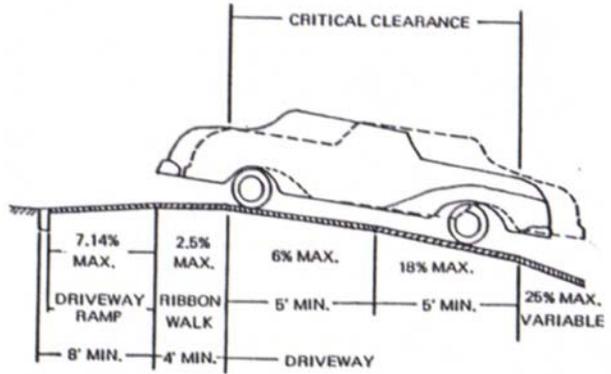


DIAGRAM A

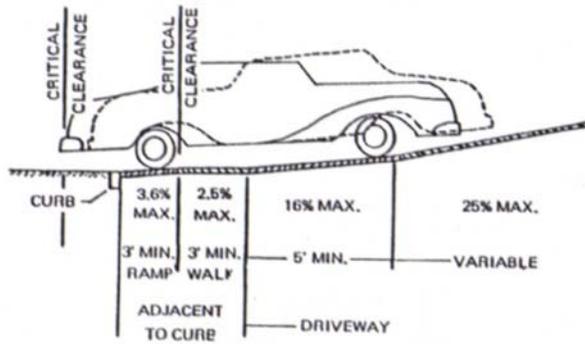
Case A-1 Sidewalk 8' or more from curb, uphill drive.

# Site Plan



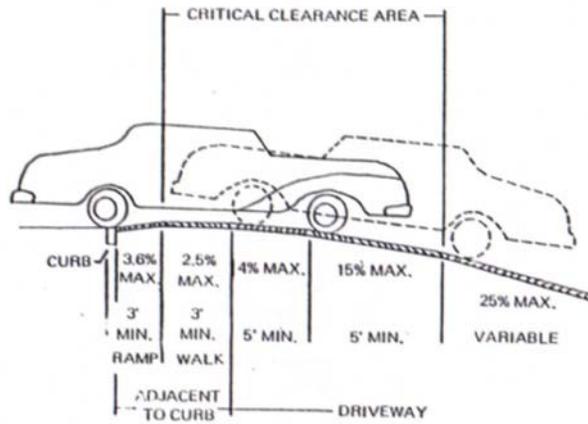
**DIAGRAM B**

Case A-2 Sidewalk 8' or more from curb, downhill drive.



**DIAGRAM C**

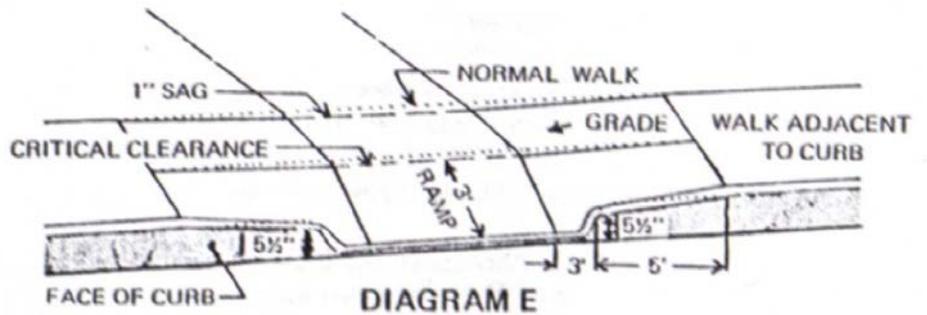
Case B-1 Sidewalk within 8' of curb, uphill drive.



**DIAGRAM D**

Case B-2 Sidewalk within 8' of curb, downhill drive.

Should the sidewalk be so close to the curb at a depressed driveway as to cause the ramp to be too steep and be likely to cause undercarriage drag, the sidewalk shall be appropriately lowered to provide a suitable ramp gradient.



Typical case curb cut and sidewalk design.

Source: Highway Research Board "Bulletin 195", 1958, Pages 23-29 (Street and Highway Design by L. A. Bauer).

B. Curbing at Driveway Openings:

Where a proposed driveway is to serve any land development providing 50 or more parking spaces, curbing need not be carried across the driveway opening as a depressed curb: rather it may be swept back as curb returns as in the case of a street intersection.

If the driveway serves a facility having less than 50 parking spaces, a depressed curb driveway shall be used.

Where depressed curbs are used at driveways, the following specifications shall apply:

1) *Existing Curb*

To construct a depressed curb where curbing exists, the existing curb shall be modified in accordance with the requirements set by the County Engineer.

## Site Plan

### 2) *New Depressed Curb*

New depressed curb shall be constructed in accordance with specifications as set forth by the County Engineer.

### 3) *Height of Depressed Curb Above Street Pavement or Shoulder*

The top of the depressed curb shall be no greater than one and one half inches higher than the gutter grade.

### 4) The horizontal transition of depressed curb from full curb height shall not exceed 18 inches except where the sidewalk is so narrow and close to the curb that a portion of the sidewalk four feet or less from its outer edge has a slope exceeding 6:1. In this case, the depressed curb transition may be modified to prevent the outer four feet of sidewalk from exceeding a slope of 6:1.

## 11-7.9 Sight Triangle at Road Intersections

Whenever a land development lies at the intersection of two roads and one or both roads is a County road, a sight triangle easement shall be laid out and dedicated as follows:

The area bounded by the Right-of-Way lines and a straight line connecting "sight points" on street center lines which are the following distances from the intersecting center lines.

- A. Where a State or Federally designated highway intersects a County road two overlapping sight triangles shall be required formed by 250 feet and 90 feet on each road,
- B. Where a County road intersects another County road, a sight triangle measuring 250 feet on the road designated as a through street in the adopted "Through Street Resolution" of the County and 90 feet on the other.
- C. Where a County road intersects a local street, a sight triangle shall be required measuring 250 feet on the County road from intersecting centerlines and 90 feet in the local street. An example of the easement agreement to be used may be found in Appendix A of this resolution.

11-7.10 Public Utilities

When improvements required by these design standards will result in existing utility poles, light standards, fire hydrants or other above-ground utility structures remaining within a driveway or a required paved area of the County road, the applicant shall be responsible for the relocation of same. At no time shall any newly paved area within the County Right-of-Way be utilized by the traveling public until such time as all utility structures are relocated.

All above-ground utility structures shall be located behind the curb line at locations approved by the County Engineer.

The relocation or extension of underground utilities such as gas, water or sewer lines may be required when necessary to secure compliance with the traffic safety and drainage provisions of this resolution.

11-7.11 Drainage

Each land development subject to County site plan approval shall provide adequate drainage structures in accordance with standards set by the County Engineer for handling storm water that is generated on and/or through such site and that now flows or will flow directly or indirectly to a County road or under a County bridge or culvert.

Where no drainage will flow to the County road that is adjacent to the site but where in order to serve the site, any driveway, acceleration or deceleration lane, shoulder or other facility will be installed within the adjacent County Right-of-Way in accordance with requirements of other sections of this ordinance, drainage facilities shall be installed in the County road in accordance with standards set by the County Engineer under or in conjunction with such driveways, acceleration and deceleration lanes, shoulders or other facilities.

- A. The County Planning Board shall require adequate drainage facilities and easements to be provided for by the applicant in conjunction with a site plan application that will cause storm water to drain either directly or indirectly to a County road or through any drainageway, structure, pipe, culvert or facility for which the County is responsible for the

## Site Plan

construction, maintenance or proper functioning. Such drainage shall be designed to handle all existing and future storm water to be generated.

- 1) On and/or through the site plan and
- 2) On and/or along such County road or roads as may abut the site plan and which if not properly disposed will create potential safety hazards or impediments to traffic flows caused by the site plan.

B. In addition, the County Planning Board shall require an applicant to contribute to the provision of adequate off-site and/or off-tract County drainage facilities the needs for which will result from the total development of the drainage basin of which the applicant's site plan is a part. In such case, the applicant will be required to contribute a proportionate share of the cost of such off-site and/or off-tract facilities, such proportionate share to be computed on the basis of the acreage of the site plan as related to the acreage of the total drainage basin involved plus 10% contingencies. Required drainage facilities shall include drainageway Rights-of-Way or easements, bridges, culverts, pipes, drainageways, detention basins, recharge basins and other drainage structures as may be determined by the County Engineer to be necessary and appropriate to accomplish the foregoing purposes.

C. In addition, the provisions for adequate drainage facilities shall include provision for widening an existing County bridge or lengthening an existing County culvert or other drainage facility where a proposed site plan abuts the drainage facility on one or both sides of the stream and which facility is on a County road for which a future Right-of-Way width has been established on the duly adopted County Master Plan or Official Map. Where the proposed site plan contains both sides of the stream and the County Engineer finds that the waterway area of the existing bridge or culvert is adequate both for present and future flows, the applicant shall be required to widen the County bridge to the proposed future width of pavement plus a ten foot sidewalk or lengthen the culvert to the full width of the proposed Right-of-Way. However, the applicant for the proposed site plan shall be permitted to provide a cash

contribution to cover the cost, as determined by the County Engineer using current competitive bid prices for the units involved, for the bridge widening or culvert lengthening when the existing bridge or culvert is deemed by the County Engineer to be inadequate in capacity to be widened or lengthened for structural or hydraulic reasons. In addition, where the site plan application abuts only one side of a stream or waterway, the applicant shall be required to provide a cash contribution to cover only that portion of the cost of the bridge widening or culvert lengthening which is the proper share attributable to the site plan.

D. General Design Criteria

- 1) Runoff for design of internal site plan drainage systems shall be determined by the Rational Formula:

$$Q = ACi$$

Q = Peak discharge of watershed in cubic feet per second (cfs) due to storm given in Appendix B.

A = Area of watershed in acres.

C = Coefficient of runoff as given in Appendix C.

i = Intensity of rainfall in inches per hour based on a 15 minute time of concentration unless existing conditions permit a longer time of concentration. (See Appendix D)

Design criteria are outlined in Appendix B.

Concentration Time = time necessary for water at most remote portion of watershed to reach point of analysis. Concentration time can also be determined from Appendix F.

- 2) The sizing of conduit for the transmission of storm flow shall be determined by the use of the Manning Formula:

Site Plan

$$Q = a \times \frac{1.486}{n} \times R^{2/3} S^{1/2}$$

Q = Flow of conduit in cubic feet per second (cfs).

a = Cross-sectional area of water flow through conduit in square feet.

R = a/p (hydraulic radius) in feet

S = Slope, in feet/feet, fall/length

V = Average velocity of water in feet/second.

P = Wetted perimeter in feet.

n = Roughness coefficient (Appendix E).

3) *General requirements and layout of systems*

- a. Applicant must submit complete calculations for all designs.
- b. Plans must show horizontal alignments and profiles of all structures.
- c. Velocities: minimum - 2.5 fps, maximum - 8 fps.
- d. Manholes:
  - A. Change in alignment
  - B. 300 feet maximum
- e. Minimum pipe diameter: 15".
- f. Maximum inlet flow 6.0 cfs.
- g. Maximum inlet spacing 500 feet.
- h. Access manholes shall be spaced at 300 foot intervals (maximum) through Rights-of-Way

## County of Middlesex

and at sewer junctions where there are no catch basins.

- i. Access manholes shall be used at every change of horizontal alignment.
- j. Every street intersection shall have a minimum of two inlets. In general, inlets should be located so that no water will flow across a street or crosswalk in order to reach an inlet. This requires that inlets be placed in the high corners at intersections and at sufficiently frequent intervals that the gutters are not overloaded.
- k. Inlets and manholes shall be constructed in accordance with standards established by the County Engineer.
- l. Pipe used shall be circular reinforced concrete pipe Class III wall B unless otherwise directed by County Engineer and laid with not less than two (2) feet of cover over top of pipe.

### 4) *Natural Streams*

Where a site plan incorporates within its bounds a stream considered to be in its natural state, the applicant must submit a properly executed application along with all other data required, to the N.J. Department of Environmental Protection, Division of Water Resources. Proof of this submission must be included at the time the site plan is reviewed. If work is contemplated on the stream, i.e., piping, relocation, lining, widening, etc. design should be based on the "Flood Runoff Index Curves", see Appendix G. The municipality in which the site plan is located will be used to determine which curve is applicable for that area. Appendix L shows Runoff Zones for Middlesex County. Locations in Runoff Zone A shall use the North Jersey Curve and Locations in Runoff Zone B shall use the Mean Curve. These Runoff Zones are based on the relative permeability of soils in the County.

## Site Plan

On major streams within the County, flood hazard areas have been delineated and adopted by the Water Policy and Supply Council of the N.J. Department of Environmental Protection. Any proposed work on the delineated floodways of these streams will require a permit from the Division of Water Resources, N.J.D.E.P. On other major streams, where floodways have not been delineated, the County may require an encroachment line to be set on the stream based on a 100-year storm. No permanent structures will be permitted within this encroachment area.

### 5) *Culverts and Bridges*

The design of structures shall be in accordance with the "Standard Specifications for Highways Bridges" adopted by the American Association of State Highway and Transportation Officials, 17<sup>th</sup> Edition, 2005.

- a. The loading for structures shall be H20-44 as designated in the above captioned specifications.
- b. Deck width of structure.

Culverts shall be constructed for the full width of the existing or proposed Right-of-Way as outlined in Section 10-7.9C.

Bridges shall be constructed for the total width of pavement, plus shoulder, plus two 10-foot sidewalk areas.

## E. General Requirements

### 1) *All design must be approved by the County Engineer*

- a. All plans and specifications must be submitted with complete hydraulic and structural calculations.
- b. Applicant must submit proof of application to, or permit issued by Department of

County of Middlesex

Environmental Protection, Division of Water Resources for proposed structure at the time the site plan is reviewed.

2) *Inspection, testing and final approval*

- a. The County Engineer or his authorized representative will make necessary inspections to be facilitated by applicant. Applicant will take corrective action if directed by County Engineer.
- b. The County Engineer may require that certain tests be made by a recognized testing laboratory at the cost of the applicant.
- c. All structures must have final approval of the County Engineer.
- d. All permits of the Division of Water Resources shall be secured before construction can begin.

3) *Detention basins*

- a. Shall be designed in accordance with:
  1. Technical Release 55 (TR-55) Urban Hydrology for Small Watershed
  2. A Guide to Storm Water Management Practices in New Jersey: April 1986 (N.J.D.E.P.E./Division of Water Resources)

b. Dams for Detention Basins.

A properly executed application shall be submitted to the N.J.D.E.P., Division of Water Resources for proposed dams or repairs to existing dams along a stream. A permit shall be required before any construction can be undertaken on a proposed dam or for repairs to an existing dam. Proof of submission or permit will be required of the applicant at the time of submission for site plan review. All

## Site Plan

standards and design criteria of the Division of Water Resources shall govern for any size dam. An environmental assessment may be required for certain dams. All dams will require inflow-outflow hydrographs and a statement assessing downstream damages, should the dam fail.

### 4) *Erosion Control*

It will be the responsibility of the applicant to provide sound and workable designs for the control of erosion on cut slopes, fills, and in channels. The plans submitted should show all areas of potential erosion problems and should show the corrective design utilized to minimize erosional soil losses. All work undertaken shall conform to, "Soil Erosion and Sediment Control Standards" adopted June 12, 2008 by the New Jersey Department of Transportation. These standards cover procedures to be followed for the design of measures and treatment to prevent erosion including the following:

- a. Earth slopes
- b. Waterway and channels
- c. Erosion control structures
- d. Detention and sediment basins
- e. Preservation of existing vegetation
- f. Soil treatment
- g. Seed Bed preparation
- h. Seeding
- i. Mulching

### 11-7.12 Conformance To Provisions Of Traffic Control Plan

In addition to the above requirements, the Planning Board may specify that a driveway or driveways or other site plan features shall conform in location and design to the provisions of an

adopted Traffic Control Plan for the County road that abuts the site for which site approval is sought subject to the approval of the appropriate State agency.

11-7.13 Drainageways

As a condition to the approval of a site plan application, the Subdivision & Site Plan Review Committee shall require the dedication of drainageways shown on a duly adopted County Master Plan or Official County Map where said drainageway lies partly or in their entirety within the boundaries of the proposed site plan application.

11-7.14 Inspection Fees

An inspection fee for the release of a performance guarantees shall be deducted from the 10% cash portion of the performance guarantee submitted in accordance with the fee schedule provided herein.

**11-8 Standards and Criteria for Varying or Waiving Requirements**

11-8.1 Variances

The rules, regulations and standards herein set forth are designed as minimum requirements for the safety and welfare of the people of the County. However, if an applicant can demonstrate that, with reference to his site plan, the literal enforcement of one or more of said rules, regulations or standards will exact an undue hardship, the Planning Board may permit such variance or variances as may be reasonable and within said general purposes.

And to the extent that benefits do not accrue to the subject matter of the application and detriments do not accrue to the public then relief may be granted from the terms and conditions of this Resolution.

11-8.2 Provision for Waiving Development Review Fees

Where it is determined by the Site Plan Review Committee that a hardship will result by the exaction of the review fees adopted by the Board of Chosen Freeholders or for other good cause, the Committee may waive all or part of said fees for the following:

- A. Public projects being financed through public funds; or
- B. Projects submitted by and for the sole use of a duly qualifying non-profit organization.

**11-9      Validity**

If any section, subsection, paragraph, clause, phrase or provision of this resolution shall be adjudged invalid or held unconstitutional such adjudication shall not affect the validity of this resolution as a whole or any part or provisions hereof other than the part so adjudged to be invalid or unconstitutional.

**11-10     Repeal of Conflicting Resolutions**

All resolutions or parts of resolutions which are inconsistent with the provisions of this resolution are hereby repealed to the extent of such inconsistency.

**11-11     Effective Date**

This amended resolution shall take effect February 1, 1970.

County of Middlesex

Appendix A

SIGHT TRIANGLE AGREEMENT TO BE USED

This Agreement made this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_ by and between \_\_\_\_\_, OWNERS of the land hereinafter referred to as the OWNER, and COUNTY OF MIDDLESEX, a municipal corporation of the State of New Jersey, hereinafter referred to as the COUNTY.

WHEREAS, it is in the interest of the general public and the welfare of the County of Middlesex that the lands hereinafter described shall be at all times retain as Open Space for the purpose of permitting the operators of vehicles, and pedestrians to see across said lands and to provide a clear view for oncoming vehicles or pedestrians from adjoining streets, roads or highways;

NOW, THEREFORE, in consideration of the sum of One (\$1.00) Dollar and other good and valuable consideration the Owner hereinabove referred to does hereby covenant, promise and agree and does hereby dedicate by easement the hereinafter described lands for the purposes as follows:

- 1) There shall not be erected at any time on said lands any building, structures or signs which may in any way interfere with the view or sight of operators of vehicles or pedestrians traversing the abutting streets, roads or highways. However, such varieties of ground cover or shrubs having an ultimate height of from two to 3.5 feet and that may easily be cared for by the County Road Department may be planted in the area designated below.
- 2) The County of Middlesex, its agents, representatives or employees may, but shall have no duty to enter upon and re-enter upon said lands hereinafter described for the purpose of establishing a clear sight or view for operators of vehicles or pedestrians traversing the abutting streets, roads or highways.
- 3) The lands affected by this Declaration are as follows:  

*Metes and Bounds Description, including Lot and Blocks*
- 4) This Declaration shall run with the land and shall be perpetual.

SIGNATURES; the Owner/Applicant signs this Sight Triangle Agreement as of the date at the top of the first page.

Site Plan

Appendix B

Design Criteria

Area (Ac.)	Maximum Time of Concentration (Minutes)	Design Freq. (Years)	Rainfall (Inches per hour)
Less than 250	30	10	2.15
250 to 800	45	15	2.40
Greater than 800	60	25	2.60

Source: Middlesex County Engineering Department May, 1969.

County of Middlesex

Appendix C

Coefficient of Runoff

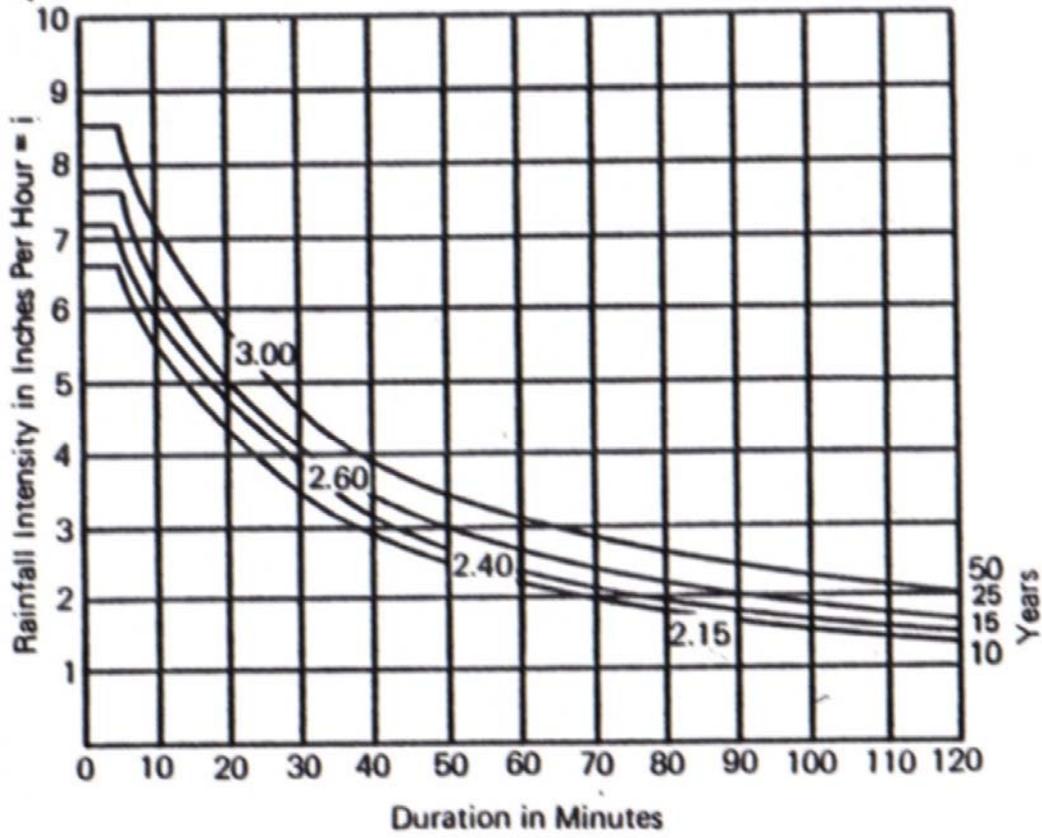
Land Use	Description	Coefficient
Residential	Individual Dwelling with Lot size: 20,000 Sq. Ft. or greater	0.40
Residential	Individual Dwelling with Lot size: less than 20,000 Sq. Ft.	0.50
Apartments		0.70
Commercial		0.85
Industrial		0.80
Undeveloped or Parks		0.25

Source: Middlesex County Engineering Department, May, 1969.

Site Plan

Appendix D

Rainfall Intensity Duration Curves



Source: Middlesex County Engineering Department, May, 1969.

County of Middlesex

Appendix E

Hydraulic Computation Table

n = Roughness coefficient

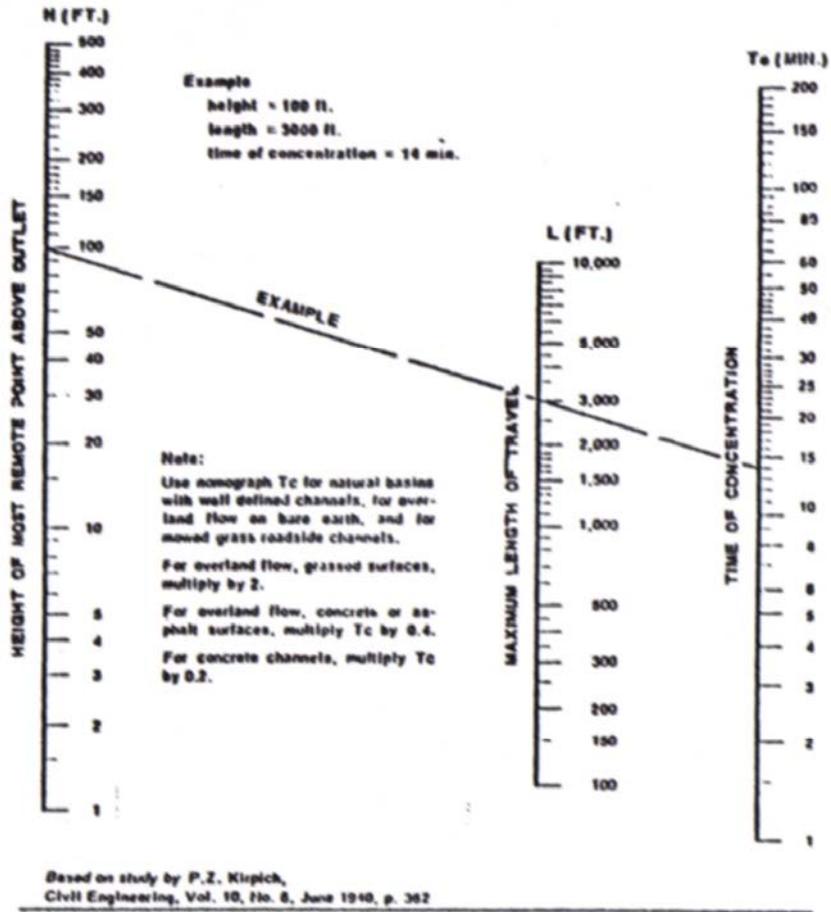
Surface	Condition			
	Best	Good	Fair	Bad
Uncoated cast-iron pipe.	0.012	0.013	0.014	0.015
Coated cast-iron pipe.	0.011	0.012*	0.013*	
Vitrified sewer pipe.	{0.010 0.011}	0.013*	0.015	0.017
Cement-mortar surfaces.	0.011	0.012	0.013	0.015
Concrete pipe.	0.012	0.013	0.015	0.016
Concrete-lined channels.	0.012	0.014	0.016	0.018
Canals and ditches:				
Earth, straight and uniform.	0.017	0.020	0.0225*	0.025
Rock cuts, smooth and uniform.	0.025	0.030	0.033*	0.035
Rock cuts, jagged and irregular.	0.035	0.040	0.045	
Winding sluggish canals.	0.0225	0.025*	0.0275	0.030
Dredged earth channels.	0.025	0.0275*	0.030	0.033
Canals with rough stony beds, weeds on earth banks.	0.025	0.030	0.035*	0.040
Earth bottom, rubble sides.	0.028	0.030	0.033*	0.035

\* Values commonly used in designing.

Site Plan

Appendix F

Overland Flow - Time of Concentration



OVERLAND FLOW - TIME OF CONCENTRATION

County of Middlesex

Appendix G

Flood Runoff Index Curves and 15 year Flood Estimates

