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# Town of Barnstable

## Subdivision

## Rules and Regulations



1973

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# Subdivision Rules and Regulations

## Section 2 General

### Section 1 Authority, Purpose

**A. Authority**  
Under the authority vested in the Board, or its legally constituted successor, by Section 81-Q of Chapter 41 of the General Laws, said Board hereby adopts these rules and regulations governing the subdivision of land in the Town of Barnstable. Such rules and regulations shall supersede and replace any previously adopted Subdivision Control Law Rules and Regulations; and may be amended in accordance with the provisions of Section 81-Q of the General Laws.

Joseph J. Reardon, Chairman  
Hugh C. Findlay, Vice-Chairman  
Sally A. Norris, Clerk  
Roger A. Goodspeed  
John J. Rosario  
William P. Knowlton  
William G. Howes III

**B. Purpose**  
The subdivision control law has been enacted for the purpose of protecting the safety, convenience and welfare of the inhabitants of the town by regulating the laying out and construction of ways in subdivisions providing access to the several lots therein, but which have not become public ways, and ensuring sanitary conditions in subdivisions and in proper cases parks and open areas. The powers of the Board under the subdivision control law shall be exercised with due regard for the provision of adequate access to all of the lots in a subdivision by ways that will be safe and convenient for travel; for lessening congestion in such ways and in the adjacent public ways; for reducing danger to life and limb in the operation of motor vehicles; for securing safety in the case of fire, flood, panic and other emergencies; for ensuring compliance with the applicable zoning ordinances or by-laws; for securing adequate provision for water, sewerage, drainage, underground utility services, fire, police, street lighting, and other similar municipal equipment and other requirements where necessary in a subdivision; and for co-ordinating the ways in a subdivision with each other and with the public ways in the town and with the ways in neighboring subdivisions.

No person shall make a subdivision of any land within the town, or proceed with the improvement or sale of lots in a subdivision, or the construction of ways, or the installation of municipal services therein, unless and until a Definitive Plan of such Subdivision has been submitted to and approved by the Board as hereinafter provided.

After the approval of such plan, the location and width of ways shown thereon shall not be changed without the approval of the Board; but the number, shape and size of the lots shown on the plan so approved may be changed without action by the Board, provided every lot so changed still has frontage on a public way, or a way shown on a plan approved by the Board and such frontage, size and shape of the lot meets the latest requirements of the Zoning By-Laws of the Town of Barnstable.

### A. Definitions

AASHO Latest Revisions of Standard Specifications for Highway Materials and Methods of Sampling Testing adopted by the American Association of State Highway Officials.  
ACI Latest Revisions of the Manuals of Concrete Practice published by the American Concrete Institute.  
Applicant "Applicant shall include an owner, or his agent or representative, or his assigns.  
ASTM Latest Revisions of Standard Specifications published by the American Society for Testing and Materials.  
Board The Planning Board of the Town of Barnstable.  
Definitive Plan The plan of a subdivision as submitted (with appropriate application) to the Board for approval, to be recorded in the Registry of Deeds or filed with the Recorder of the Land Court when approved by the Board, and such plan when approved and recorded or filed. The requirements and content of the Definitive Plan shall be as specified hereinafter.

Department's Specifications The Standard Specifications for Highways and Bridges of the Massachusetts Department of Public Works, including all revisions thereto.  
Department's Standards Latest Revisions of the Construction Standards of the Massachusetts Department of Public Works.  
Engineer A Registered Professional Engineer or Registered Land Surveyor.

General Laws The General Laws, Ter. Ed., with all additions thereto and amendments thereof. In case of a re-arrangement of the General Laws, any citation of particular sections of the General Laws shall be applicable to the corresponding sections in the new codification.

Lot "Lot" shall mean an area of land in one ownership, with definite boundaries and shape, used, or available for use, as the site of one or more buildings.

Municipal Services Sewers, surface water drains, water pipes, gas pipes, electric lines, telephone lines, fire alarm lines and their respective appurtenances and other like services.

Owner As applied to real estate, the person (as hereinafter defined) holding the ultimate fee simple title to a parcel, tract or lot of land, as shown by the record in the appropriate Land Registration Office, Registry of Deeds or Registry of Probate.

Person An individual, or two or more individuals or a group or association of individuals, a trust, a partnership or a corporation having common or undivided interests in a tract of land.

Planning Board Engineer A Registered Professional Engineer or Registered Land Surveyor so designated by the Board to act as their agent in that capacity.

Preliminary Plan A plan of a proposed subdivision or a re-subdivision of land submitted for discussion and consideration by the Board prior to the preparation of a definitive plan. Requirements and contents shall be as specified hereinafter.  
Print A contact print, dark line on white background.

Roadway That portion of a way which is designed and prepared for vehicular travel.  
Street Major Street: A street which, in the opinion of the Board, is being used, or will be used as a thoroughfare between different portions of the Town or which will be the principal access to a business or industrial subdivision.  
Secondary Street: A street intercepting several minor streets and which in the opinion of the Board may carry traffic from such minor streets to a major street or community facility, including the principal access streets or principal circulation streets of residential subdivisions, and including all streets, except those designated as major streets, of a business or industrial subdivision.

Street Major Street: A street which, in the opinion of the Board, is being used, or will be used as a thoroughfare between different portions of the Town or which will be the principal access to a business or industrial subdivision.  
Secondary Street: A street intercepting several minor streets and which in the opinion of the Board may carry traffic from such minor streets to a major street or community facility, including the principal access streets or principal circulation streets of residential subdivisions, and including all streets, except those designated as major streets, of a business or industrial subdivision.

**Minor Street:** A street which, in the opinion of the Board, is being used or will be used primarily, to provide access to abutting lots, and which is not intended for use by through traffic. There shall be two types of minor streets: (A) That street which, in the opinion of the Board, may be used for access to land as yet undeveloped or is of sufficient length to justify the additional width to insure convenience of travel. (B) That street which, in the opinion of the Board, may not be used for access to land as yet undeveloped and is less than seven hundred and fifty (750) feet in length.

**Subdivision** The division of a tract of land into two or more lots and as further defined in Section 81-L, Chapter 41, G.L.

**Subdivision Control Law** Sections 81-K to 81-GG, inclusive; of Chapter 41, G.L. as now in force, and any acts in amendment thereof.

Way A way shall be the full strip of land designated as a way or street as distinguished from the roadway.

**Wetlands**—That area of land which may not be excavated or filled as of right and is subject to Federal, State, County or Town regulations governing tidal lands, salt marsh, lakes, ponds, rivers, streams and fresh water swamps.

#### **B. Administration**

No plan shall be deemed to have been submitted to the Board until said plan, together with all application forms, fees and other items as required and executed as specified herein has been delivered in person to the Board at a meeting thereof, or by registered mail through the Office of the Town Clerk by the owner of the land involved or his authorized agent. (For matters not covered by these rules and regulations, reference is made to Section 81-K to 81-GG, inclusive, Chapter 41, G.L.)

#### **C. Certification of Plans**

All plans submitted to the Board shall include a certification as to their conformance with these Rules and Regulations and as to the validity of their content executed by a person registered in the Commonwealth of Massachusetts as a Land Surveyor or Professional Engineer or both as required by the Board. The Board suggests that the owner be represented at any meeting with the Board by the person responsible for the design of the subdivision and the preparation of the plans.

#### **D. Variation**

1. The Board may, when appropriate, waive such portions of these rules and regulations, when, in their judgment such action is in the public interest and not inconsistent with the purpose of the Subdivision Control Law.

2. For matters not covered by these rules and regulations, reference should be made to Section 81-K to 81-GG, inclusive, of Chapter 41 of the General Laws.

#### **E. Inspection**

All work required by these Rules and Regulations shall be under the inspection of and with the approval of the respective Town Departments and utilities involved hereunder.

#### **F. Responsibility**

1. All work performed under these rules and regulations shall be the responsibility of the owner and/or applicant.

2. The purpose of inspection by the Town is to assure that good practices are followed in constructing the project in accordance with the designs and specifications, and not to establish these practices.

3. The owner is expected to employ his own quality control program through the services of a Professional Engineer.

#### **G. Separability**

If any section, paragraph, sentence, clause or provision of these regulations shall be adjudged not valid, the adjudication shall apply only to the material so adjudged and the remainder of these regulations shall be deemed valid and effective.

#### **H. Amendments**

These regulations or any portion thereof may be amended, supplemented or repealed from time to time by the Board after a public hearing on its own motion or by petition.

#### **Section 3**

#### **Procedure for the Submission and Approval of Plans**

##### **A. Plan Believed Not to Require Approval**

1. Any person wishing to record a plan of land who believes that his plan does not require approval under the subdivision control law shall proceed as follows:

(a) Submit original cloth tracing and three prints from original for a meeting of the Board. The Plan shall be at a scale of (1) inch equals forty (40) feet, plus one copy which shall be a scale of one (1) inch equals one-hundred (100) feet. Plan sheets shall be twenty-four (24) inches wide and thirty-six (36) inches long with a 3/4 inch border.

(b) Submit Form A (see Appendix I) in duplicate to the Board, with a twenty dollar (\$20.00) filing fee, plus one dollar \$1.00 for each lot in excess of five (5).

(c) Give written notice of submission to the Town Clerk by delivery or by registered mail, postage prepaid. Such notice shall describe the land to which the plan relates sufficiently for identification, and shall state the date when such plan was submitted and the name and address of the owner of such land.

(d) Plan shall show locus, Assessors Map number, lot number and zoning district.

2. The Planning Board shall:

(A) At a Meeting of the Board, Sign and date Form A. (Clerk's, Vice-chairman's or Chairman's signature only necessary)

(b) Examine plan and Form A and if it finds that the plan does not require such approval, it shall without a public hearing and within fourteen days endorse on the plan the words "Barnstable Planning Board approval under the subdivision control law not required." Endorsement shall be signed by those duly authorized to act for the Board.

(c) Return plan, original tracing only, to applicant and notify Town Clerk of its action by noting such on duplicate copy of Form A and deliver to Town Clerk.

3. If the Board shall determine that the plan requires approval it shall notify the Town Clerk and the applicant within 14 days of submission of the plan of its determination. The Town Clerk shall be notified on Form A and the applicant by letter. Original tracing shall be returned to applicant with the letter.

(a) Submit his plan for approval as provided by law and the rules and regulations of the Board, or

(b) Appeal from the determination of the Board in the manner provided by law (Chapter 41, Section 81BB), within (20) days after the date of notice of its determination.

##### **B. Preliminary Plan**

1. General - A Preliminary plan of a subdivision may be submitted by the subdivider for discussion and approval by the Board. The purpose of the submission of such a Preliminary Plan will be to enable the subdivider, the Board and other municipal agencies to discuss and clarify the problems of such subdivision before a

Definitive Plan is prepared. Three (3) copies of the plan shall be submitted to the Board with the necessary copies to the Board of Health and written notice of such submission made to the Town Clerk by delivery or by registered mail, postage prepaid. A pro- perty executed Form B and the necessary fees shall be submitted. (See Appendix I & II)

2. Contents - The Preliminary Plan so titled may be drawn on tracing paper at a suitable scale. Said Preliminary Plan should show sufficient information about the subdivision including locus, to form a clear basis for discussion of its problems and for the pre- paration of the Definitive Plan.

Such information will include major site features such as exist- ing stone walls, fences, buildings, wooded areas, rock ridges and outcroppings, swamps and water bodies, and existing topography as required, together with the information required by items (e) and (f) of Section 3-C-1 and items (a) to (h) and (o) inclusive of Section 3-C-2. In special instances where subdivision construction could result in excessive removal of large trees, the Planning Board may require a tree map showing the size, species and location of all trees over six (6) inches in diameter. During discussions of the Preliminary Plan, information required for the Definitive Plan will be developed.

3. Board Actions - The Board shall, within sixty (60) days after submission, give such Preliminary Plan its approval with or with- out modification, or shall disapprove such plan stating its reasons. The Town Clerk shall be notified of the Board's decision in writing. Such approval does not constitute approval of a subdivision, but does facilitate the procedure in securing final approval of the Definitive Plan.

#### C. Definitive Plan

1. General - Any person who submits a Definitive Plan of a subdivision for approval shall file in accordance with Chapter 41, Section 81T, 81U and shall also file the following:

a. An original drawing of the Definitive Plan to the Board and four (4) reproducible contact prints thereof, dark line on white background.

(The original drawing will be returned after approval or dis- approval).

b. The necessary copies to the Board of Health.

c. A properly executed Form C and the necessary fees re- quired. (See Appendix I & II)

d. A sketch plan showing a possible or prospective street lay- out for any adjacent unsubdivided land owned or controlled by the owner or subdivider of the subdivision, unless such a plan has al- ready been filed with the Board. In the case where the applicant does not own or control any contiguous land, a statement to this effect shall appear in the application.

e. The applicant shall submit calculations for the determination of all waterway openings to justify culvert and drain sizes as re- quired by Section 4-C-3c. Such calculations shall be prepared by a Registered Professional Engineer.

(f) The applicant shall submit a boring log and soil classifica- tion performed by a Registered Professional Engineer of borings taken at the location of each proposed catch basin and manhole to a depth of two (2) feet below these structures, but in no case less than ten (10) feet below finish grade.

2. Contents The Definitive Plan shall be prepared by a Civil Engineer and/or Land Surveyor, registered in Massachusetts, and shall be clearly and legibly drawn in black India Ink upon tracing cloth. All surveying shall conform to the requirements of the Land Court, Class A, as set forth in the manual of said court, from time to time current. The Plan shall be at a scale of one (1) inch

equals forty (40) feet, plus one copy which shall be a scale of one (1) inch equals one hundred (100) feet. Plan sheets shall be twenty-four (24) inches wide and thirty-six (36) inches long with 3/4" border.

a. Name of subdivision, date, scale, name of owner, subdivider, surveyor, north point, bench marks. A title block must appear on each page.

b. Names of all abutters as they appear in the most recent tax list, and approximate intersecting boundary lines of the abut- ting lands.

c. Lines of existing and proposed streets, ways, lots, ease- ments and public or common areas within the subdivision. (The proposed names of proposed streets shall be shown in pencil until they have been approved by the Planning Board. No duplicate names or names closely similar to existing street names shall be permitted).

d. Sufficient data to determine the location, direction and len- gth of every street and way line, lot line and boundary line, and to establish these lines on the ground.

e. Location of all permanent monuments as defined in "Design Standards and Required Improvements," properly identified as to whether existing or proposed.

f. Location, names, and present widths of streets bounding approaching or within reasonable proximity of the subdivision.

g. Size and location of existing proposed storm drains, water mains, utilities and their appurtenances, including hydrants, within and adjacent to the subdivision. (Refer to design standard Section 3-A).

h. Profile plans of proposed streets drawn as follows:

(1) A horizontal scale of one inch (1") equals forty feet (40')

(2) A vertical scale of one inch (1") equals four feet (4')

(3) Existing center line in fine solid line.

(4) Existing right side line in fine dotted line.

(5) Existing left side in fine dashed line.

(6) Proposed center line grades in heavy lines, all appropriat- ely designated showing grade elevations at every fifty (50) foot station, except on vertical curves where they shall be shown at every twenty-five (25) foot station and at P.V.C. and P.V.T.

(7) Proposed system of drainage, including catch basins, man- holes and proposed inverts, and pipe sizes.

(8) All existing intersecting walks and driveways.

(9) Elevations referred to mean sea level as established by the U.S. Coast and Geodetic Survey.

(10) Rates of gradient shown by figures for roadways and drainage.

i. Typical section of proposed streets shown on a profile plan in accordance with typical cross section as shown in Appendix, showing construction and all proposed and required utilities.

j. Profiles and cross sections of drainage easements, existing water bodies, natural waterways, swamps and flood plains within and adjacent to the subdivision.

k. Suitable space for endorsement by the Board and verifica- tion of no appeal by the Town Clerk.

l. Require present zoning be shown.

m. Show Assessors map page number for locus.

n. Existing and proposed topography set forth on a separate plan as follows:

The contour intervals shall be two feet (2') where slopes are less than 5% and five feet (5') on slopes 5% or greater. Existing contours shall be shown as solid lines, and proposed final contours as dashed lines. Contours shall extend beyond the boundaries of the property a sufficient distance to indicate the effect of the sub- division on abutting property as required by the Board.

o. Cross area of the subdivision in square feet and in acres. Gross area of roads and cul-de-sacs, in square feet and in acres. Gross area of wetlands in square feet and in acres. Net area of wetlands within each lot or parcel, in square feet.

3. Review by Board of Health as to Suitability of the Land  
When a definitive plan of a subdivision is submitted to the Planning Board a copy thereof shall also be filed with the Board of Health. Such health board or officer shall report to the Planning Board in writing approval or disapproval of said plan, and in the event of disapproval shall make specific findings as to which, if any, of the lots shown on such plan cannot be used for building sites without injury to the public health, and include such specific findings and the reasons therefor in such report, and, where possible, shall make recommendations for the adjustment thereof, provided, however, if a municipal sewerage system will service the proposed subdivision, then failure of the board to make such a report within forty-five days after the plan is filed with their office shall be deemed approval by such board or officer. Such health board or officer shall send a copy of such report, if any, to the person who submitted said plan.

(a.) Any lot so located that it cannot be served by a connection to a municipal sewer system shall be provided with on-site sewage disposal facilities satisfactory to the Board of Health and the Planning Board.

(b) If district sewage is not proposed, approval by the Board of Health of the means of sewage disposal proposed and approval of the soil structure of the disposal locus shall be required. The layout of the fire alarm system, including the hydrants and the layout of the fire alarm system, including locations of boxes if any.

(c) The Tree Warden and Park Department as to the location, size and species of street trees.

(d) The Sewer Commissioners as to the requirements for provision for connections to the sewer system and, if required, the layout and design of the necessary connecting mains, laterals, manholes and stubs for such system. In such cases, review by the Sewer Commissioners will include the profiles of the streets.

(e) The Manager of the Water Company as to the location and size of water mains, including service to the fire hydrants.

(f) The Manager of the Electric Company as to the requirements for electrical service.

(g) The Gas Company as to the location and size of gas mains.

(h) The Telephone Company as to the location of the telephone lines.

(i) The Highway Surveyor.

(j) The Police Chief.

(k) The Superintendent of Schools.

(l) The Conservation Commission.

(m) Such other departments or officials deemed necessary.

5. Performance Guarantee  
Before approval of a Definitive Plan of a subdivision, the applicant shall agree to complete the required improvements as shown on the Definitive Plan and as specified in Sections 4 & 5 for all lots in a subdivision, such construction and installation to be secured by one, or in part by one and in part by the other, of the following methods which may from time to time be varied by the applicant:

(a) Final Approval with bonds or surety  
The applicant shall either file a surety company performance bond or a deposit of money or negotiable securities in an amount determined by the Board to be sufficient to cover the cost of all or any part of the improvements as shown on the Definitive Plan

and as specified in Sections 4 & 5 not covered by a covenant under "b" below. Such bond or security, if filed or deposited, shall be approved as to form and manner of execution by the Town Counsel and as to sureties by the Town Treasurer and shall be contingent on the completion of such improvements within one year of the date of the bond. The form of the bond may be as given by Form D, or Form E in Appendix I, or as otherwise required, by the Board. At the discretion of the Board a time extension may be granted for a period not to exceed one (1) year; provided that such an extension may be conditioned upon an increase in the amount of such bond or security as determined by the Board.

(b) Final approval with covenant  
The applicant shall file a covenant acceptable to the Board executed and duly recorded by the owner of record, running with the land, whereby such improvements as shown on the Definitive Plan and as specified in Sections 4 & 5, not covered by bond or deposit under "a," above, shall be provided to serve any lot before such lot may be built upon or conveyed, other than by mortgage deed. A suggested form of the covenant is given by Form F in Appendix I.

6. Public Hearing  
Before approval of the Definitive Plan is given, a public hearing shall be held by the Board at the time and place designated by the Board. Notice of such hearing will be given by the Board at least fourteen (14) days prior thereto by advertisement in an official publication of, or in a newspaper of general circulation in the Town of Barnstable. A copy of said notice will be mailed to the applicant and to all owners of land abutting upon the subdivision as appearing in the most recent tax list.

7. Approval, Modification or Disapproval  
After the required hearing but within sixty (60) days of submission of the Definitive Plan the Board will take final action thereon. The Board may approve, approve with modification, or disapprove said Plan. If the Board modifies or disapproves said Plan, it will state in its vote the reasons for such action, and shall so notify the applicant.

8. Certificate of Approval  
The action of the Board in respect to said Plan shall be by vote, copies of which shall be certified and filed with the Town Clerk and sent by registered mail to the applicant. Final approval, if granted, shall be endorsed on the original drawing of the Definitive Plan by the signature of the person officially authorized by the Board but not until the statutory twenty-day appeal period has elapsed following the filing of the certificate of the action of the Board with the Town Clerk and said Clerk has notified the Board that no appeal has been filed. In any case, approval of the Definitive Plan shall not constitute the laying out or acceptance by the Town of any ways within a subdivision.

9. Recording of Plan  
After the return to the applicant of the Definitive Plan, as approved and endorsed, he shall cause to be recorded at the Barnstable Registry of Deeds and in the case of registered land, with the recorder of the Land Court, said plan with covenant and easements, if any, and shall pay all fees and costs related to the registry of the plan. After such plan, with covenant, and easements, if any, or modification thereof is approved by the Board it shall be recorded within six (6) months, or said approval will no longer be valid. Furthermore, he shall notify the Board of such recording, submitting evidence thereof satisfactory to the Board within thirty (30) days of final endorsement.

Upon receipt of notification of recording, the Board shall file one print of the Definitive Plan with the Building Inspector. Where

approval with covenant is noted thereon, he shall issue no permit for the construction of a building on any lot within the subdivision except upon receipt from the Board of a copy of the certificate of performance (Form G) releasing the lot in question.

#### 10. Revision of Definitive Plan

No revision or change of the Definitive Plan can be made without the prior approval of the Planning Board. This includes any revision of any nature whatsoever of the Definitive Plan. If the applicant desires to make revisions due to field conditions or for any reason whatsoever, he shall submit a print of the definitive plan or plans to be revised with a colored pencil representation of the changes he proposes to make. The Board will consider such change in the same manner as consideration of the original plan and approve, disapprove or modify the requested change with or without a public hearing as the Board may determine. The change as approved shall then be incorporated on the original Definitive Plan or a cloth reproduction thereof, and prints shall be filed as required of the original plan.

#### 11. Evidence of Satisfactory Performance

Before the Board will release the interest of the Town in a performance bond or deposit or, in the case of approval with a covenant, issue a release of covenant:

(a) The applicant shall furnish the Board with satisfactory evidence of compliance with the provisions of 3-C-9.

(b) The applicant shall be responsible for filing with the Planning Board as-built plans of the ways of the subdivision, clearly marked as such. The as-built plan shall include the profile plan and shall meet the requirements as to format and content as given in Section 3-C-(2) for the Definitive Plans. The as-built plans may be cloth reproductions of the Definitive Plans. The as-built plans shall represent the as-built conditions of all work and appurtenances constructed as a requirement of the subdivision and shall show with a reasonable degree of accuracy all municipal services installed as part of the subdivision. As a condition precedent to the preparation of the as-built plans, the applicant shall engage the necessary engineering services to properly record the location of the municipal services installed, and the as-built plans shall contain a certification by such engineer that the municipal services were installed in the location as shown on the plans. The as-built plans shall be submitted as a condition of the release of the Bond or Covenant, as required for the approval of the Definitive Plan, and as a condition of approval by the Planning Board of acceptance of the ways by the Town Meeting.

(c) The applicant shall furnish to the Board from the applicant's engineer, a certified inspection report to the effect that all work required by these rules and regulations has been completed for each way in the subdivision (or way or ways serving the lots in question), and that he has approved the methods of construction and the materials used in the performance of such work.

(d) The Board may obtain from the Chief of the Fire Department a statement that he has approved the installation of the hydrant system for each way in question and that the installation of the fire alarm cable and boxes has been approved by the Fire Chief.

(e) The Board may obtain from the Superintendent of the Tree and Park Department a statement that he has approved the location, size and species of street trees.

(f) The Board may obtain from the Sewer Commission a statement that they have approved the installation of the sewer system as required by them.

(g) The Board may obtain from all other utilities a statement that they have approved the installation of the utilities as required by them.

#### 12. Release of Performance Guarantee

Upon the completion of the improvements as shown on the Plan and as required herein, security for the performance of which was given by bond, deposit or covenant, or upon the performance of any covenant with respect to any lot, the applicant may request and agree on terms of release with the Board. The applicant shall send by registered mail to the Town Clerk and Planning Board a written statement in duplicate that the said construction or installation in connection with such bond, deposit or covenant has been completed in accordance with the requirements contained in these rules and regulations, such statement to contain the address of the applicant.

If the Board determines that said improvements have been completed, and these Rules and Regulations have been complied with, it shall release the interest of the Town in such bond and return the bond or the deposit to the person who furnished the same, or release the covenant by appropriate instrument. (From G), duly acknowledged, with a copy to the Building Inspector. If the Board determines that said improvements have not been completed, and/or these Rules and Regulations have not been complied with, it shall specify in notice sent by certified mail to the applicant and the Town Clerk the details wherein said improvements fail to comply with its rules and regulations.

#### 13. Reduction of Bond or Surety

Upon written application of the applicant stating reasons therefore, the penal sum of any such bond, or the amount of any deposit held hereunder may, from time to time, be reduced at the discretion of the Board and the obligations of the parties thereto released by said Board in part. If release is by reason or covenant, a new plan of the portion to be subject to the covenant may be required.

#### 14. Time of Completion of Ways and Installation of Municipal Services

Every applicant shall state in his application the time within which he agrees to complete the proposed ways, and to install the drainage system, water pipes, gas pipes and electric lines, and all other municipal services required by the Board. The Board may decline to approve any plan unless the applicant agrees to complete the ways shown thereon and install the municipal services aforesaid within one (1) year of the date of his application.

In the event the work is not completed within the time set forth or as extended, the Board may rescind its approval and require a new Public Hearing.

### Section 4

#### A. General

Existing contours shall be preserved insofar as it is practical. In any event no change shall be made in existing contours which adversely affects and land abutting the proposed subdivision. Due consideration shall be given to the attractiveness of the layout and the preservation of natural features. All work on the ground hereinafter specified shall be performed by the subdivider in accordance with these rules and regulations, in conformity with approved definitive plans and specifications and other construction requirements of the Town Agencies concerned, and the satisfaction of such Agencies.

#### B. Streets

##### 1. Location of Streets

(a) The streets shall be designed and located so as, in the opinion of the Board, to be continuous and in alignment with existing streets; to provide adequate access to all lots in the subdivision, by streets that are safe and convenient for travel; to lessen con-



gestion in such streets and adjacent public streets; to reduce danger from the operation of motor vehicles; to secure safety in case of fire, flood, panic and other emergency; to insure compliance with applicable Zoning By-Laws; to secure adequate provision for proper drainage and water, sewers and other municipal services; and to coordinate the streets in the subdivision with each other and with the existing street system of the Town, and the streets in neighboring subdivisions.

(b) The proposed streets shall be designed and located so as to conform to the Master Plan, if any, as adopted in whole or in part by the Board.

(c) Provision satisfactory to the Board shall be made for the proper projection of streets, or for access to adjoining property which is not yet subdivided.

(d) Due consideration will be given by the Board to the attractiveness of the layout and to the conformance of the ways to the topography.

(e) Reserve strips prohibiting access to streets or adjoining property shall not be permitted, except where, in the opinion of the Board, such strips shall be in the public interest.

(f) In case access to a subdivision crosses land in another municipality, the Board may require certification, from appropriate authorities, that such access is in accordance with the Master Plan and subdivision requirements of such municipality and that a legally adequate performance bond has been duly posted or that such access is adequately improved to handle prospective traffic.

## 2. Width, Alignment and Grades of Streets

(a) The criteria contained in the Appendix shall be observed in the design of streets. The Board may require that the traveled way be separated by a raised median strip with a width to be determined by the Board. In this case, the traveled way shall consist of two roadways, each with a minimum width of 15 feet or such greater width as the Board may specify.

(b) Street intersections with center line offsets of less than one hundred and fifty (150) feet shall be avoided unless otherwise specified by the Board.

(c) Streets shall be laid out so as to intersect as nearly as possible at right angles. No street shall intersect any other street at less than sixty (60) degrees.

(d) Where the angle of intersection between two streets varies more than ten degrees ( $10^\circ$ ) from a right angle, the radius of the curve at the curb line at the obtuse angle shall be less and at the acute angle shall be correspondingly greater than the radius specified in the Appendix to the extent approved or required by the Board.

(e) All changes in grade exceeding two (2%) percent shall be connected by vertical curves of sufficient length to afford the following sight distances: Minor Street 100 feet; Secondary Street 250 feet Major Street 500 feet.

(f) No center line gradient is to exceed six (6) percent on any curve.

(g) No center line gradient is to exceed six (6) percent within 500 feet of a dead end.

(h) No street shall intersect another street at a gradient in excess of two (2) percent for a distance of at least one hundred (100) feet from the intersection.

(i) Way lines shall be parallel unless otherwise specified by the Planning Board.

## 3. Dead End Streets

(a) Dead end streets shall not be longer than five hundred (500) feet unless, in the opinion of the Planning Board, a greater length is necessitated by the topography or other local conditions.

(b) Dead end streets shall be provided at the closed end with a turn-around having an outside roadway diameter of at least ninety (90) feet with a property line diameter of at least one hundred five (105) feet or greater if required by the Fire and School Departments.

(c) Upon construction of an extension of a dead end street the easement for the existing turn-around shall terminate in accordance with the provision of Chapter 41 of the General Laws.

## C. Drainage

### 1. General

All drainage systems within the subdivision shall be designed in accordance with Rational Method based on the storm frequency and rainfall intensity indicated in the Appendix. Calculations shall be made from the source of drainage run off using topographic maps for the entire drainage area, including those areas outside the subdivision. Copies of all drainage calculations shall be submitted on forms as contained in the Appendix. Percolation tests may be required at the discretion of the Board.

### 2. Subsurface Drains or Subdrains

In areas where the finished grade of the roadway is less than four (4) feet above the water table or in areas where less than four (4) feet of hill is placed above water in swampy places or any standing water, or in other areas, where in the opinion of the Board the subgrade must be drained, a system of subdrains shall be designed for such areas. The subdrain shall consist of a minimum of one longitudinal drain for each forty (40) foot width of roadway or fraction thereof. In addition, laterals shall be required as directed by the Board in areas in which an undue amount of water could accumulate in the subgrade. The system of subdrains shall be discharged into the storm drainage system or otherwise disposed of in a manner satisfactory to the Board. Subdrains shall also be required where test borings show an impervious layer of soil above a permeable layer of soil which is located at or above one (1) foot below the proposed basement floor elevation.

### 3. Storm Drains

A complete storm drain system shall be designed for each street of the subdivision and, to the satisfaction of the Board, shall be so laid out and of sufficient size to permit unimpeded flow of all natural waterways, to provide adequate drainage of all portions of the street system so that water does not accumulate thereon, to intercept storm water runoff from the adjacent lots of the subdivision, and to eliminate undesirable or unnatural accumulation of water on any portion of the subdivision or surrounding property. Those conditions which result from a ten (10), twenty-five (25) or fifty (50) year-storm as required shall be assumed as a basis for design of the street drains. The storm drain system shall include gutters, catch basins, manholes, culverts, drain lines, headwalls and such other items as may be required to complete the system to the satisfaction of the Board.

(a) Catch Basins shall be located in pairs, one on each side of the roadway, at all low points or sag curves in the roadway, at intervals of not more than three hundred (300) feet on continuous grades of the roadway, and at or near the corners of the roadway at intersecting streets.

(b) Manholes shall be located at all changes in direction, either horizontally or vertically, of a drain line or at the intersection of two (2) or more drain lines, or so located that no drain line greater than three hundred (300) feet in length would exist without either a catch basin or manhole.

(c) Culverts shall be designed on the assumption that the entire drainage area is built up to that density and in the manner which the applicable section of the Zoning By-Law allows. The calculations (or a copy thereof) necessary to determine the size



of any culvert which carries a brook, stream, river or other natural waterway shall be submitted to the Board for review. All culverts shall have a headwall at each end and any culvert over thirty-six (36) inches in diameter shall include at the upstream end additional protection, as approved by the Board, for the roadway side slopes.

(d) All the drains shall be a minimum of twelve (12) inches in diameter and shall be laid on a slope of not less than one-half of one (0.5) percent. The minimum design velocity shall be three (3) feet per second and maximum design velocity shall be ten (10) feet per second. If the system is designed as a self-cleaning system, the Board may accept a lesser minimum slope for the drain lines. All outfall shall extend to a natural waterway or to the exterior boundary of the subdivision and such pipe shall have a capacity 25 percent greater than required by the calculations. In such cases as it is deemed necessary and acceptable by the Board and its Engineer, surface water may be disposed of by a leaching system of the proper size and design. Calculations for the design of such system shall be submitted with other drainage calculations for the subdivision and under the same provisions. Provision shall be made for the disposal of surface water intercepted or collected by the system in such a manner that no flow is conducted over Town ways, or over the land of others unless a drainage easement is obtained or unless such flow, in essentially the same quantity, previously existed in the same location. Where adjacent property is not subdivided, provision shall be made for extensions of the system by continuing appropriate drains to the boundary of the subdivision at such size and grade as will allow their proper projection.

(e) A headwall shall be provided at the outfall end of all drains where required.

(f) A tide gate shall be provided at the discharge end of all drainage outlets into tidal waters.

#### D. Easements

1. Easements for municipal services shall be provided and recorded as required and centered on lot lines where practical.

2. Where a subdivision is traversed by a water course, drainage way, channel or stream, the Board may require that there be provided a storm water easement or drainage right of way of adequate width to conform substantially to the lines of such water courses, drainage way, channel or stream, to provide for construction, maintenance, or other necessary purposes.

3. Access Easements may be required where deemed necessary.

4. Slope Easements may be required where deemed necessary.  
5. Sight and/or Scenic Easements may be required where deemed necessary.

#### E. Sidewalks

Sidewalks, having a width of not less than four and one half (4½) feet, constructed of either bituminous or Portland Cement concrete shall be installed beside the roadway along each way in a subdivision as follows:

- Major Street - Both sides.
- Secondary Street - Both sides.
- Minor Street - One side.

Final decision as to the requirement and type of sidewalks will be at the Board's discretion with due consideration being given to size and number of lots in the subdivision, population density of the subdivision, and location of the subdivision in regard to walking distance to both existing and future schools, shopping districts, etc.

#### F. Curbing and Berms

All Streets may have bituminous concrete "Cape Cod Berms" vertical granite, sloped granite, or precast concrete curbing at the discretion of the Board. In the case where granite or precast concrete is used, the curbing shall extend along the entire circumference of curves plus six (6) feet at all intersections. Vertical inlet curbing shall be used for all catch basins when either granite or precast concrete curbing is used.

#### G. Lots

All lots within the subdivision shall comply with the Zoning By-Law of the Town, or with terms of any variance from such requirements which may have been specifically granted by the Board of Appeals. Percolation tests may be required for each lot at the discretion of the Board. Lot numbers as shown on the approved plan to be conspicuously displayed with a suitable marker which shall be visible from the road layout.

#### H. Open Spaces

Before approval of a plan, the Board may also in proper cases, require the plan to show a park or parks suitably located for playground or recreation purposes or for providing light and air. The Board may, by appropriate endorsement of the plan, require that no building be erected upon such park or parks for a period of not more than three (3) years without its approval. These parks shall be offered for just compensation to the Town in the form of a deed, with the Town having the option of accepting or releasing these areas within the three (3) year period.

#### I. Protection of Natural Features

Due regard shall be shown for all natural features, such as large trees, water courses, scenic points, historic spots, and similar community assets, which, if preserved, will add attractiveness and value to the subdivision.

#### J. Retaining Walls

1. Wherever retaining walls may be required, design and type of wall construction shall be submitted to the Board's Engineer for approval prior to installation.

#### K. Cases in Which Ways Are Not Adequate

In any case in which the Board deems ways are not adequate, it may approve the plan on conditions limiting the lots upon which buildings may be erected and the number of buildings that may be erected on particular lots without further consent by the Board to the access provided and in each such case shall endorse such conditions on the plan to which they relate or set them forth in a separate instrument attached to which reference is made on the plan.

#### L. Municipal Services & Utilities

1. The Board may require that the plan show municipal services and utilities of the kinds existing in the public ways nearest to the subdivision, or which in the opinion of the Board are likely to be laid in such public ways within the reasonably near future and which will be necessary for the health, safety, or convenience of the prospective occupants of the subdivision.

2. The municipal services and sleeves for house connections shall be located as shown on the "Typical Road Cross-Sections." The number and type of sleeves for house connections will be directed by the Board.

3. The design of the sewer system, if required, shall be as directed and approved by the Sewer Commissioners. Dead line sewer connections shall be required in areas that now have service or are scheduled for such service within three (3) years. See Appendix.

4. The design of the water system and provision for hydrant service shall be as directed or approved by the Water Department in accordance with "Typical Road Cross-Sections." In the case where sidewalks are to be constructed on one side of the roadway, the water and hydrants shall be on the opposite side of the roadway.

5. The location and type of hydrants and size of pipe serving the hydrants shall be as directed or approved by the Fire Department and or Water Department.

6. The location and type of the fire alarm boxes and point of entry into the subdivision of the connecting fire alarm cable shall be as directed by the Fire Chief. The applicant shall furnish and install the necessary ducts, fire alarm boxes, and electric cable. See Appendix.

7. The design and location of the electric power system shall be as directed by the Electric Company. See Appendix.

8. The applicant shall consult the Gas Company relative to coordination of the installation of gas pipes, if gas service is to be installed. See Appendix.

9. The applicant shall consult with the Telephone Company relative to the installation of telephone service. See Appendix.

10. All utility poles shall be centered between the way line and edge of sidewalk where sidewalks exist or between the way line and edge of roadway where no sidewalks exist. See Appendix.

11. All electrical, telephone, and other utility wires shall be placed below ground in every subdivision whose definitive plan is submitted after the adoption of these Rules and Regulations, unless the Board determines that such placement is not feasible or is not in the best interest of the Town. Such utilities shall be constructed according to the information contained in the Appendix.

12. All service connections for utilities shall be clearly marked at the lot line and shall be installed such that electric, telephone, sewer, and water services are located on the lot line perpendicular to the street and the gas service is located on the alternate lot line and said service connection shall be installed prior to the completion of the fill.

## Section 5

### Specifications for Construction of the Required Improvements

#### A. General

All improvements specified or implied on the Definitive Plan shall be constructed or installed by the applicant in accordance with the provisions of this Section of the Rules and Regulations or as directed by the Board. The applicant, at his own expense, shall furnish all necessary materials, labor, and equipment which may be required to complete the work called for or implied on the Definitive Plan. Items not specifically mentioned herein shall be constructed in accordance with the latest revision of the Standard Specification for Highways and Bridges of the Massachusetts Department of Public Works (herein after referred to as the Department's Specifications); unless specifically directed otherwise by the Board.

All work performed by the applicant as a consequence of these Rules and Regulations will be subject to the review and acceptance or approval of the Board. Therefore, the Board may employ a Registered Professional Engineer or Land Surveyor to act as its agent for the inspection of the work. In order that the Board's Engineer may properly inspect the work as it progresses, the applicant will keep the Engineer informed of the progress of the work, and shall at any time, provide safe and convenient access to all parts of the work for inspection by members of the Board or its Engineer or such persons as the Board may designate. No

work will be approved which has been covered prior to inspection by subsequent work. Reference should be made to the Appendix for inspections required by the Board.

#### B. Subdivision Layout

The subdivision, including all way and lot lines and all drain lines and municipal services shall be laid out as to line and grade by a Registered Land Surveyor and a certificate filed with the Board to this effect. Stakes for line and grade, clearly marked with the proper station shall be maintained throughout construction.

Any work which, in the opinion of the Board, has not been properly laid out or does not conform to the Plans may be checked by a Registered Land Surveyor employed by the Board. If the Board determines that such work does not conform to the Plan, the applicant shall pay all costs which the Board incurs as a consequence of checking the work. The Board may require the removal and correct replacement of any work which has been incorrectly laid out.

#### C. Clearing, Grubbing and Excavation

The entire area of each way within its exterior lines shall be cleared of all trees not intended for preservation, stumps, brush, roots, rocks, or boulders, and all perishable or unsuitable material.

The entire area to be occupied by the roadway plus an additional four (4) feet or extending outward to the toe of slopes in fill areas, whichever is greater, shall be excavated a minimum of fifteen (15) inches below finished grade in cut sections or as necessary to remove the topsoil in fill sections or such greater depth as may be required by the Board's Engineer if soft or yielding material, clay, peat, silt, sand pockets, boulders or rocks, organic material, or other material detrimental to the subgrade is encountered. All fill or undisturbed material shall be non-frost susceptible and shall contain not more than three (3) percent passing the 0.02 millimeters sieve for a minimum depth of three (3) feet below the finished roadway grade.

Trees intended to be preserved shall be protected from injury by suitable boxes, or fenders, or wells if in fill.

The Board's Engineer will make an inspection when this phase of the work is completed.

#### D. Drainage System

The construction and quality of materials shall conform to the applicable sections of the Department's Specifications except as modified hereafter or as directed by the Board's Engineer.

All storm drains within the street line and in any location subject to vehicular loading shall be reinforced concrete pipe and shall be laid with a minimum of two and one-half (2-1/2) feet of cover. All storm drains outside the street line and in a location not subject to vehicular loading shall be either plain or reinforced concrete pipe or asphalt coated corrugated metal pipe. All joints shall be sealed by caulking and cement mortar or firmly clamped as applicable. Plain concrete pipe shall be laid with minimum cover of three and one-half (3-1/2) feet.

All catch basins shall be constructed of air entrained cement concrete, and a standard square frame and grate, with square holes, and a granite mouth frame shall be furnished and set. All catch basins shall have an inside diameter of at least six (6) feet, shall be constructed with a minimum depth of two (2) feet below the invert of the outflow pipe, and as otherwise shown in accordance with the latest revisions of the construction Standards of the Massachusetts Department of Public Works (hereinafter referred to as the Department's Standards). In cases where a leaching system for surface water disposal has been approved, a standard air entrained

cement precast leaching basin may be employed. (See Appendix).

All manholes shall be constructed of the same materials as permitted herein for catch basins except that a standard heavy twenty-six (26) inch diameter cover and frame shall be furnished and set and all other details shall be as shown in the Department's Standards for manholes. (See Appendix).

The subsurface drainage system as shown on the Definitive Plan or as ordered by the Board during construction shall be constructed of not less than 10-inch diameter perforated asphalt coated corrugated metal pipe with all joints firmly clamped, perforations turned up, and laid to line and grade.

All drainage pipe shall end in an air entrained cement concrete or air entrained cement masonry headwall having dimensions as specified in the Department's Standards and constructed in accordance with the Department's Specifications. (See Appendix)

The air entrained cement concrete shall have a minimum compressive strength of 3000 pounds per square inch after twenty-eight (28) days curing.

All tide gates shall be of standard manufacture, of the same size as the outfall pipe, cast-iron frame and flap each fitted with a bronze seat and subject to the approval of the Engineer.

The Engineer will inspect the completed drainage system or sections thereof prior to placing any backfill.

All trench backfill for the storm and subsurface drains and other backfill within the limits of the way shall conform to the base course requirements and shall be deposited to required subgrade in not more than six (6) inch layers and compacted to 95 percent of the maximum dry density as determined by modified Proctor Test, in accordance with ASTM-C-157, Method "D."

#### E. Municipal Services

1. The applicant shall provide and install all necessary materials, apprentices and equipment to complete the municipal services as may be required by the Definitive Plan in a manner acceptable to the officials or agency having jurisdiction of each service as previously mentioned herein. All costs incurred by the applicant as a consequence of installing and maintaining such municipal services as the Board required shall be paid by the applicant, including all costs which may be incurred for any reasons whatsoever until such time as the Town assumes the responsibility for such service. The Board will not take any action to have the applicant reimbursed for any costs so incurred.

2. The fire alarm system connection will be made by the Fire Department using materials which shall be furnished by the applicant as specified by the Fire Chief.

3. The type of hydrants and type and size of pipe serving the hydrants shall be as directed or approved by the Fire Chief.

4. The type and size of pipe, fittings and apprentices for the water system shall be as directed or approved by the Water Department.

5. All materials and work in connection with the sewer system shall be as directed and approved by the Sewer Commissioners or authorized agents.

6. All materials and work in connection with the street lights and electric power service shall be as directed and approved by the Manager of the Electric Co.

7. All work in connection with the municipal services shall be left uncovered until such time as the Board's Engineer permits the backfill to be placed.

The applicant shall notify all utility companies with municipal services installed or to be installed within the ways as to the date and time he intends to place the gravel base course and the paving so that such utility company may properly record the location of pertinent features of the system so that they will not be covered

or lost as a result of the paving operation. (See Appendix for further construction requirements).

8. All trench backfill material for the municipal services within the way limits shall conform to the base course requirements and shall be deposited to required subgrade in not more than six (6) inch layers and thoroughly tamped, not puddled, to 95 percent of the maximum dry density as determined by modified Proctor Test, in accordance with ASTM-D-1557, Method "D."

#### F. Fill

All fill material which may be required within the exterior lines of the way up to the twelve (12) inch gravel foundation shall be of clean gravel or other suitable material as approved by the Engineer and compacted to 95 percent of the maximum dry density as determined by modified Proctor Test, in accordance with ASTM-D-1557, Method "D". All municipal services including but not limited to storm drains, subdrains and drainage structures and sewers if required within the way lines shall be installed prior to the completion of the fill. This shall include the installation of each service pipe, sleeve or conduit to the front lot line of each lot in the subdivision. Upon completion of the fill and the backfill of all service trenches, the work will be inspected by the Board's Engineer. Subsequent work shall not be commenced until the Engineer has approved the fill as acceptable for the application of the roadway foundation material.

#### G. Roadway Foundation

A minimum of twelve (12) inches of clean gravel, as approved by the Engineer, shall be deposited in not more than six (6) inch layers for the full width of the way so as to form a roadway foundation which shall be at all points parallel to the finished grade of the roadway surface. The gravel shall be compacted to 95 percent of the maximum dry density as determined by the modified Proctor Test, in accordance with ASTM-D-1557, Method "D". The gravel shall conform to the following gradation:

Sieve Size	% of Passing by Weight
3"	100
2	95-100
1	60-100
3/4	55-95
1/2	48-85
3/8	44-80
#	
4	33-68
10	23-55
20	15-43
40	8-34
80	2-22
200	0-10
.02 mm	0-3

The Engineer will inspect the roadway foundation after the compaction of each six (6) inch layer, and, after the approval of the completed foundation, the entire roadway shall be penetrated with an application of .25 to .50 gallons per square yard of MC-70 outback asphalt in accordance with Department's Specifications and as approved by the Engineer.

#### H. Roadway Surface

(a) All roadways shall be paved to conform with the finished grade and width as specified with Class I Bituminous Concrete Paving Mass, Type I-1 in accordance with the Department's Specifications and subject to the approval of the Engineer. The applicant shall submit a specification job-mix formula to the Engineer for approval prior to starting the work, and a test report verifying that the minimum temperature of each load is 350°F.

(b) Minimum Depth Requirements After Compaction		
Type Street	Binder Course	Finish Course
Major	2-1/2 inches	1-1/2 inches
Secondary	1-1/2 inches	1-1/2 inches
Minor	1-1/2 inches	1-1/2 inches

### I. Sidewalks

Sidewalks shall have a finished grade in relation to the roadway as shown on the "Typical Road Cross-Sections" and shall be constructed of Bituminous or Portland Cement Concrete. The gravel foundation shall be a minimum of six (6) inches in thickness and shall otherwise conform to the requirements of the Roadway Foundation.

Bituminous concrete sidewalks shall consist of one (1) inch of Type I-1 binder course and one (1) inch of Type I-1 surface course after compaction.

Portland Cement concrete sidewalks shall be constructed of a mix of the following design:

Batch Weights - (1 cubic yard - Dry)	
Cement	517 lbs. (Type II)
Sand	1250 lbs.
3/4" stone	1800 lbs.
W.R.D.A.	38.5 oz.
or Pozzolith	16.5 oz.
Darex	1.0 oz.
Slump	2 +/ - 1 in.
Air Content	7 +/ - 1 %

Aggregate to conform to Specification ASTM C-33. All concrete operations to conform to the most recent edition, references, and revision of ACI 301.

The sidewalks shall be four (4) inches thick and have a scored joint every four and one-half (4-1/2) feet. After each four (4) scored sections there shall be an expansion joint consisting of a preformed joint filler, caulked at the surface with a bead of Thiokol or approved equal.

All concrete shall be mixed, placed and cured satisfactorily in accordance with ACI Manuals. No concrete sidewalks shall be constructed later than September 30 in any year.

When the concrete surface has sufficiently dried, it shall be treated with two (2) applications of a mixture of fifty (50) percent boiled linseed oil and fifty (50) percent mineral spirits.

### J. Curbing and Berms

#### 1. Granite Curbing - General

Curbsone shall be of hard and durable granite, of a light color satisfactory to the Engineer, free from seams which impair its structural integrity, and of a good, smooth splitting appearance. Granite shall come from approved quarries and, when tested, shall have a Los Angeles percentage of wear not more than 32. Test samples shall be hand broken.

#### 2. Slope Granite Curbing

(a) Dimensions  
The stones for the several types of slope curb shall be cut to the dimensions given in the following table:

Type	Depth of Slant Face (inches)	Thickness (inches)	Length * (feet)
SA	12	5	3 to 6

\*Minimum lengths do not apply to radial slope curb. Maximum lengths of stones shall be as directed by the Engineer, when the curb is used on curves of one hundred (100) foot radius or less.

#### (b) Finish

Finish and surface dimensions for the several types of stone curb shall conform to the following requirements: Type SA curb.

(1) Exposed face shall be smooth quarry split to an approximately true plane having no projections or depressions which will cause over one (1) inch to show between a two (2) foot straight-edge and the face when the straightedge is placed as closely as possible on any part of the face. If projections on the face are more than that specified, they shall be dressed off. Drill holes will be permitted on the exposed face, but only along the bottom edge.

(2) Arris line, top front, shall be pitched to a line which shall not show over one-half (1/2) inch in any direction between the stone and a straightedge laid the full length of the stone.

(3) Arris line, bottom front, shall be pitched so that not over one-half (1/2) inch shall show between the stone and a straight-edge, the full length of the stone, when viewed at right angles to the plane of the face.

(4) Arris lines at ends shall be pitched with no variation from the plane of the face more than one-quarter (1/4) of an inch.

(5) Ends shall be square to the plane of the face and so finished that when stones are placed end to end as closely as possible no space more than three-quarters (3/4) of an inch shall show in the joint for the full depth of the face.

(6) Tops and bottoms shall not be under the square more than four (4) inches or over the square at the back more than one (1) inch.

#### (c) Mortar

(1) Mortar for pointing joints shall be composed of equal parts of air entraining cement and sand with sufficient water to form a workable mixture. Materials shall conform to the requirements of ASTM C-91 and C-144.

(2) Setting method - Slope granite curb shall be set at line and grade required. Top line of curb shall be set straight and true allowing natural variations in depth of curb to occur at the bottom of the face. Spaces under the stones shall be filled with approved material and so tamped that the slope granite curb will bear and be completely supported throughout its entire length and width at the required line, grade and slope. Curbstones shall not fit closer to each other than one-quarter (1/4) of an inch. Otherwise, they shall be fitted together as closely as possible.

(3) Pointing joints - Joints shall be primed and caulked with a bead of Thiokol or approved equal. Joints shall be filled with mortar when necessary to provide adequate base for caulking.

(4) Protection - The contractor shall protect slope granite curb and keep stones in first class condition until completion of the entire contract. Particular care shall be exercised to prevent any discoloration of exposed surfaces.

#### 3. Vertical Granite Curbing

a. Dimensions  
The stones for the several types of curb shall be cut to the dimensions given in the following table:

Type	Width at Top (inches)	Depth In (inches)	Minimum Length (feet) *	Minimum Width at Bottom (in.)
VA-4	6	17 - 19	6	5 (for 2/3 length)

\*Minimum lengths do not apply to radial curb and closures sixty (60) feet or less shall be cut to the curve required, unless otherwise directed by the Engineer.

#### b. Finish

Finish and surface dimensions for the several types of curb shall conform to the following requirements: Type VA curb

(1) Top surface of curbstones shall be sawed to an approximately true plane.

(2) Exposedarris lines shall be pitched straight and true with no variation from a straight line greater than one-eighth (1/8) of an inch.

(3) Back surfaces of curbstones, shall have no projection, for a distance of three (3) inches down from the top, which would exceed a batter of four (4) inches in twelve (12) inches.

(4) Front face shall be at right angles to the plane of the top and shall be smooth quarry split. Drill holes in exposed part of face will not be permitted.

(5) Front face shall have no projections greater than three-quarters (3/4) of an inch or depressions greater than one-half (1/2) inch measured from the vertical plane of the face through the top aris line for a distance down from the top of eight (8) inches. Remaining distance shall have no projections greater than one (1) inch measured in the same manner.

(6) Ends of all stones shall be square with the planes of the top and face, and so finished that when stones are placed end to end as closely as possible no space more than one-half (1/2) inch shall show in the joint for the full width of the top or down on the face for eight (8) inches. Remainder of end may break back not over eight (8) inches from the plane of the joint.

**c. Mortar**

Mortar for pointing joints shall be composed of equal parts of air entraining cement and sand with sufficient water to form a workable mixture. The materials shall conform to the requirements of ASTM C-19 and C-144.

**d. Setting Curbstones**

(1) Curb shall be set at line and grade required, and it shall project seven (7) inches above the shoulder grade or pavement, unless otherwise directed or called for on the plans.

(2) Curbstones for Type VA curb shall not fit closer to each other than one-eighth (1/8) of an inch, otherwise, they shall be fitted together as closely as possible.

**4. Precast**

Precast concrete curb units shall consist of castings conforming to the size and dimensions as follows:

a. Width at Top (inches)	Depth (inches)	Length (feet)	Radius of Top Face Edge (inches)	Chamfer at Edges (inches)
6	18	6	3/4	1/2

Straight curb shall be cast in standard lengths of six (6) feet. Straight and curved curb may be cast in lengths of not less than four (4) feet where needed and as directed. Curb on a radius of 100 feet or less shall be cast in radius forms to correct radius (radius measured to the outside face of the curb).

Curb shall be made of Portland Cement Type II, conforming to ACI 301. Forms shall be made of metal or concrete, (wood not allowed) to tight, rigid construction with true surfaces.

b. Concrete mix shall be of the following design:

**Dry Batch Weights - 1 cubic yard**

Cement	564 lbs.
Sand	1250 lbs.
3/4" stone	1800 lbs.
WRDA	42.0 oz.
or Pozzolith	18.0 oz.
Darex	1.0 oz.
Air Content	7 +/— 1 %
Slump	2 +/— 1 %

Aggregate to conform to Specification ASTM C-33.

After finishing, the curb shall be cured under a polyethylene blanket or in a humidity curing chamber at 100% humidity. Curing shall be at a temperature of 70°-80° F. and for a minimum period

of twenty-eight (28) days. Temperature shall be held constant during this period regardless of which method of curing is used.

Curb shall be set in a trench which shall have been excavated to a width of 18". The subgrade of the trench shall be at a depth below proposed finish grade of the curb equal to 6" plus the depth of the curbstone. Subgrade shall then be filled to proper level to support curb at final grade. Fill for this purpose shall consist of fine gravel or very coarse and thoroughly tamped. Curb units shall then be placed in accurate line, each piece butting the next with maximum joint spacing no larger than 1/4". The joints shall be caulked with a bead of Thibkol or approved equal. Final points shall be joined by closure pieces made to order. No curb shall be cut in the field. After alignment curb shall be carefully backfilled with suitable material. Extreme care shall be taken not to destroy alignment.

**5. Cape Cod Berms**

"Cape Cod Berms" two (2) feet in width shall be installed on each side of the roadway. The berms shall be constructed monolithically with the bituminous binder and top courses and shall be the same thickness as the bituminous binder and top courses.

**K. Grass Plots**

1. A grass plot shall be provided on each side of all roadways according to "Typical Road Cross-Sections". (See Appendix). The finished grade of the grass plot in relation to the finished grade of the roadway shall be as shown on the "Typical Roadway-Cross Section."

2. The top six (6) inches of grass plots and side slopes (cut or fill) shall be good quality loam as approved by the Engineer and shall be screened, raked and rolled with a hand roller to finished grade. The loam shall be seeded with lawn grass seed applied in sufficient quantity to assure adequate coverage and establish growth. The subdivider shall perform sufficient cuttings and maintain the grass plot until such time as the street is accepted by the Town.

**L. Street Trees**

Street trees, not less than twelve (12) feet in height and of a species approved by the Superintendent of the Tree and Park Department, shall be planted on each side of every street in the subdivision wherever, in the opinion of the Planning Board existing woodlands or individual trees are not retained. Trees shall be located outside the exterior roadway lines and at such distance there-from and spacing as the Superintendent of the Tree and Park Department shall specify in accordance with general practice in the Town. At the discretion of the Board, an easement, of such width as requested, outside the exterior way lines may be required for the planting of trees.

**M. Side Slopes**

The area outside the traveled way (cut or fill) shall be sloped at a rate not steeper than two (2) to one (1) until it intersects the finished grade of the abutting lots, except as may be required for sidewalks. All such slopes shall be loamed and seeded as previously required for grass plot.

**N. Monuments**

Granite or Reinforced Concrete Bounds shall be set at all street intersections at all points of change in direction of curvature of streets, and at other points where, in the opinion of the Board permanent monuments are necessary, but in no case more than (500) five hundred feet apart. Monuments shall be at least five (5) by five (5) by thirty (30). The cap shall be as specified by the Board. The bounds shall otherwise conform to the Department's Specifications and shall not be set until all construction which could disturb the monument is completed.

**O. Street Signs**

Street signs of the type commonly used on public ways of the Town and bearing the names of the intersecting streets as indicated on the Definitive Plan shall be erected at all intersections of streets in the subdivision. Such signs shall be subject to the approval of the Board.

**P. Cleaning Up**

The entire area of the subdivision shall be cleaned up so as to leave, in the opinion of the Board, a neat and orderly appearance free from debris and other objectionable materials. All catch basins and manholes shall be cleaned out.

Following the completion of this and other items of work as required herein, a final inspection will be made.

**Q. Maintenance**

If released from restrictions with regard to sale of lots or buildings on lots by the posting of a performance bond, the subdivider shall maintain the roadway for vehicular traffic in a manner satisfactory to the Board. Further, the subdivider shall maintain the roadway in a subdivision in a condition which meets all the above requirements to the satisfaction of the Board either until acceptance of the way by vote of the Town, or for a period of one (1) year from the date of release of check, bond, or all restrictions pertaining to the subdivision.

**Section 6**

**Inspection**

**A. General**

1. All work performed as a consequence of these Rules and Regulations shall be subject to the review of the Board which shall approve and accept or disapprove and reject each phase or portion of such work and at completion shall recommend the acceptance of all work or disapproval of the work with reasons therefor. The Board will employ a Registered Professional Engineer to act as its agent in the inspection of the work to insure compliance with those Rules and Regulations and to report to the Board his recommendations as to approval or disapproval of the work. The Applicant will engage the services of a Professional Engineer throughout both the design and construction phases of the work who will act as his agent with the Planning Board Engineer or the Town Engineer and who will submit to the Planning Board a certified inspection report. Such Engineer may make certain inspections as prescribed herein in order to check the adequacy of the work at various stages prior to such work being covered by subsequent work. However the Board, its Engineer, and such other persons as the Board may designate shall have the right to inspect the work at anytime. Therefore, the applicant shall at any time provide safe and convenient access to all parts of the work for inspection by the Board or its authorized agents.

2. All work which has been disapproved or is not acceptable to the Board shall be removed and replaced or otherwise corrected to the point of complying with the requirements of the Board for acceptance. Any work which has been covered by subsequent work prior to acceptance or is otherwise not available or obscured to the point of rendering inspection of the work difficult shall be considered to be not acceptable to the Board. Such subsequent work shall be removed as directed by the Engineer to insure availability of the work to be inspected as required herein. The release of all performance guarantee shall depend upon the acceptance of all work prescribed herein and on the Definitive Plan and as directed by the Board.

3. At points indicated in Section 5 and as further described

hereinafter, the construction of the required improvements may be inspected by the Board's Engineer or authorized agent, and unless approval of the work completed, including approval of materials used, to each such point has been given in writing, no further work shall be commenced. Such inspections may include the taking of certain samples for laboratory analysis or testing, in such cases, the applicant shall insure that the Engineer is in no way hindered or obstructed in the course of obtaining such samples. Where such samples are removed from the completed work, the applicant shall replace and restore such work, to the satisfaction of the Engineer, to its condition prior to the taking of the sample.

The Engineer may require certified copies of delivery receipts or bills of lading or other certification as to the description of materials used or incorporated in the work. The Engineer may also require a sample of any materials or supplies which may be incorporated in the work; such samples shall be furnished at the expense of the applicant, and the applicant shall be liable for all costs and fees incurred by the Board as a result of transporting and testing such materials.

**B. Notification to the Engineer**

1. After the approval of the Definitive Plan and subsequent to the receipt by the Board of the fees required in the Appendix, the Board will notify the applicant of the name and address of the Engineer. If other than the Town Engineer, designated herein and otherwise act as the Board's agent to insure compliance with these rules and regulations. The applicant shall notify the Planning Board as to the Engineer who will act as his agent, and keep the Town Engineer fully informed as to the status and progress of the work and shall notify the Engineer directly in writing at least forty-eight (48) hours in advance, that the work has progressed to a stage that an inspection is required. The applicant shall also submit samples for testing one (1) week in advance of the date the results are needed.

2. In the event that the Town Engineer is unable for forty-eight (48) hours after the work is ready to make such inspection or examination the applicant shall notify the Chairman or Clerk of the Board to such effect, who will designate an alternate to make such inspection and shall notify the applicant.

3. In the event the Town Engineer makes an inspection of the work at the time designated and finds that such work is not at the proper state of completion or that the work has been covered or otherwise obscured; the Town Engineer shall notify the applicant and the Board as to the additional steps the applicant shall take to complete the work to the point required or to the extent the work shall be uncovered or exposed to full view. The applicant shall notify the Town Engineer again when the work is ready as prescribed in Section 6-B-1.

4. The applicant shall be liable for all costs and fees incurred by the Board as a result of requests by the applicant for an inspection of the work which, in the opinion of the Board, was not at an acceptable stage of completion for such inspection, said costs and fees to be in addition to those specified in appendix II.

**C. Lines and Grades**

1. The Engineer will advise the Board at any time during the construction if, in his opinion, he believes that the work has not been laid out to the lines and grades as shown on the Definitive Plan. In such cases, the Board will proceed as described in Section 5-B.

2. Any costs which, in the opinion of the Board, are the responsibility of the applicant as noted in Section 5-B shall be in addition to the fees required elsewhere herein.



#### D. Inspection of Required Improvements

The following inspections of the required improvements will be made by the Subdivider's Engineer and may be verified by the Planning Board's Engineer. These inspections may be in addition to any other inspections the Board may make or cause to be made.

1. First Inspection: An inspection will be made of the work upon completion of all clearing, grubbing and excavation and all work incidental thereto as may be required or implied in Section 5-C. No fill shall have been placed at the time of this inspection.

2. Second Inspection: An inspection will be made of the completed drainage system (without backfill) as required or implied herein or on the Definitive Plan. At the same time, or such other time as the work may be available, an inspection will be made of the completed municipal services (without backfill) as required on the Definitive Plan. The inspection of the required municipal services will be made by the agency responsible for the particular service. Each agency so involved will notify the Board's Engineer of the approval of such work.

Backfill of any portion of the drainage system or municipal services shall not be made until after receipt of notification of approval or acceptance by the Engineer or agency responsible.

The inspection of the construction of the ways shall include the inspection of the back-filling and compaction of all utility trenches as may be installed by utility companies, and such work shall be performed in the manner as required by these Rules and Regulations. It shall be the applicant's responsibility to insure compliance with these requirements. If, in the opinion of the Planning Board, the backfilling and compaction of utility trenches and the patching of the pavement, if required, has not been performed in accordance with these Rules and Regulations, the Planning Board may not release the bond or covenant applicable until such work has been performed to the satisfaction of the Planning Board.

3. Third Inspection: An inspection will be made of the compacted fill as specified in Section 5-F and as may be required to bring the roadways to their proposed grades. The applicant shall notify the Engineer as to his source of gravel for fill as soon as such information is known, so that samples may be taken and analyzed by the Engineer. The applicant is hereby advised not to proceed with the filling operation until such time as the Engineer notifies the applicant that the gravel proposed for the fill is acceptable. If the applicant proceeds with the fill prior to such notice he does so at his own risk. The applicant shall not use a gravel source other than the one designated without prior notice to the Engineer.

4. Fourth Inspection: An inspection will be made of the first six (6) inch layer of compacted roadway foundation as specified in Section 5-G. A gravel sample or samples may be taken at the option of the Engineer, in the same manner as prescribed for the Third Inspection.

5. Fifth Inspection: An inspection will be made of the final six (6) inch layer of compacted roadway foundation (prior to the application of the asphalt penetration) as specified in Section 5-G and gravel samples may be taken by the Engineer.

6. Sixth Inspection: An inspection will be made of the completed application of the asphalt penetration as specified in Section 5-G.

7. Seventh Inspection: An inspection will be made of the completed Class I Bituminous Concrete Pavement Type I-1 for the roadway surface. Samples of the mix may be taken by the Engineer for purposes of performing an extraction test in order to compare the sample with the job-mix formula previously submitted.

8. Eighth Inspection: An inspection will be made of all work as required on sidewalks, curbing, grass plots, side slopes, monuments, bounds and street signs.

9. Ninth Inspection: A final inspection will be made of all subsequent work as required herein or on the Definitive Plan to include the final clean-up.

#### E. Engineer's Report

1. The Subdivider's Engineer will submit a completed certified report to the Board for each way in a subdivision. Such report will be similar to that given herein and will be augmented by such additional information as the Board may require to describe any special problems or situations which may arise during the construction of the required improvements.

2. The Engineer will report to the Board that the work has been performed in accordance with these Rules and Regulations and the Definitive Plan, or the Engineer will advise the Board that the work is not acceptable with the reasons therefor.

3. At any time during the progress of the work, the Engineer will advise the Board, immediately, of any factors which may adversely affect the progress of the work.



**FORM A**

Barnstable, Massachusetts

....., 19.....

Form A: Application for Determination that Plan does not Require Approval

To the Planning Board of the Town of Barnstable:

The undersigned hereby submits the accompanying plan proposed division of land in Barnstable which, for the reason below stated, he believes does not require approval under the Subdivision Control Law.

Said land is described as follows:

Reason:

The undersigned hereby requests the Planning Board to determine that the proposed division does not require approval under said law.

Submitted this ..... day of ....., 19.....

..... Signature .....

**FORM B**

**APPLICATION FOR TENTATIVE APPROVAL OF PRELIMINARY PLAN**

....., 19.....

To the Planning Board of the Town of Barnstable

The undersigned, being the owners of all land included within a proposed subdivision shown on the accompanying plan, entitled ....., 19..... submit such plan as a preliminary plan showing in a general way the proposed subdivision of the land, and makes application to the Board for tentative approval thereof.

The Owner's title to the land is derived under deed from ....., dated ....., 19..... and recorded in Barnstable County Registry of Deeds, Book ....., Page ....., or under Certificate of Title No. ...., registered in Land Registry District, Book .....

Page .....

..... Applicant .....

..... Address .....



**FORM E**  
**PERFORMANCE BOND -- SECURED BY DEPOSIT**

KNOW ALL MEN BY THESE PRESENTS

That \_\_\_\_\_ of \_\_\_\_\_ Massachusetts, hereby binds and obligates himself/itself and his/his/their executors, administrators, devisees, heirs, successors and assigns to the Town of Barnstable, a Massachusetts municipal corporation, in the sum of \_\_\_\_\_ Dollars, and has secured this obligation by the deposit with the Treasurer of said Town of Barnstable of said sum in money or negotiable securities.

The condition of this obligation is that if the undersigned or his/his executors, administrators, devisees, heirs, successors and assigns shall fully and satisfactorily observe and perform in the manner and in the time therein specified, all of the covenants, conditions, agreements, terms and provisions contained in the application signed by the undersigned and dated \_\_\_\_\_, 19\_\_\_\_, under which approval of a definitive plan of a certain subdivision, entitled \_\_\_\_\_, and dated \_\_\_\_\_, 19\_\_\_\_, has been or is hereafter granted by the Barnstable Planning Board, then this obligation shall be void; otherwise it shall remain in full force and effect and the aforesaid security for said sum shall become and be the sole property of said Town of Barnstable as liquidated damage.

IN WITNESS WHEREOF the undersigned has hereunto set his hand and seal this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_.

**FORM F**  
**COVENANT**

The undersigned \_\_\_\_\_ does hereby covenant and agree with said Planning Board and the successors in office of said Board, pursuant to G.L. (Ter. Ed.) c. 41, Sec. 81U, as amended, that:

1. The covenantor is the owner of record of the premises shown on said plan;
2. This covenant shall run with the land and be binding upon the executor, administrators, heirs, assigns of the covenantor, and their successors in title to the premises shown on said plan;
3. The construction of ways and the installation of municipal services shall be provided to serve any lot in accordance with the applicable Rules and Regulations of said Board before such lot may be built upon or conveyed, other than by mortgage deed, provided that a mortgagee who acquires title to the mortgaged premises by foreclosure or otherwise and any succeeding owner of the mortgaged premises or part thereof may sell any such lot subject only to that portion of this Covenant which provided that no lot so sold shall be built upon until such ways and services have been provided to serve such lot;
4. Nothing herein shall be deemed to prohibit a conveyance subject to this covenant by a single deed of the entire parcel of land shown on the subdivision plan or of all lots not previously released by the Planning Board without first providing such ways and services.
5. This covenant shall take effect upon the approval of said plan;
6. Reference to this covenant shall be entered upon said plan and this covenant shall be recorded when said plan is recorded.

The undersigned \_\_\_\_\_, wife, husband, of the covenantor, hereby agree that such interest as I, we, may have in said premises shall be subject to the provisions of this covenant and insofar as is necessary release all rights of tenancy by the courtesy, dower, homestead and other interest therein.

EXECUTED as a sealed instrument this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_.

COMMONWEALTH OF MASSACHUSETTS

Then personally appeared \_\_\_\_\_, ss. \_\_\_\_\_, 19\_\_\_\_, and acknowledged the foregoing instrument to be \_\_\_\_\_ free act and deed, before me \_\_\_\_\_

Notary Public

**FORM G**  
**CERTIFICATE OF PERFORMANCE**  
 (Covenant Approval Release)

Barnstable, Massachusetts, ..... 19.....  
 The undersigned, being a majority of the Planning Board of Barnstable, Massachusetts, hereby certify that the requirements for work on the ground called for by the Covenant dated ..... 19....., and recorded in ..... District Deeds, Book ..... Page ..... (or registered on Certificate of Title No. ...., in Registration Book ..... Page .....) have been completed to the satisfaction of the Planning Board as to the following enumerated lots shown on Plan entitled ..... recorded with said Deeds, Plan Book ..... Plan ..... (or registered in said Land Registry District, Plan Book ..... Plan .....) and said lots are hereby released from the restrictions as to sale and building specified therein.  
 Lots designated on said Plan as follows:

.....  
 .....  
 ..... Majority of the  
 ..... Planning Board  
 ..... of the Town of  
 ..... Barnstable.

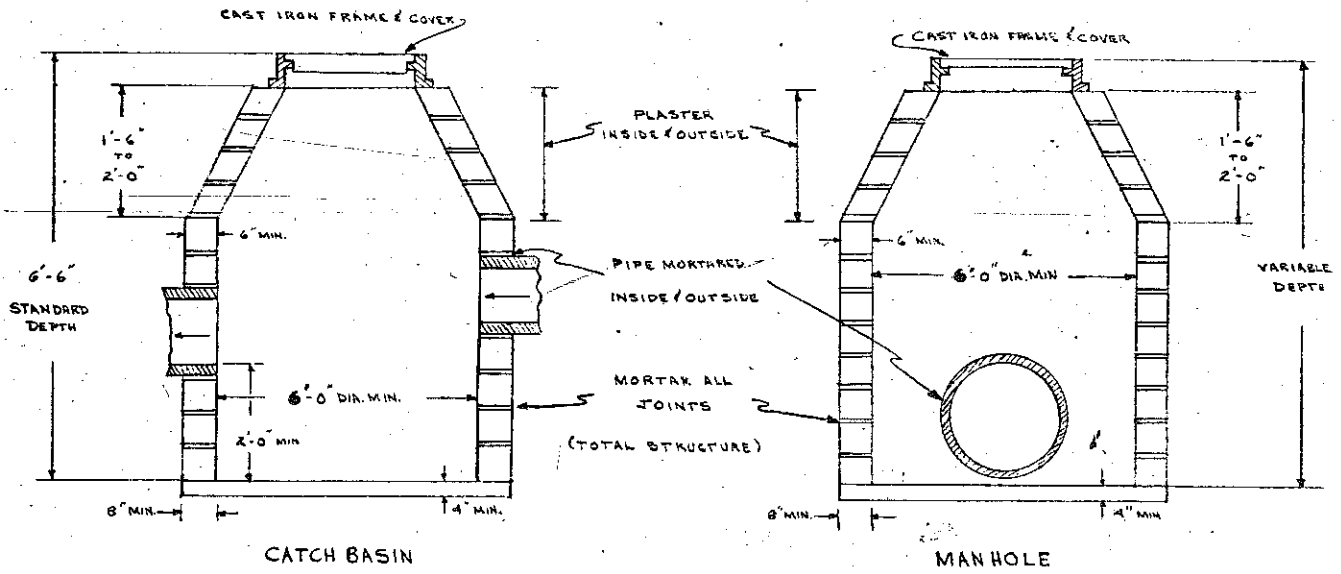
COMMONWEALTH OF MASSACHUSETTS

....., ss. .... 19.....  
 Then personally appeared ..... one of the above named members of the Planning Board of the Town of Barnstable, Massachusetts and acknowledged the foregoing instrument to be the free act and deed of said Planning Board, before me.  
 .....  
 Notary Public  
 My commission expires: .....

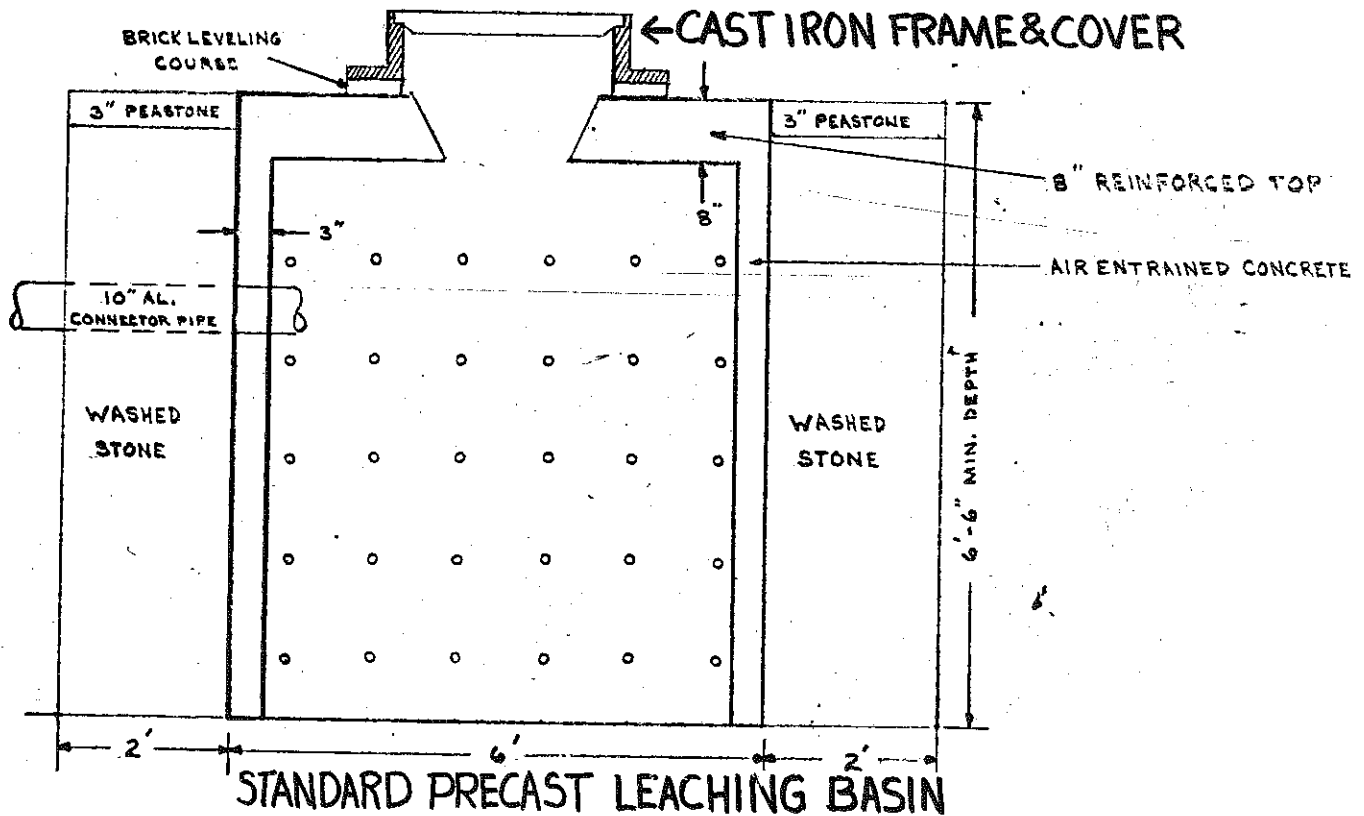
**APPENDIX II**

***Design And Construction Standards***

# TYPICAL DRAINAGE STRUCTURES

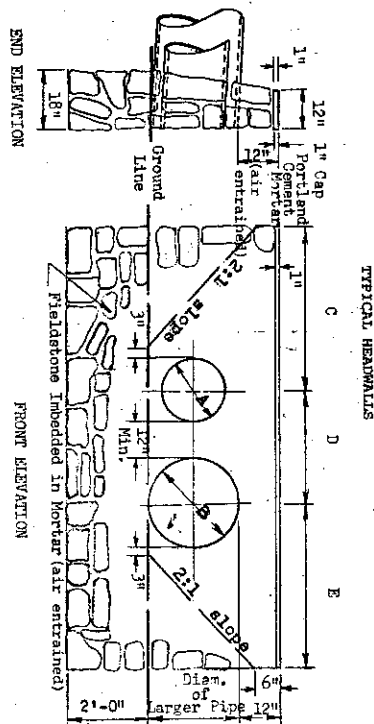


NOTE: USE AIR ENTRAINED CEMENT FOR ALL MORTAR



TYPICAL HEADBALLS

Portland Cement (air entrained)



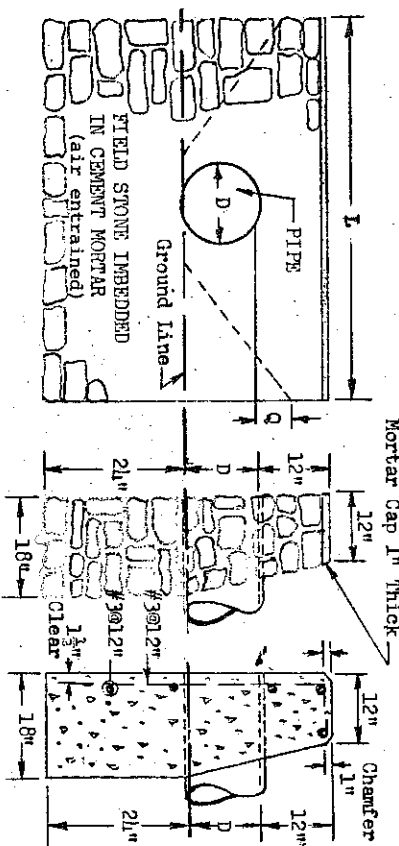
COMBINATION ENDS FOR PIPES UP TO 30 INCH DIAMETER

FRONT ELEVATION

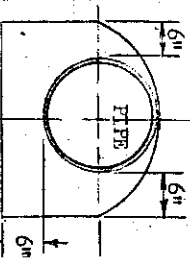
ALTERNATE - CLASS "C" CONCRETE

FRONT ELEVATION

END ELEV.



CONCRETE GRADE FOR PIPE CULVERTS (To Be Used Where Specified) Class "C" Concrete (air entrained)

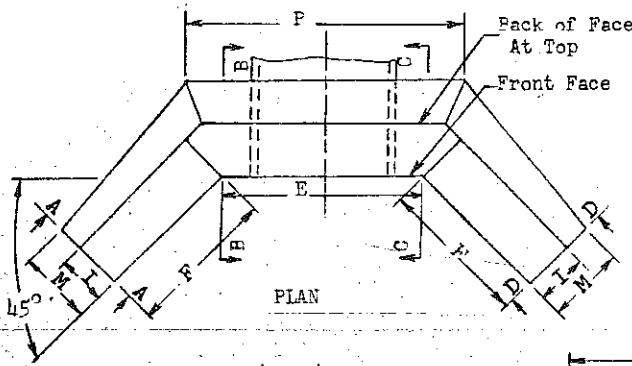


Design No.	Diameter in Inches		Lengths					Cubic Yards of Masonry	Pounds of Steel
	A	B	C	D	E	F			
1	12"	12"	3'-9"	2'-2"	3'-1"	3'-9"	1.89	27	
2	12"	15"	4'-3"	2'-1"	4'-1"	5'-0"	2.27	31	
3	12"	18"	4'-9"	2'-1"	5'-0"	6'-0"	2.65	36	
4	12"	21"	5'-4"	2'-1"	5'-8"	6'-8"	3.12	41	
5	12"	24"	5'-9"	2'-1"	6'-6"	7'-6"	3.51	46	
6	12"	30"	6'-9"	3'-1"	7'-6"	8'-6"	4.18	56	
7	15"	15"	4'-5"	2'-6"	4'-1"	5'-0"	2.32	32	
8	15"	18"	4'-11"	2'-1"	4'-11"	5'-8"	2.72	36	
9	15"	21"	5'-5"	2'-1"	5'-10"	6'-8"	3.15	41	
10	15"	24"	5'-11"	3'-0"	6'-1"	7'-3"	3.60	46	
11	15"	30"	6'-11"	3'-0"	7'-1"	8'-0"	4.24	57	
12	18"	18"	5'-0"	2'-1"	5'-0"	5'-0"	2.72	36	
13	18"	21"	5'-7"	2'-1"	5'-10"	6'-8"	3.17	41	
14	18"	24"	6'-0"	3'-0"	6'-1"	7'-3"	3.58	46	
15	18"	30"	7'-0"	3'-0"	7'-1"	8'-0"	4.53	57	
16	21"	21"	5'-8"	3'-1"	5'-1"	6'-1"	3.20	42	
17	21"	24"	6'-2"	3'-1"	6'-1"	7'-1"	3.69	47	
18	21"	30"	7'-2"	3'-1"	7'-1"	8'-1"	4.55	58	
19	24"	24"	6'-3"	3'-1"	6'-1"	7'-1"	3.67	47	
20	24"	30"	7'-3"	3'-1"	8'-1"	8'-1"	4.69	58	
21	30"	30"	7'-6"	4'-0"	7'-1"	8'-1"	4.76	59	

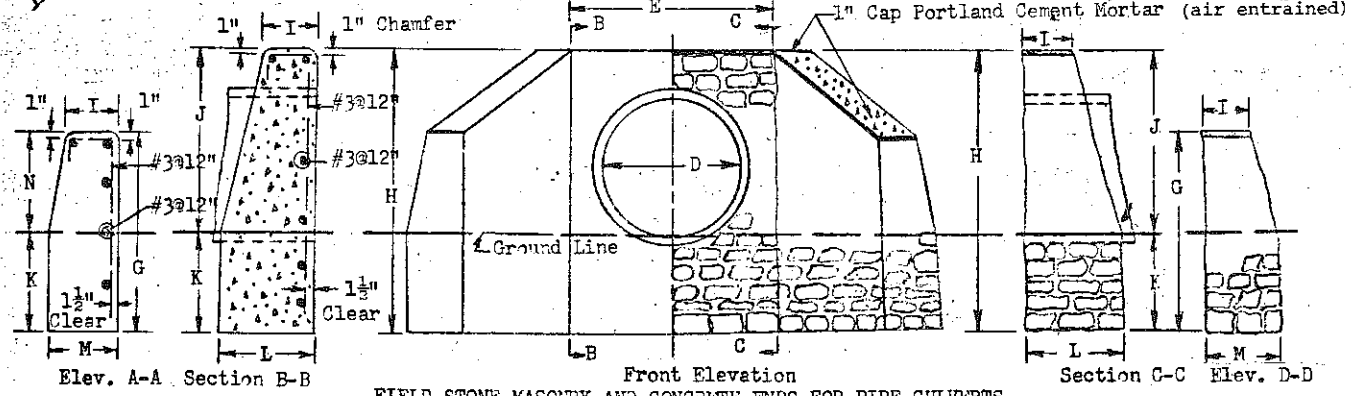
PIPE D	1 1/2:1 SLOPE		2:1 SLOPE		
	CU. YDS.	LBS.	L	CU. YDS. / LBS.	
8"	4'-2"	0.77	13	5'-10" / 1.08	19
10"	4'-10"	0.92	11	6'-8" / 1.28	22
12"	5'-6"	1.08	19	7'-6" / 1.49	26
15"	6'-6"	1.34	21	8'-9" / 1.82	29
16"	6'-10"	1.42	22	9'-2" / 1.94	30
18"	7'-6"	1.61	27	10'-0" / 2.18	32
21"	8'-8"	1.95	30	11'-6" / 2.62	42
24"	9'-3"	2.16	34	12'-6" / 2.97	46
30"	10'-6"	2.63	40	15'-0" / 3.86	56

FIELD STONE MASONRY AND CONCRETE ENDS FOR 8" TO 30" PIPE CULVERTS

TYPICAL HEADWALLS



1 1/2:1 AND 2:1 SLOPES													1 1/2:1 SLOPE		2:1 SLOPE	
D	E	G	H	I	J	K	L	M	N	P	F	CU. YDS.	LBS.	F	CU. YDS.	LBS.
30"	14.0"	1.0"	5.6"	12"	3.6"	2.4"	1.6"	1.8"	2.0"	3.3"	3.0"	260	40	4.3"	3.6	47
36"	14.6"	1.3"	6.0"	12"	4.0"	2.4"	1.8"	1.8"	2.3"	3.1"	3.6"	3.35	49	5.0"	4.35	62
42"	15.0"	1.6"	6.6"	12"	4.6"	2.4"	2.0"	1.8"	2.6"	3.6"	4.0"	4.20	59	5.9"	5.25	68
48"	15.6"	1.9"	7.0"	12"	5.0"	2.4"	2.0"	1.8"	2.9"	4.2"	4.6"	5.19	67	6.6"	6.50	79
54"	16.0"	2.2"	7.6"	12"	5.6"	2.4"	2.2"	1.8"	3.0"	4.8"	5.0"	6.26	77	7.3"	7.88	88
60"	16.6"	2.5"	8.0"	12"	6.0"	2.4"	2.4"	1.8"	3.3"	5.4"	5.6"	7.43	83	8.0"	9.37	110
72"	17.6"	3.1"	9.0"	12"	7.0"	2.4"	2.8"	1.8"	3.9"	6.4"	6.4"	10.25	105	9.6"	12.99	139
84"	18.6"	3.7"	10.0"	12"	8.0"	2.4"	3.0"	1.8"	4.3"	7.4"	7.4"	13.19	132	11.0"	17.32	187



FIELD STONE MASONRY AND CONCRETE ENDS FOR PIPE CULVERTS Under Embankments with 1 1/2:1 And 2:1 Slopes

Page 42

APPENDIX II  
DESIGN AND CONSTRUCTION STANDARDS  
DRAINAGE CALCULATIONS  
(Rational Method)

1. Use the rainfall intensity and storm frequency shown in the Table of Design Standards for the appropriate type of roadway.
2. Determine the area in acres of each drainage area as determined by contour study both within and without subdivision area. (1 acre = 43,560 feet)
3. Determine the time of flow (TOF) by using Figure 1. The distance is the greatest measured distance of water runoff from the highest to the lowest elevation. The % slope is the drop in elevation divided by the distance times 100. The runoff coefficients (C) to use are listed as follows:

Type of Surface	Runoff Coefficient (C)
Concrete of Bituminous Concrete	0.8 - 0.9
Gravel	0.4 - 0.6
Bare Earth	0.2 - 0.9
Steep Grassed (2:1 or steeper)	0.5 - 0.7
Turf Meadows	0.1 - 0.4
Forested	0.1 - 0.3
Cultivated Fields	0.2 - 0.4

If variable surfaces exist within an area, the average C value is determined by using the following formula:

$$C_+ = \frac{C_1A_1 + C_2A_2 + C_3A_3 + \dots}{A_1 + A_2 + A_3}$$

where  $C_+$  = total or average C value  
 $C_1$  = C value for area 1  
 $A_1$  = area 1 in acres

Figure 1 can be used by plotting a line horizontally and right from the distance value until it intersects the % slope value curve; thence plotting a line vertically downward until it intersects the C value curve; thence plotting a line horizontally and right until it intersects the time. The final value of time obtained is the TOF value.

4. Determine the rainfall intensity (I) by using Figure 2. The curves shown on Figure 2 are for storm frequencies of 10, 25, and 50 years and the I value obtained by using this graph is specifically for the drainage area under consideration. Figure 2 can be used by plotting a line vertically upward until it intercepts the intensity curve; thence plotting a line horizontally and left until it intercepts the intensity. The final value of inches per hour is the rainfall intensity for the area being studied.

5. Calculate the rate of runoff by using the following Rational Method formula:

- $Q = CIA$   
 where  $Q$  = rate of runoff in cubic feet per second (c.f.s.)  
 $C$  = runoff coefficient  
 $I$  = rainfall intensity in inches per hour  
 $A$  = drainage area in acres.

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6. Pipe and ditch sizes are calculated by using the following Manning Formula:

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

where Q = discharge in cubic feet per second

A = cross sectional area of flow in square feet

\*\* n = roughness coefficient

\* R = hydraulic radius in feet

S = gradient in feet per foot

Note: \*hydraulic radius =  $\frac{\text{area of section in square feet}}{\text{wetted perimeter in feet}}$

\*\*Type of Conduit

Concrete Pipe	0.015
Asphalt Coated Corrugated Metal Pipe	0.024
Channel — shallow	0.080
Channel — over 1 ft. depth	0.060

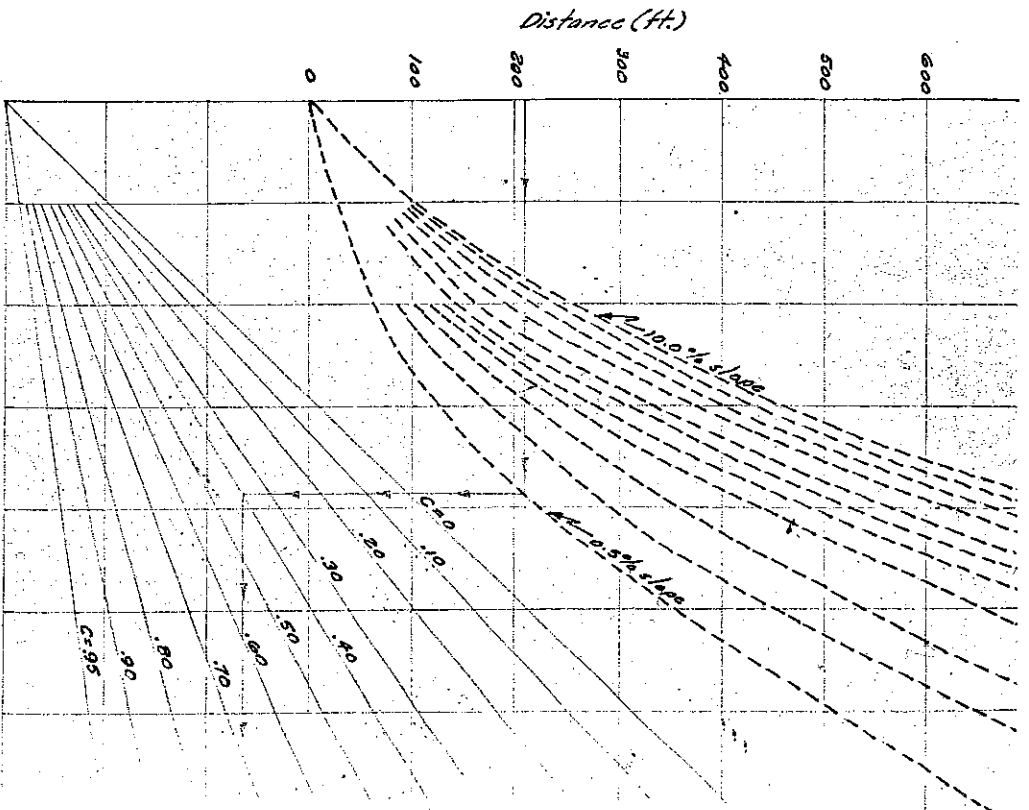
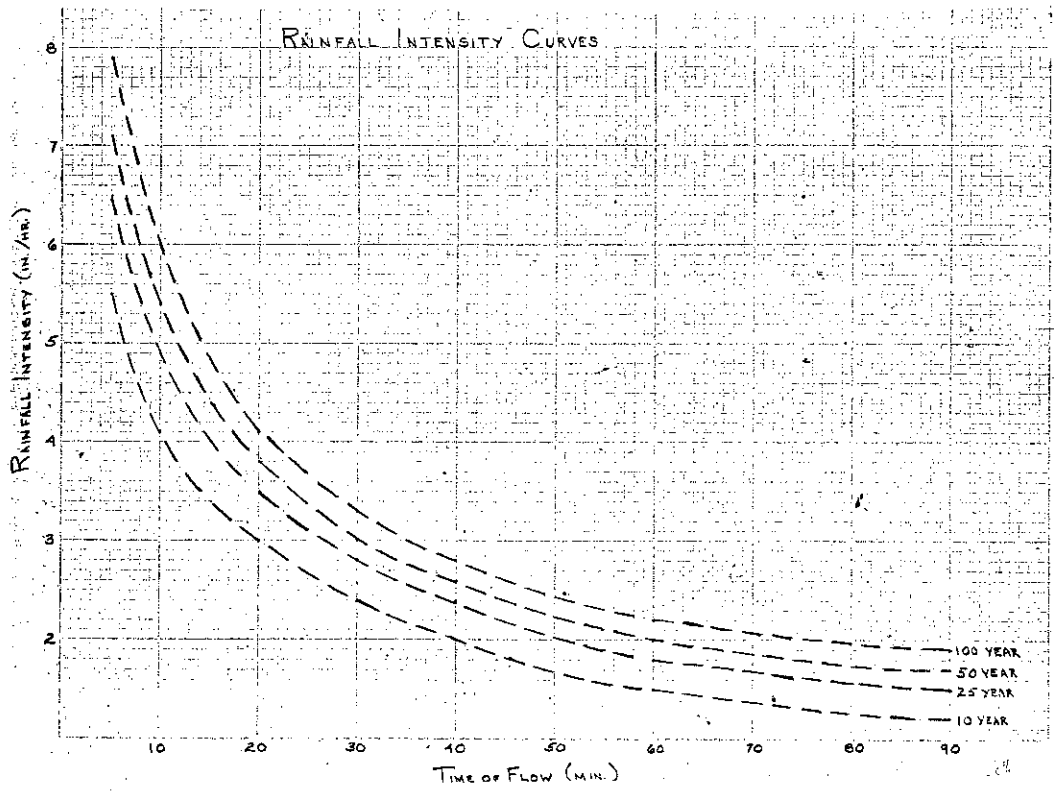
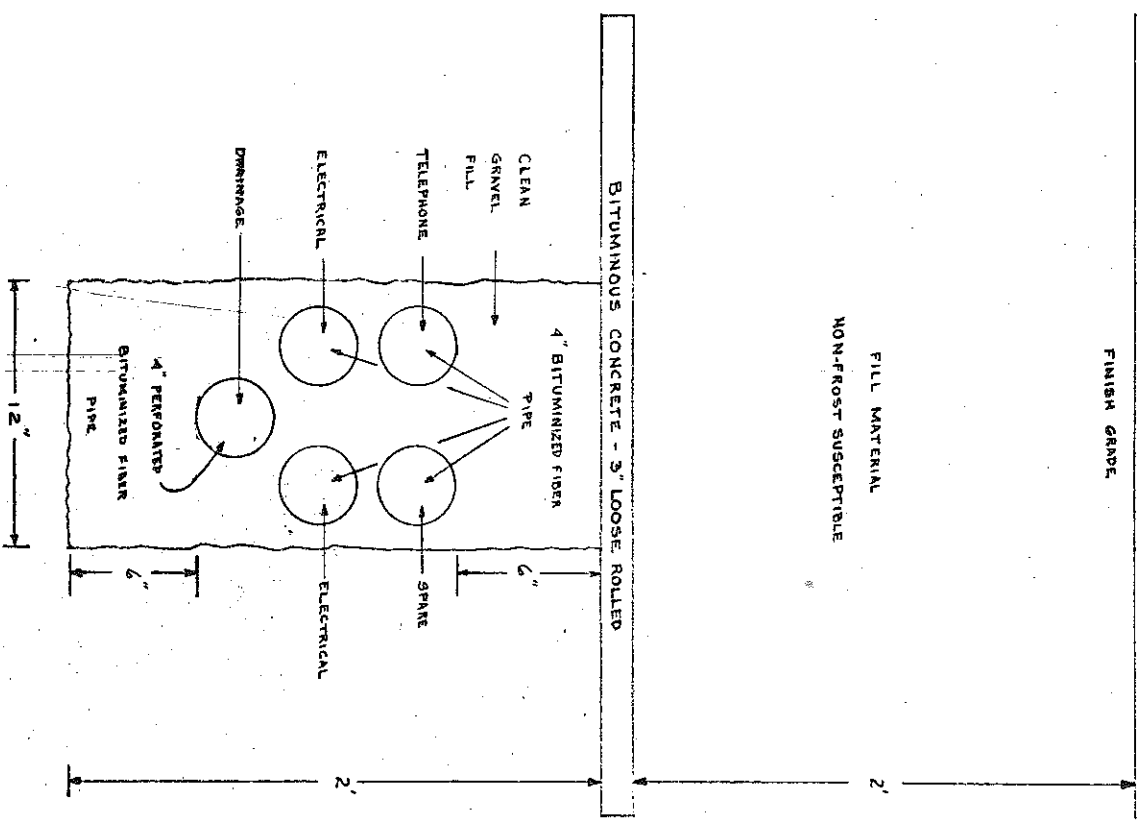


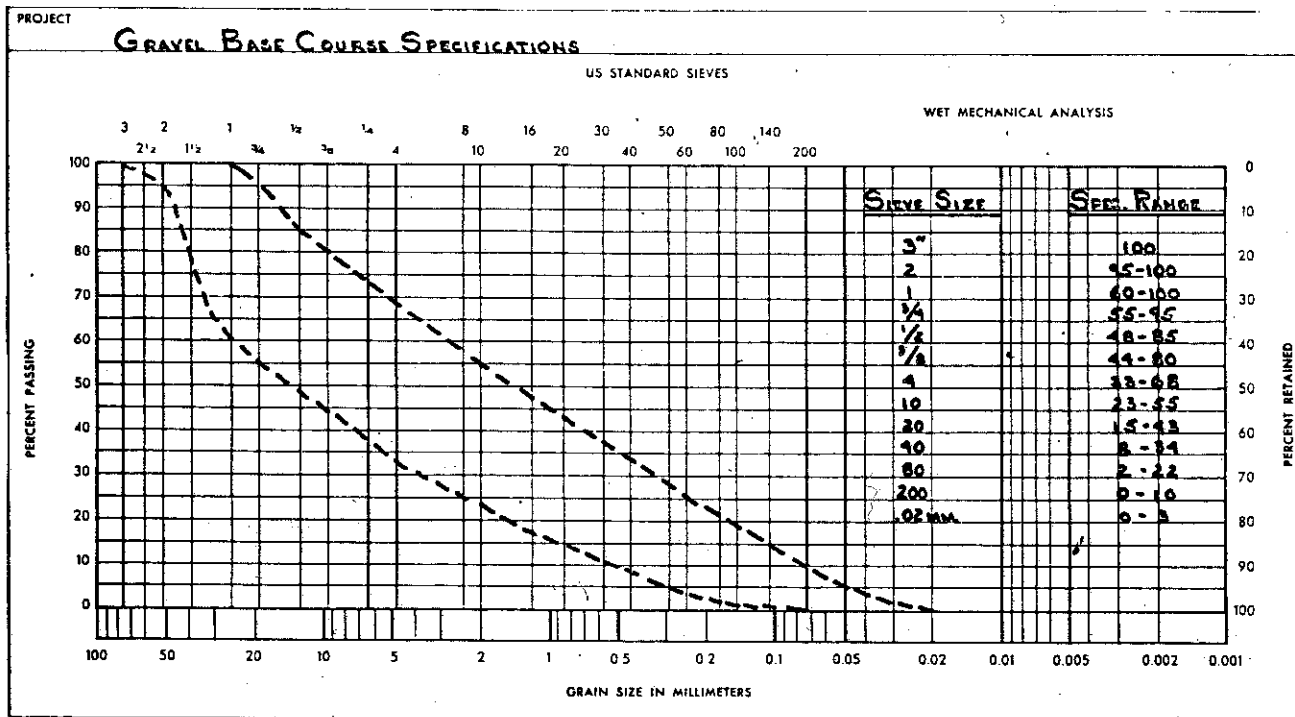
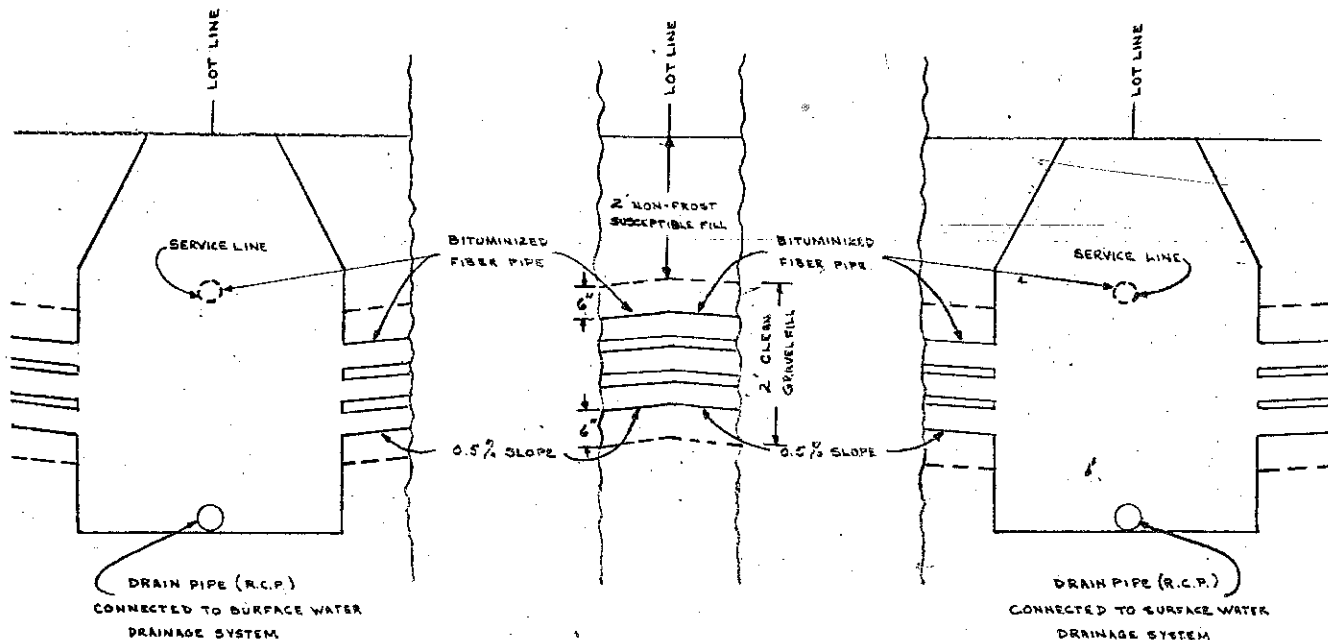
Fig. 1



### BURIED UTILITIES TYPICAL CROSS SECTION



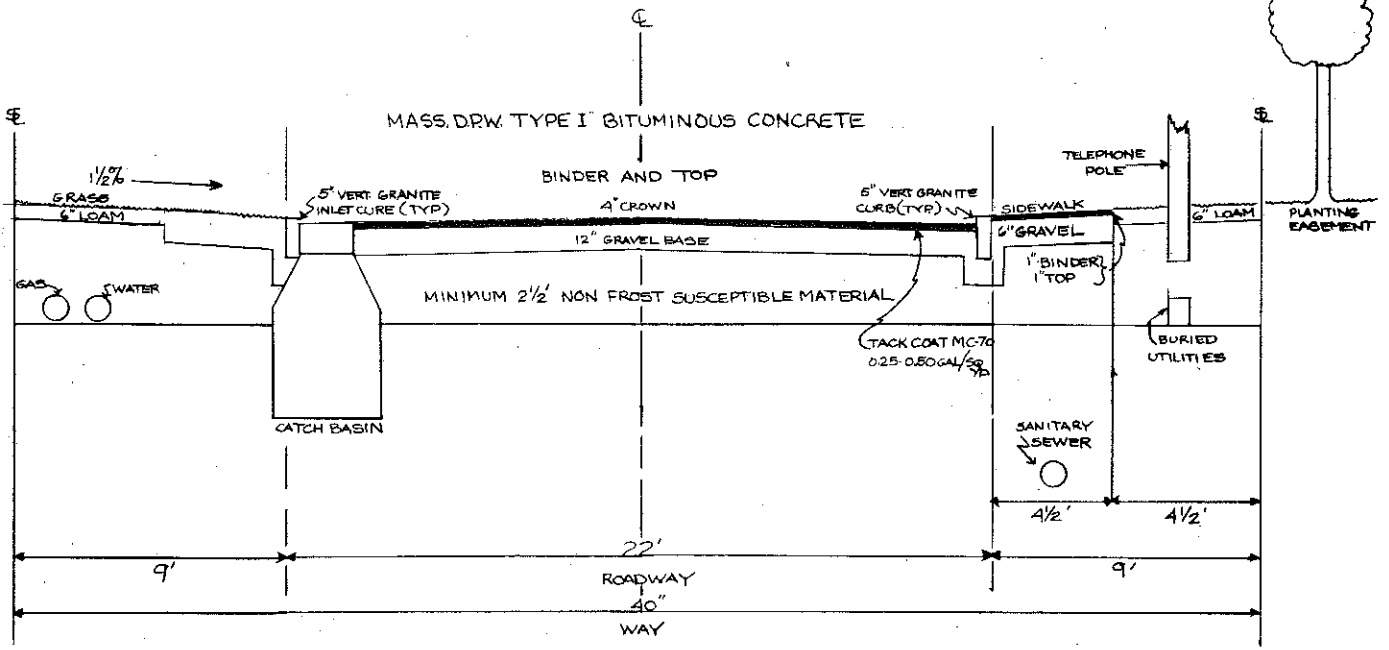
TYPICAL CROSS SECTION  
BURIED UTILITIES





TYPICAL CROSS SECTION

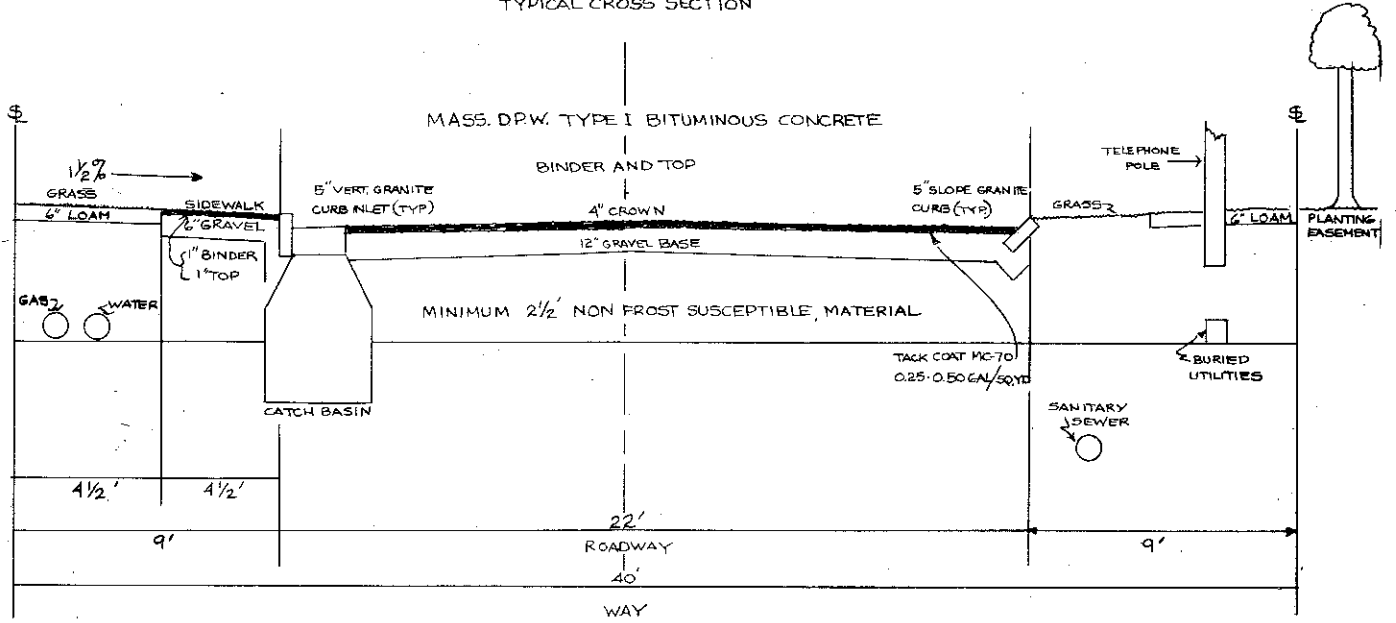
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MINOR STREET A - VERTICAL CURB

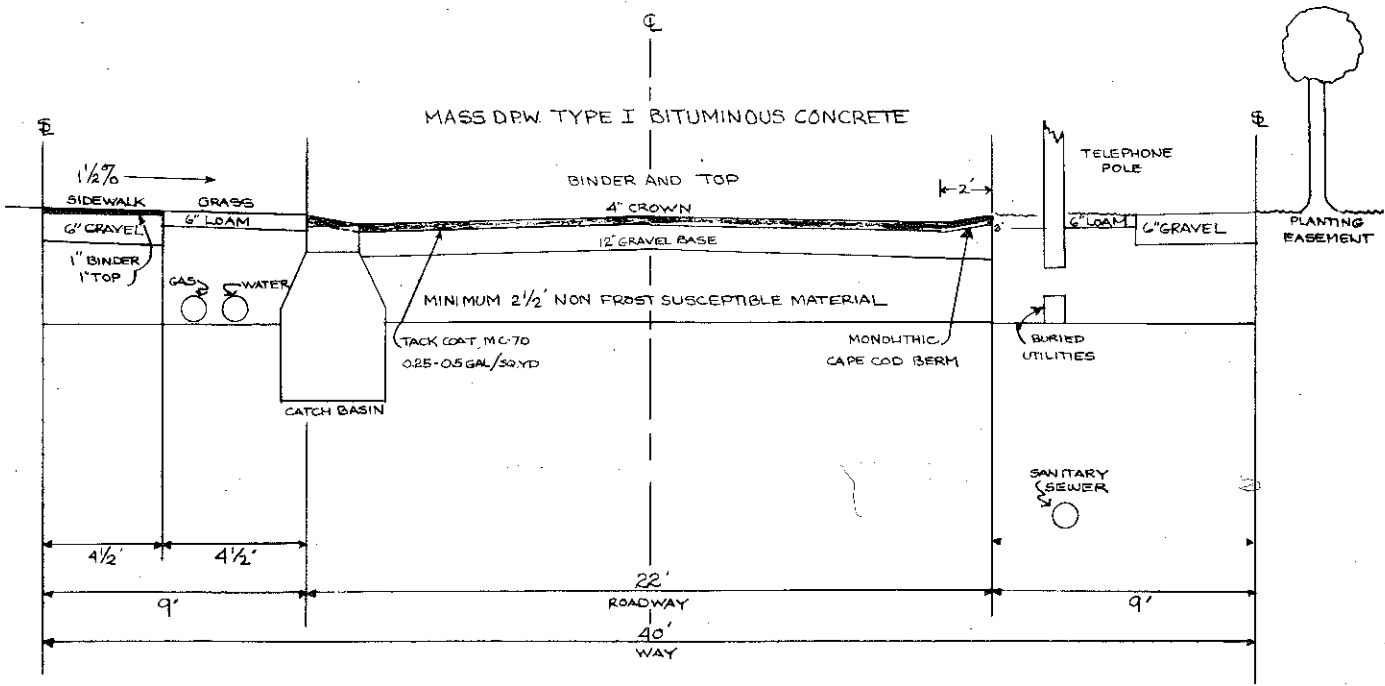
TYPICAL CROSS SECTION

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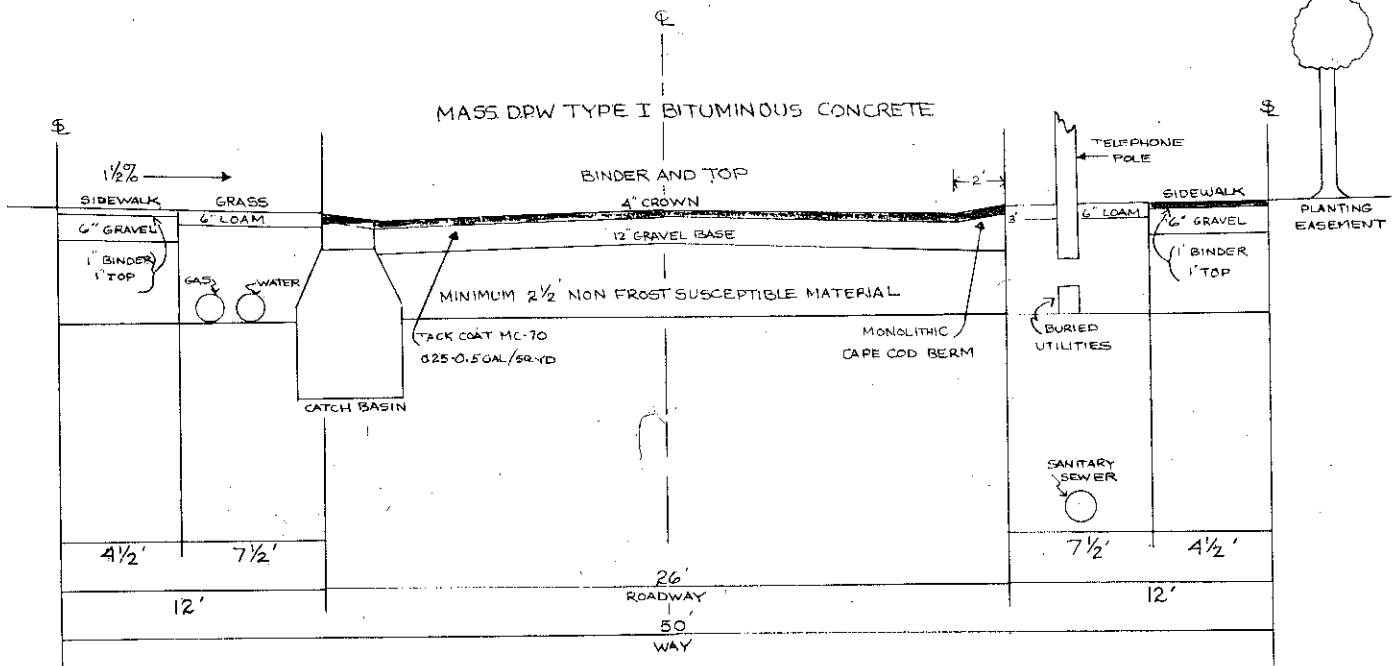
MINOR STREET A - SLOPED CURB

TYPICAL CROSS SECTION



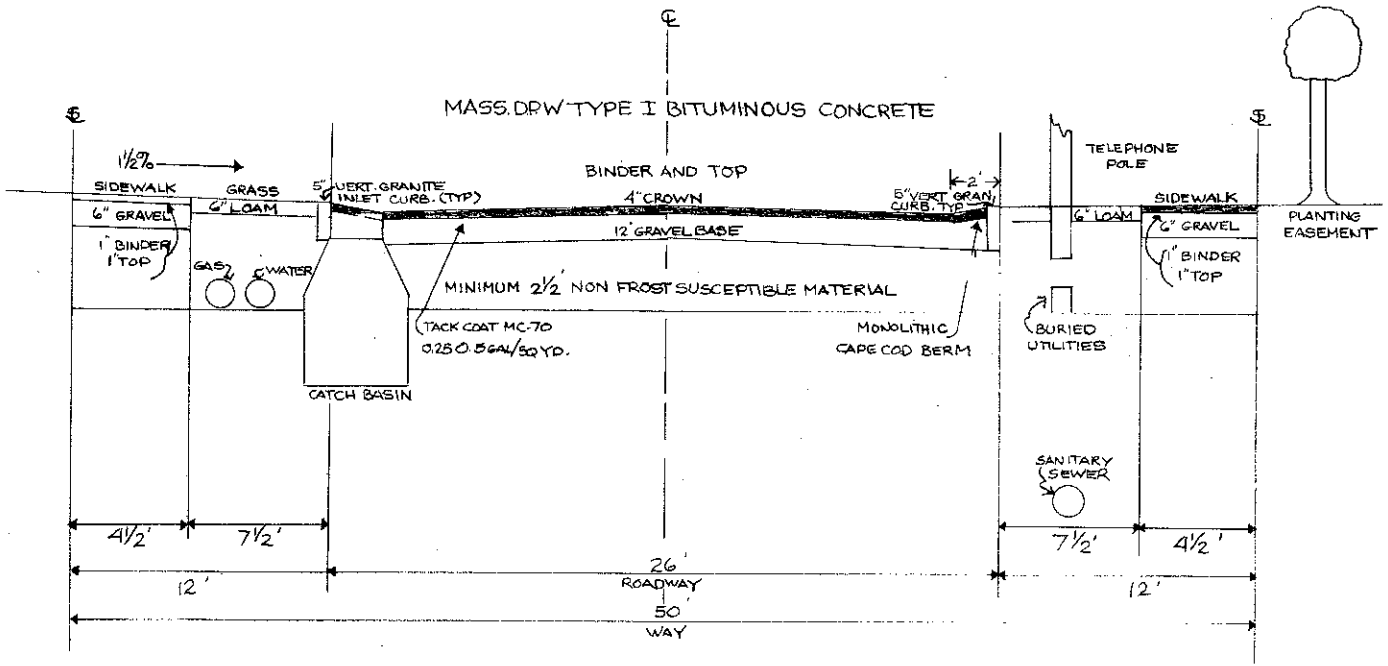
MINOR STREET 'A' - CAPE COD BERM

TYPICAL CROSS SECTION



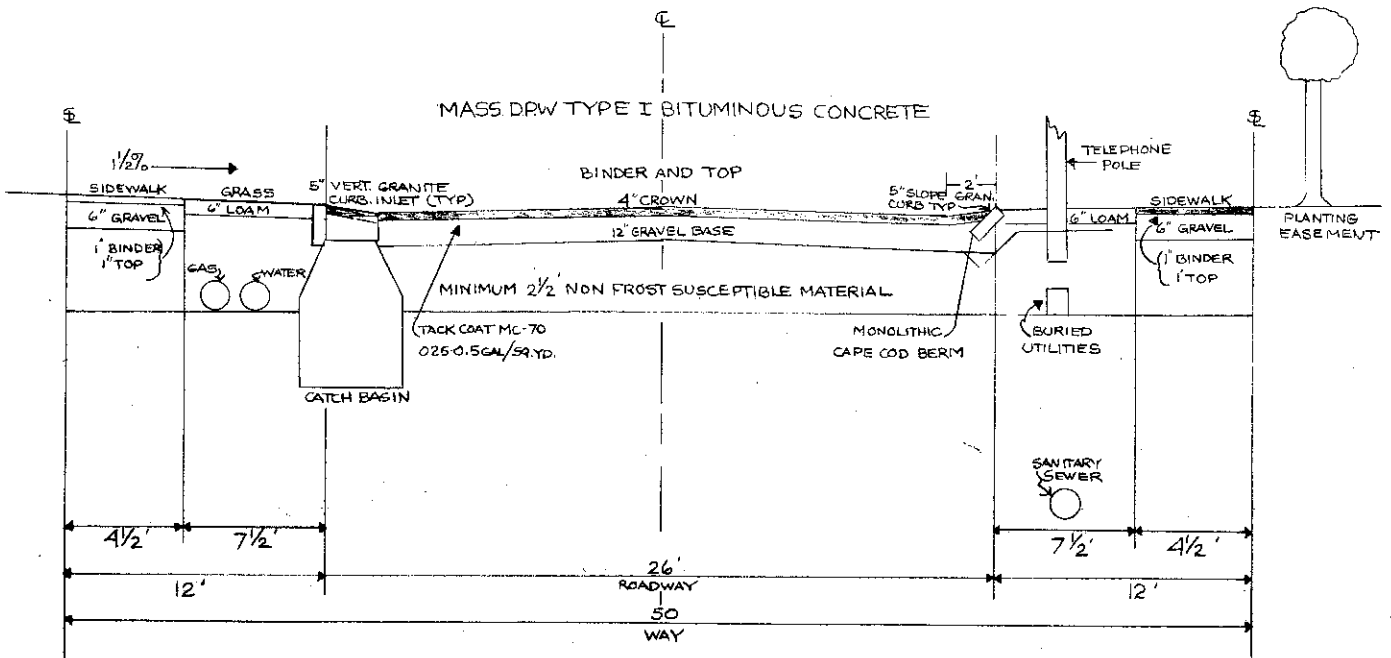
SECONDARY STREET - CAPE COD BERM

TYPICAL CROSS SECTION



SECONDARY STREET - VERTICAL CURB

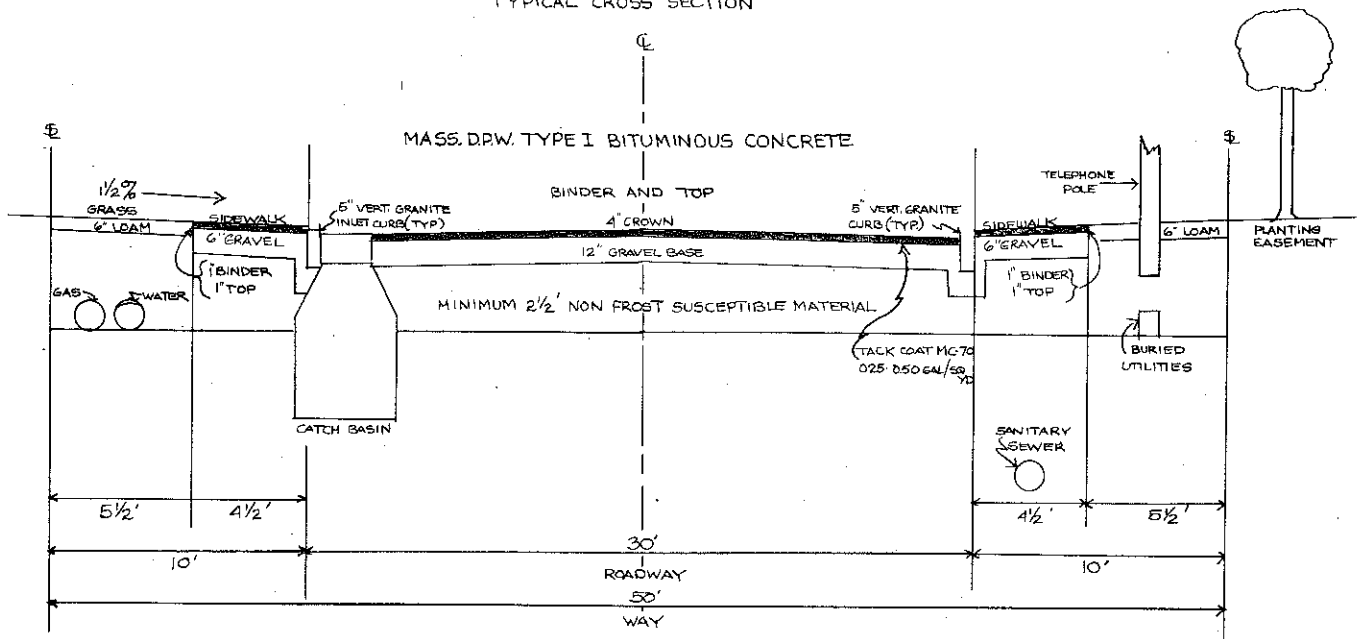
TYPICAL CROSS SECTION



SECONDARY STREET - SLOPED CURB



TYPICAL CROSS SECTION



MAJOR STREET - VERTICAL CURB

**FEES**

**1. Filing Fee**

(a) A filing fee of \$50.00 shall be submitted to the Board at the time of submission of the Preliminary Plan. This fee shall be held by the Board as a deposit until the Board takes action upon the Preliminary Plan. At the time of the taking of such action, the Board in its discretion may waive or refund such filing fee in whole or in part to the extent the Board determines that professional or other services were not required in consideration of the Preliminary Plan.

(b) A filing fee of \$50.00 minimum, plus \$5.00 per lot and/or dwelling unit and \$2.00 per abutor in excess of 10, shall be submitted to the Board at the time of submission of the Definitive Plan. If the Definitive Plan has evolved from a Preliminary Plan, the Board shall credit against the required filing fee the amount of any filing fee paid (and not waived or refunded) by the applicant under paragraph (a). Said fee shall be made payable to the Town and deposited with the Planning Board.

**2. Inspection Fee**

Prior to the return to the applicant of the Definitive Plan as approved and endorsed the applicant shall pay to the Board a fee of \$100. per lot and/or dwelling unit.