TOWN OF MANSFIELD
DEPARTMENT OF PUBLIC WORKS
ENGINEERING STANDARDS

and

SPECIFICATIONS

DECEMBER 1992 REVISION
11/22/95 Table of Contents Revision Only
December, 2005 To Clarify the Required Use of Temporary Paving

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Section I--Purpose and Authority

These specifications are established by the Director of Public Works in order to regulate the construction of Public Improvements within the Town of Mansfield, including public improvements required by the Subdivision Regulations of the Town of Mansfield.

All public improvements shall be constructed as set forth herein.

These regulations are prepared in accordance with requirements of the Mansfield Road Permit and Engineering Standards and Specifications Ordinance, effective January, 1993 and the Regulations adopted pursuant to this Ordinance.

Section II--Reference to Related Codes, Manuals, Regulations and Ordinances

These specifications set forth general and specific requirements for construction of Public Improvements. Specific reference is made to the following Standards for Public Improvements:

1. "A Policy on Geometric Design of Highways and Streets, 2001" AASHTO Highway Subcommittee on Design.

2. Connecticut Highway Design Manual, 2003 edition, Connecticut Department of Transportation.

3. Form 816, "Standard Specifications for Roads, Bridges and Incidental Construction," Connecticut State Department of Transportation, 2004, as amended from time to time.

4. "Manual on Uniform Traffic Control Devices for Streets and Highways", 2003 Edition, United States Department of Transportation Federal Highway Administration.

It is the requirement of these specifications that Public Improvements be constructed according to generally accepted standards and procedures adhering to standard engineering practice.

Section III--Inspections

A. Routine Inspections

All site improvements covered by these specifications will be inspected by the Director of Public Works or his authorized representative to insure satisfactory construction and materials.

The Director or his representative must be informed of all phases of work being started so that inspection can take place as work is being done. In no case shall the Contractor or Subdivider perform any paving work without giving 24 hours advance notice to the Director so that a representative of the Town can be present at the time work is being done. Failure to notify the Director of Public Works 24 hours in advance of performing work will result in delays and the necessity of excavating and replacing work already performed before approval is given.

B. Final Inspections

A final inspection of all improvements and utilities will be made to determine whether the work is satisfactory and in substantial agreement with any approved drawings and applicable specifications.

Satisfactory clean-up and the general condition of the site is a consideration for final approval of work.

C. As-Built Plans

If the construction of the road and location of utilities in the field differ from the plans and specifications approved by the Town and the differing locations are acceptable to the Town, the Contractor or Subdivider shall file with the Town, plans and profiles certified by a Registered Land Surveyor as "as-built" drawings showing the actual locations of construction and utility locations. If the construction conforms to the original plans, a copy of the originally approved plans shall be certified by a Registered Land Surveyor indicating that construction has taken place in conformance with the approved plan.

Upon a satisfactory final inspection report and submission of "as-built" plans or certification, the Director of Public Works will recommend release of the performance bond covering the improvements. (See Section VII--Bonds and Acceptance of Work.)

Section IV--Town Roads and New Subdivision Construction

A. Road Geometry and Design Criteria[1]

1. Sight Distance

Minimum stopping sight distance shall be:

Design speed, MPH	30	40	50	Required Visibility
	(Seconds)			
Stopping sight distance	200	275	400	5 sec
Intersection sight distance	300	400	500	7 sec
K value for: *				
crest vertical curve	28	55	85	
sag vertical curve	35	55	75	

*K value multiplied by the algebraic difference in grade gives the length in feet of the vertical curve which will provide the required stopping sight distance.

Criteria for measuring sight distance, both vertical and horizontal, are that the visible distance between an eye height of 3.75 feet and an object 6 inches high shall equal the required stopping sight distance.

Where crest vertical curves and horizontal curves occur at the same location, there should be above-minimum sight distance design to assure the horizontal curve is visible to drivers as they approach.

2. Alignment

Sudden changes of alignment between curves of widely different radii or between long tangents and short curves of small radii are to be avoided.

3. Superelevation

Superelevation shall not be more than 6% and shall be considered in combination with longitudinal slopes so that maximum grades are below 8%. (See Section 4.A.4, Maximum Grades.)

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[1] This information is taken from "A Policy on Geometric Design of Highways and Streets", published by the American Association of State Highway Officials.

Superelevation runoff is the length of highway needed to accomplish the change in cross slope from a normal crown to a fully elevated section.

Minimum lengths of superelevation runoff are shown as follows:

Superelevation Rate	Length of Runoff in Feet for Design Speed, MPH		
	30	40	50
0.02	100'	125'	150'
0.04	100'	125'	150'
0.06	110'	125'	150'

In addition, design runoff length may be adjusted for smooth riding, surface drainage, and good appearance.

4. Maximum Grades

Grades shall not be steeper than 8% for Town roads. These grades may be increased to 10% if it can be demonstrated that no alternative to such grade exists. In such case, plans must be reviewed with the Director of Public Works before grades steeper than 8% are used.

5. Width of Surfacing, Shoulder and Roadway

Required minimum widths for Town roads are as follows:

Type of Street	Required Road Width	Shoulder Snow Shelf
Residential		
Dead-end	24'	3'
Through	26'	3'
Commercial/Industrial	32'	3'

Shoulder width is measured from the edge of the pavement surface to the point of intersection with shoulder slope.

Where a guardrail or guideposts are to be used, the graded width of the shoulder snow shelf shall be increased. In deep fills or cut areas, where large amounts of material are involved in excavation or filling operations, the width of the graded shoulder may be reduced to 2' upon approval of the Director of Public Works.

The radius of the pavement edges at intersections shall be 25' whenever possible and in no case less than 15'.

(See standard details of Local, Residential and Commercial Streets.)

6. Pavement Cross Section

The standard required cross section of pavement constructed on suitable material for other than a commercial or industrial roadway (see cross sections on page 52):

Wearing surface . . . . . 3"
High stability base course. . . . 6"
Free draining subbase . . . . . .12"
Compacted subgrade. . . . . .existing material if suitable, or clean fill
Unsuitable material . . . . . .to be removed

Commercial/industrial road cross sections shall be as shown on page 52 or as approved by the Director of Public Works based on site-specific engineering design considering factors such as land use, traffic (all types), functional use (present and future), wheel loadings, etc.

Unsuitable Material --All unsuitable material, large roots, organic materials, peat, muck, topsoil, etc., in the area of the constructed roadway must be removed before road construction begins. The determination of whether a material is suitable or unsuitable will be made by the Director of Public Works or his designated agent.

Compaction --Subgrade, Subbase, and Base courses shall be compacted according to the requirements of Form 816, Sections 2.12, 2.14, and 3.02, outlined as follows: Each layer must be rolled and compacted using methods approved by the Director of Public Works until a dry density of 95% or more of the maximum dry density for that subbase material when tested in accordance with AASHTO T-180, Method D, except that the mold in the test shall be 6.11 inches high, and correction for particles retained on the 3/4" sieve shall be as specified in AASHTO T-224. These requirements are the same as those specified in Section 2.12.03 of Form 816. At least one such density test shall be provided for each 500 feet of road.

Compacted Subgrade --In all cases, all organic material, topsoil, and unsuitable material shall be removed from the area of road construction before free-draining subbase material or clean fill is placed. The subgrade may consist of the native underlying material (after removal of unsuitable materials) or clean, compacted fill to establish the required grades before construction of the road section.

Free Draining Subbase --This portion of the pavement section is generally constructed of local bank run gravel material. This layer shall be granular, free draining material, free of stones greater than 6" in diameter and free of organic material.

The base of this free draining layer shall be placed at an elevation such that ground and surface water levels remain below this layer of road section.

High Stability Base Course --This layer is to be constructed of "processed gravel," meeting Form 816 specification M.05.01 for "Processed Aggregate Base and Pavement." This layer shall be free of all foreign material.

This is the surface on which pavement material is later placed. Experience has shown that delay between placing this layer and paving results in unsatisfactory finished pavement. Delays between placing this layer and the subsequent paving operation are to be avoided and may be cause for rejection of the work.

Wearing Surface --The required wearing surface shall consist of three inches of compacted bituminous concrete placed in a 1 1/2" layer of binder course and a 1 1/2" layer of surface course.

7. Curbing

Curbing shall be installed along the gutter line of new roads at all locations where the discharge of street water is on the surface of adjacent yard areas which are lower than the street.

Locations of all curbs, discharge points and discharge mechanisms shall be as approved by the Director of Public Works.

8. Required Intersection and Cul-de-sac Geometry
(See standard detail -- page 41)

B. Signs

All signs shall be compatible with other Town signs and the manual on uniform Traffic Control Devices for Streets and Highways published by the Federal Highway Administration as may be amended from time to time so as to be readable and readily recognizable as such by the travelling public.

C. Rights-of-Way

1. Required Width of Right-of-way

The following widths are established under requirements of the Planning and Zoning Commission for various classes of roadway as presently defined in the Zoning Regulations and as may be varied from time to time.

Local Roads

These roads are residential and may be either dead-end or through streets. In either case the required right-of-way is fifty feet.

Collector Roads

These are through streets and may be either residential or commercial streets. In either case, the required width of right-of-way is sixty feet.

Arterial Streets

Eighty feet minimum right-of-way is required. More width is required if the improvements associated with the project are located in a wider zone than eighty feet.

See Section IV-C-1, which details required pavements widths within these rights-of-way according to road type.

2. Street Dedication Along Existing Roads

On existing streets, a strip of land shall be dedicated for transfer to the Town. This strip shall be of sufficient width to establish a new streetline 25', 30' or 40' from the center line of the existing street, as required based on the street classification. Easements may be required beyond the specified R/W strip for slope maintenance and other road maintenance activities.

This strip of land shall pass to the Town by deed. In the event that dedication of this land to the Town creates a hardship to the land from which the dedication is taken, the Director of Public Works or his designated agent may recommend varying the above requirements based on the particular facts of the case involved (existing structures, topography, special site features, etc.). In such case a specific recommendation will be made to the Planning and Zoning Commission that variance of the street dedication requirement should be given.

See Section VIII--Property Transfers and Easements.

3. Other Improvements

Where development is proposed along existing rights-of-way, improvements to affected streets may be required. This may include, but is not limited to:

a. dedication of right-of-way at dangerous curve locations for future Town improvements

b. necessary improvements to improve sight distance
c. all, or a portion of, the cost of required drainage improvements
d. widening of the traveled way to the minimum required width for traffic including any additional traffic generated by the development.

In all cases involving these types of improvements, consideration shall be given to the extent that the particular improvement benefits the property being developed. The developer will be responsible for the cost of required improvements which result from the property being developed.

Section V--Utilities

A. Sewer Systems

1. General Requirements

a. Minimum pipe size for service tie-ins shall be four inches.

Minimum pipe size for street laterals shall be eight inches.

b. Pipe material shall be vitreous clay, heavy-duty plastic, or cast iron conforming to the manufacturer's recommendations for strength for the proposed use and as approved by the Director of Public Works.

c. See standard details for bedding requirements, placement, required cover, etc.

d. Provision may be required for sufficient sewer line capacity to serve areas that can reasonably be served by Town sewers at a later date. This must be determined by review of plans with the Department of Public Works. The costs of this additional capacity shall be apportioned to the benefited properties under the Town's Sewer Assessments and Charges Ordinance.

e. Gravity flow sewers shall be designed according to the standards set forth in American Society of Civil Engineers Manual of Practice No. 37, as revised. Velocities in gravity sewers shall be designed to be between two and ten feet per second.

2. Tie-ins to existing Town Sewers

Service tie-ins to existing sewers are made through a routine sewer permit process, administered by the Department of Public Works. A permit fee of $50 is charged for each residential or commercial tie-in and $100 for each industrial tie-in. Tie-ins must be constructed according to these specifications and/or plans approved by the Director of Public Works. Tie-ins to existing Town sewers are administered under the provisions of

the Town's Sewer Use Ordinance, and are subject to a "benefit assessment" under the provisions of the Town's Sewer Assessment and Connection Charges Ordinance.

Tie-ins to existing Town Sewers are subject to a "benefit assessment" when changes of use, building size or other considerations are determined by the Water Pollution Control Authority to warrant such assessment.

3. Extensions of Town Sewer System

In the event that Town sewers are not available adjacent to the subject property and that the Town sewer system must be extended from another location to the property, approval of the Mansfield Water Pollution Control Authority is required.

Specific plans must be submitted for approval, together with agreements detailing conditions of work. Costs of construction of the portion of the extended system which will be owned by the Town must be fully bonded. Such sewer line extensions are subject to particular requirements of the Director of Public Works depending on the facts and circumstances of the situation.

Sewer extensions are administered under the provisions of the Town's Sewer Assessments and Charges Ordinance, as administered by the Water Pollution Control Authority.

4. Community Systems

Systems that serve more than one residential structure may be defined as a Community Sewer System. In cases where DEP review indicates the system is a Community Sewer System, an agreement must be made with the Town Water Pollution Control Authority under the requirements of Section 7-245 of the Connecticut General Statutes.

Specific plans must be supplied for approval of such systems showing all details and conforming to the requirements of these specifications and having the approval of the Director of Public Works.

B. Water Systems

In Mansfield, Municipal water supply is by the Willimantic Water Works over a large area in the southern portion of Town near Willimantic, and by the University of Connecticut over a smaller area around the University. Any installation of water service utilizing either of these systems must have the approval of the appropriate agencies as well as the approval of the Director of Public Works.

Pipes used for water mains shall be ductile iron, cement lined.

Water meter connections for systems consuming more than 25,000 feet of water per year must provide bypass capacity allowing for continuous service without interruption in the event of meter failure.

NOTE: A watermain carrying pressures over 100 psi runs from the Willimantic Water Works plant on Route 195 through the property of the Natchaug Hospital, along Conantville, Meadowbrook and Mansfield City Roads. This line is a 16" diameter Transite pipe requiring extreme caution when work must take place near it.

C. Phone and Electrical

When installed by the contractor rather than the utility providing service, all details of installation shall be approved by the utility company and installed according to their requirements as well as those of the Director of Public Works. See the standard details for residential and commercial streets herein for the suggested locations of all utilities within Town rights-of-ways.

D. Underground Services

Where located underground, utilities must be clearly and permanently marked.

E. Above Ground Services

Above ground utility poles shall be placed at least six feet from the pavement edge or as required by the Director of Public Works for traffic safety.

F. Natural Gas

HIGH PRESSURE LONG DISTANCE GAS TRANSMISSION LINES ARE LOCATED WITHIN MANSFIELD AND EXTREME CAUTION MUST BE EXERCISED IN THESE AREAS.

This line exists as an east-west conduit located centrally in Town (18"-24"-36" @ 500-750 psi). At the intersection of Maple Road and Route 275, a lower pressure line that still carries much higher pressure than normal street gas lines, carries gas to the University of Connecticut (90 psi).

If work is to take place near any of these lines, the Gas Company must be contacted and all of their requirements must be met.

G. Trench Backfill

Vibratory tamping of backfill is required unless otherwise approved by the Director of Public Works.

H. Call Before You Dig

The code number for Call-Before-You Dig must be supplied to the Public Works Department before starting any excavation project on town roads or rights-of-way.

The toll free telephone number for Call-Before-You-Dig is available at the Public Works Department offices.

Section VI - Drainage Requirements

Reference is hereby made to the "Drainage Manual," State of Connecticut State Department of Transportation, December 2000, as amended.

A. Basis of Design

Review and acceptance of the design of ALL DRAINAGE SYSTEMS AND STRUCTURES, including driveway culverts, is according to accepted methods such as the "Rational Method," the "Soil Conservation Method," USGS SR38 for large basins, TR55 or other standard and approved methods.

1. The following design storm periods are required:

Storm Period	Type of Structure
10 years	Small structure, no consequence of flooding to the structure itself, roads, or other buildings or structures of any kind
25 years	Moderate structure, incidental consequences of flooding, no hazard to other structures, buildings, or structures of any kind
100 years	Major structure, real consequences of failure to expensive
structures, roads,	and/or other structures of any kind

No pipe size shall be installed for storm drainage, or for any part of any Town drainage system, less than 12 inches in diameter.

2. Outfall Requirements

In all cases, discharges are to be directed to an appropriate outfall, such as:

a. a continuous flowing stream
b. developed bed on an intermittent stream
c. as otherwise approved by the Director of Public Works

Where such discharges will be accepted by the Town or contain water flowing from Town property, easements for flowage and maintenance rights must be presented. Where discharge is onto or in the proximity of another owner's land, rights must be acquired from that property owner. (See Section VIII - Property Transfers and Easements.)

Water from a proposed development may not be discharged onto land of another property owner or into an existing town drainage system which discharges onto land of another without obtaining drainage rights from that other party.

Within subdivisions, all incidental drainage discharges shall be covered by easements or rights to drain whenever discharge is to land of another, or of one of the proposed subdivision lots, or to other land of the subdivider.

3. Retention Systems

a. Leaching Basins

Leaching catch basins shall be designed on the basis of storing a storm with the appropriate recurrence period within the basin system without overflow. Wherever possible, leaching basins at the same elevation shall be connected at mid-height to provide uniform hydraulic loading.

Leaching basins shall be on Town property with sufficient adjacent property provided to permit maintenance of the structures and adequate separating distances from wells, septic systems and other underground facilities.

b. Retention Basins or Systems

Retention systems shall be based on a rigorous inflow/outflow/storage design that provides for retention of the appropriate design year storm. Such systems are not mandatory if:

1. It can be demonstrated that downstream impacts are negligible, or

2. Potentially damaged downstream structures are repaired or replaced to prevent damage due to increased runoff.

Consequences of failure of the retention system as well as consequences of downstream flooding damage shall be considered in determining the design storm recurrence period.

Section VII - Bonding and Acceptance of Work

(See also Section III- Inspections)

The amount of required bonds is determined by detailed cost estimates based on actual work measures to be undertaken. Such estimates are to be prepared according to standard engineering practice and are to include a percentage as determined by the Director of Public Works for contingency and the effects of inflation over the estimated period of the bonded project.

Bonds submitted for acceptance by the Town must be guaranteed by a bonding company registered with the State of Connecticut and acceptable to the Director of Public Works. Standard permit and performance bonds are to be submitted on a form provided by the Town. Larger bonds involving projects with conditions and requirements established during the Town's approval processes must be accompanied by an agreement in which all conditions and considerations of such approvals are set forth, and which agreement shall be signed by both the Town and the Applicant. This bonding agreement is generally attached to the submitted bond form and made a part thereto. Acceptance of all bonds is subject to approval of the Town Attorney.

Department of Public Works bond release recommendations are made to the Planning and Zoning Commission and the Town Council only on the basis of substantial and satisfactory performance of work. Bonds placed with the Town are a guarantee of completion of work and are held for that purpose. Bonds are not wholly or partially released except on the basis of satisfactory performance of work.

Recommendations to the Planning and Zoning Commission and Town Council for partial releases of bonding may be considered when there has been:

A. A substantial performance of work of a permanent and protected nature.

B. A combination of circumstances making it impossible for the developer to proceed. Examples: weather, supplier strikes, plant shut-downs. It is expected that any such reason for release would be based on considerations beyond the developer's control.

The Director of Public Works will only recommend release of a performance bond covering road construction and site improvements on the basis of a satisfactory final inspection.

Section VIII - Property Transfers and Easements

A. General Requirements

Deeds and easements coming to the Town for acceptance must include the following information:

1. A copy of the deed or easement document

2. Certificate of Title stating there are no encumbrances or stating what they are

3. If there are encumbrances:

   a. deed transfer--then a partial release of the mortgage on the portion of the property being transferred to the Town is required.

   b. easement transfer--then a subordination agreement whereby the holder of the encumbrance agrees to the transfer of the easement right to the Town is required.

4. The volume and page of the Land Records under which the current land owner acquired title to the property.

In general, street dedications for additional right-of-way along existing streets may be made by quit-claim deed. Property transfers for new roads or other property coming to the Town for recreational, open space, etc. must be made by warranty deed.

Sample documents for common transfers involving the Town are provided at the end of this section.

THE SPECIFIC REQUIREMENTS FOR ANY TRANSFER DEPEND ON THE FACTS AND CIRCUMSTANCES OF THAT TRANSFER AND ARE SUBJECT TO FURTHER REVIEW AND COMMENT FROM THE TOWN ATTORNEY. IN UNUSUAL CIRCUMSTANCES THE REQUIREMENTS FOR TOWN ACCEPTANCE MAY DIFFER FROM THE REQUIREMENTS LISTED IN THIS SECTION.

B. Street Dedication

This transfer may be made by quit-claim deed. This type of transfer occurs with most subdivisions which come before Planning and Zoning. The intent of this document is to transfer to the Town all right which the subdivider has in property lying between the new streetline established by the subdivision process at the front lot line of the newly created lots and the existing streetline. Since existing streetlines are frequently lost or poorly defined, it is not necessary to specifically describe the existing streetline in the proposed conveyance.

However, the newly established line is specifically known and must be described fully. The description must start at a point or make reference to a point which has meaning over and above the technical description of the shape of the property. (Example: Beginning at a point which point is the northeast corner of the land herein conveyed and the northwest corner of land now or formerly of Smith; thence. . . .) The use of this language makes it possible to re-establish the location of the streetline and the transferred property in the event that monuments become lost over the years. Specific reference must be made to the existing streetline wherever it may lie so that no question of ownership of a strip of land remaining with the subdivider exists.

C. Monumentation for Streetlines

Section 13a-41 of the Connecticut General Statutes provides that all beginnings and ends of curves and all changes of direction on all streetlines shall be monumented according to these requirements.

On any new road being dedicated to the Town all such points shall be monumented along the proposed road.

Acceptance of any street dedication bordering a subdivision requires monumentation and the approval of the:

1. Director of Public Works
2. Town Attorney
3. Town Manager

Acceptance of any new road requires monumentation and the approval of the:

1. Director of Public Works
2. Town Attorney
3. Town Manager
4. Town Council

D. New Roads, Recreation Areas, and Other Parcels Coming to the Town

These transfers must be made by warranty deed.

The description for these transfers should be detailed and have the following elements:

1. A starting point that has meaning over and above the technical description. (Example: The northeast corner of the herein described parcel and the northwest corner of land now or formerly of Smith.)

2. Abuttors should be noted for each course of the description.

3. Wherever applicable, the description must include physical features that make it possible to follow in the footsteps of the survey used to make the description as close as possible.

4. The area of the parcel being transferred should be stated.

E. Easements

General Requirements

1. Drainage easements

   a. Should be at least 20 feet wide

   b. Should continue to a proper discharge point

   c. Should provide for the entering of the property for maintenance purposes (See section on drainage for requirements for drainage discharge outlets).

2. Rights-to-drain

   Where the drainage right is indicated by a notation on the subdivision map and a general reference to a right being made in a deed or easement document, a 25 foot square area shall be shown at the point of discharge covered by the right-to-drain. The map and easement document shall bear the wording "right-to-drain and enter for maintenance purposes in favor of the Town of Mansfield." Flowage right should be indicated by arrow on the map from the 25 foot square easement area.

3. Other Easements

   Other easements for various purposes which must come to the Town for highway, recreational, conservation, and other miscellaneous uses are reviewed for specific requirements with the Town Attorney. Generally, specific mapping is required, and specific language is required in the body of the document for the easement so that no question of the right being transferred exists.

F. Documents for Property and Easement Transfers to the Town

Document Sections:

1. Certificate of Title
2. Agreement Regarding Priority
3. Permanent Easement

The following are guidelines for assistance in preparing necessary documents when transfers of land or easements on land are coming to the Town.

Document:

1. Certificate of Title

   This certificate is a requirement for all interests in real property to be conveyed to the Town. This is a legal document and must be prepared by your attorney.

2. Agreement Regarding Priority

   a. this document is a requirement before maps are signed for recording where documents are held for later recording with phased subdivisions or subdivisions with bonded but incomplete public improvements.

   b. this document preserves the validity of deeds and easements signed and given to the Town for later phases of work before they are completed and the documents accepted by the Town. Without this Agreement, subsequent mortgaging or other encumbrances which are necessary during construction invalidate deeds and easements not yet recorded.

   c. a Certificate of Title from your attorney is required at the time of submission of this document to the Town.

d. sample document:

AGREEMENT REGARDING PRIORITY

_____ of _____, owner of premises in a deed dated _____ and recorded in Volume _____, Page _____ of the Mansfield Land Records, hereby agrees that the Town of Mansfield, regarding the following specific prospective rights to property:

A. _____
B. _____
C. _____
D. _____

to be conveyed to it in connection with the approval process for _____ subdivision, which subdivision and rights are more particularly described and shown on a map entitled "_____ _____", shall have a prior right to said rights notwithstanding any encumbrances hereafter recorded.

Dated at Mansfield, Connecticut this _____ day of _____, 20__.

Witnessed by: signed:

_____ _____

_____ _____
date

STATE OF CONNECTICUT }
} ss. Mansfield
COUNTY OF TOLLAND }

Personally appeared, _____, Signer of the foregoing Instrument, and acknowledged the same to be _____ free act and deed, before me.

_____

3. Permanent Easement

   a. a Certificate of Title from your attorney is required.

   b. for the description, the preference is for a general easement description in the document with specific reference to the easement map.

   c. easements for different purposes will vary, Public Works Department requirements for street drainage easements generally are:

      For minor drainage easements along a road:

      1. a defined 25 foot square outlet easement area,

      2. with rights of access for maintenance purposes,

      3. an obligation for the Town to leave the area in good condition after any work is done,

      4. a specific "right to drain" indicated on the map with an arrow showing water flow continuing onto other property of the Grantor. A map note should indicate a "right to drain in favor of the Town of Mansfield".

      For larger street related easements containing piped drainage or other systems:

      1. width of easement sufficient to allow easy access with construction equipment for maintenance, generally 20 foot width is the minimum but, more may be required depending on land configuration.

      2. the easement length should provide for carrying water to an appropriate discharge point in stream of sufficient size to accommodate the discharge designed alternatives - swales, retention, detention should be reviewed on a case by case basis with the Public Works Department.

      3. a specific "right to drain" indicated on the map with an arrow showing water flow from the easement continuing onto other property of the Grantor. A map note should indicate a "right to drain in favor of the Town of Mansfield".

Section IX--Highway Permits

A. Introduction

Under Town Ordinance and the Regulations adopted pursuant to this Ordinance all work on Town Roads and rights-of-way is administered under a Town Road Permit process. The following types of operations within the limits of Town Highways and rights-of-way require a written application for permit issuance by the Public Works Department, before any work can be performed:

1. Construction, repair, maintenance, and installation of sewers, drains, water mains, gas mains, telephone and electrical conduits and any service connections made to such facilities, driveways, temporary access roads, pavement extensions, manholes, drainage inlets, catch basins, fire hydrants, sidewalks, curbs, steps, retaining walls or fences.

2. The temporary storage of equipment or construction materials connected with any operation on or off Town roads or rights-of-way, when such storage is to occur within Town roads or rights-of-way.

3. The erection, maintenance, and replacement of utility poles, wires, guy anchors, cables and any other overhead structures.

4. Any other operations, other than Town contracted projects, which may cause abnormal wear to or deface or damage existing structures, pavement (including edges), curbs, sidewalks, drainage facilities or any part of the roadway system.

The issuance of a permit to an applicant to perform any of the above operations does not relieve the applicant in any way from complying with rules, regulations, laws and acts of other State, Federal, or Local agencies or departments.

B. General requirements for highway permits allowing work on Town Roads are as follows:

1. The minimum bond amount is $2,000. All permit bonds shall be submitted on forms supplied by the Town, which form includes satisfactory completion as the condition of release and which form provides for a 12-month period during which the work is guaranteed against defects of workmanship. Acceptance of all bonds requires guarantee by a company registered with the State of Connecticut and approved by the Director of Public Works.

2. A certificate of insurance must be supplied demonstrating that the Contractor carries general liability coverage in the minimum amounts of $300,000 for bodily injury and $600,000 limit for bodily injury and $100,000 for property damage.

These amounts may be increased for larger jobs where consequences of accident are greater.

3. A permit form obtained from the Director of Public Works must be approved, paid for and signed before work begins.

4. Release of bond is conditional upon satisfactory completion of work. (See Section VII--Bonding and Acceptance of Work)

5. All work within Town rights-of-way and on Town roads shall be guaranteed against defects of workmanship for a period of 12 months after completion of permanent repairs.

C. Application for Permit

An application for a permit accompanied by the appropriate application fee must be filed with the Director of Public Works or his representative before preliminary investigation will be made for permit issue. Standard application forms for this permit are available at the Public Works Department. Each application must be completely filled in and signed.

The application shall include a complete explanation of the nature of the work proposed including sketches or plans and an attached letter with a description of the work and specifications for the materials to be used. Such sketches or plans shall show the location of the work to be done in relation to the outstanding features of the road such as property lines, intersections, pavement lines, trees, drainage structures and utility poles by number.

Any unusual or complex project will require plans and specifications prepared by a Connecticut licensed Professional Engineer that completely set forth the nature and extent of the facility to be constructed and the nature of the construction operation to be undertaken. When applications are made for permits involving work of major scope, complete plans and specifications must be submitted in duplicate with the application form. These plans and specifications must be so detailed as to define the exact location of the various parts of the work so that the risk of injury to road users and the probability of damage to trees, highway structures, and adjacent private properties can be ascertained.

When it appears that the work called for in an application would cause substantial or needless damage to a highway or create excessive disturbances to traffic or exceptionally dangerous conditions not commensurate with the benefits of the project applied for, the request for the permit will be denied. The applicant will be informed of such rejection by letter which will state the reasons for the rejection.

The Director of Public Works or his designated agent may refuse to issue a permit to any person, company or utility when, in their opinion, work performed under a permit already issued to the applicant has not been properly executed or when said applicant has failed to

reimburse the Town for recoverable damages billed under terms governing the previous permit.

D. Bonding and Insurance

Prior to the issuance of a permit, the applicant shall deposit with the Town a Surety Bond in an amount and on forms supplied by the Public Works Department. The amount of surety shall be determined separately for each bond, but shall not be less than $2,000. The amount of the bond will be established to protect against loss in the event of failure of the permit holder to complete the work or make required repairs or restoration of damages involving the work or encroachment authorized by the permit. The amount of the bond shall be computed on the basis of the cost required to make proper restorations or repairs. Upon receipt of an application for a permit, the Director of Public Works or his designated agent shall advise the applicant as to the amount of bond required. An annual blanket surety bond, acceptable to the Finance Director of the Town of Mansfield and the Director of Public Works, may be deposited to avoid the inconvenience and expense of obtaining individual bonds for each permit requested.

In addition to the requirement of posting a surety bond, each applicant must show proof of coverage for liability by supplying an insurance certificate stating the amounts and kinds of coverage carried by the applicant. Required coverage and minimum limits of coverage are:

General Liability--bodily injury $300,000 with a $600,000 for each event
Property damage--$100,000

These limits may be increased for larger jobs involving greater liability potential. (See also Section VII--Bonding and Acceptance of Work)

E. Responsibility for Boundary Lines

While the Town can supply right-of-way information for most Town roads, it is the applicant's responsibility to determine property lines either by retaining a registered land surveyor or otherwise informing themselves of the demarcation between public lands and private holdings, and of the limits between adjacent properties.

F. Completion of Work and Temporary Repairs

Work must be finished in a timely fashion considering the relationship of the work covered by the highway permit to the applicant's total project schedule.

1. When so notified by the Director of Public Works or his designated agent, the applicant must make temporary repairs that will protect against damage to other Town facilities and provide for the safe conveyance of traffic on the road.

2. When permanent repairs have not been made and are required, the applicant shall be so notified by the Director of Public Works, with the time period stated within which permanent or temporary repairs must be made. If the applicant does not make these repairs, the Director of Public Works may cause such repairs to be made either with Town Public Works Department crews or by private contractor. In this event, the applicant will be liable for the cost of such repairs and no bond release will be made and no new permits issued to the applicant until such costs are reimbursed to the Town according to detailed costs presented to the applicant for payment.

3. In the case of both temporary and permanent repairs that have been ordered by the Director of Public Works, the time period within which such repairs are ordered to be made by the applicant before the Town makes repairs at the applicant's expense will be determined by the nature of the hazard to the motoring public and the consequences of delay of such repairs.

G. Bond Release

Final inspection of work performed under the permit will be made by the Director of Public Works or his representative. The purpose of such inspection is to ascertain whether the work has been performed in accordance with the terms of the Town. In any case, before the work will be accepted and the bond released, all improvements must be placed in as good condition as, or better than, before the work was started.

At the time the permanent repair operation commences, if applicable, the Department of Public Works will investigate whether any Town funds were expended in connection with said permit. The Department of Public Works will then send notice to the Finance Director that bond may be released providing no Town funds were expended. If charges are to be made, they shall include the direct cost of material, labor, equipment plus a percentage for insurance and overhead. Surety will be released twelve months from the date of completion of the work covered under the application, at the end of the twelve month period of guarantee of workmanship.

H. Drainage

(See Section VI--Drainage Requirements)

All routing of drainage systems to Town drainage systems existing in the street must meet general drainage requirements and require review and approval under this section of the Department of Public Works Specifications.

All tie-ins of underdrains, cellar drains, directing of surface water to the road, etc. require permit approval before construction.

I. Responsibility for Replacement of Improvements within the Limits of the Town Right-of-way of Public Property

The applicant, at his own expense, shall replace all improvements in as good a condition as before the work was started and shall repair any damage caused by his activities under permit. The replacement of any damaged or removed property monuments shall be done by a surveyor registered for such work in the State of Connecticut.

J. Jurisdiction of Town Highways

The granting of permits to install public utility and other structures does not diminish or waive the jurisdiction of the Director of Public Works or his designated agent of the Town rights-of-way. If at any time, it becomes necessary in the opinion of the Director of Public Works or his designated agent to remove or relocate any of the structures or fixtures installed under a permit, said removal or relocation, upon notification by the Director or his agent, shall be made immediately by the owners thereof, the cost of which shall be borne entirely by the owner.

K. Quality of Construction and Repair Work

Construction repair and maintenance work done by a Permittee shall be of the highest grade and materials used shall be of the best quality for each class of work performed. All work shall conform to the specifications of the Town and to recognized standards of construction repair and maintenance.

L. Safety to Traffic

It shall be the duty of the Permittee to make certain that the security of the traveling public is safeguarded and its rights are not unreasonably curtailed. Unless specifically indicated in the permit or authorized by the inspector, the traveled path of Town roads shall not be obstructed. The portions of the highway which are torn up or which are used for storing materials, or are otherwise unsafe for public travel, shall be adequately protected at all times to avoid the possibility of accidents. Such areas shall be marked at night by flares, lanterns, lights, flasher beacons or other warning devices approved by the inspector. When portions of the traveled way are made dangerous for the movement of vehicles or pedestrians, a sufficient number of uniformed police officers, flagmen or trafficmen shall be employed by the Permittee to direct the traffic safely through the areas. The work shall, if possible, be planned to avoid such conditions.

M. Construction Requirements

1. Temporary Bypass

When, in the opinion of the Director of Public Works, a Town highway may be

obstructed by the permit applicants proposed operations to such an extent as to unduly restrict vehicular traffic or make hazardous its use, a parallel Town road bypass may be designated. All expense incurred by the Permittee as a result of this bypass establishment, use and restoration of said detour shall be the entire responsibility of the Permittee. The Permittee shall notify the Town Police and Fire Department and the Board of Education of the layout and expected time of the use of the detour. The Permittee shall supply and maintain such signs at his expense as may be necessary to clearly outline the detour.

Preliminary to detouring of traffic over a road bypass, an inspection shall be made by the Permittee and a representative of the Town to determine the adequacy of the signs and the structural condition of the road involved. A second inspection shall be made by the same persons when the detour is terminated so that there will be an agreement as to the extent of repairs, if any, to be made by the Permittee to restore the conditions equal to those existing prior to the establishment of the detour.

2. Drainage Systems to be Kept Open

The work performed under permit shall be planned and carried out so that drainage systems of the highway are effective at all times. Any damage arising from the failure of the Permittee to properly keep culverts, ditches, inlets, catch basins or any other drainage device from becoming obstructed must be borne by him and the bond shall be held by the Town until such damages are paid.

3. Excavations

The size of the excavation shall be kept as small as practical to carry on the work. No material removed in excavating shall be placed in the traveled path of a Town road unless approved by the Director of Public Works or his agent. In any case, the material shall be placed so as to interfere as little as possible with the ordinary use of the roadway.

4. Slides and Cave-ins

If the pavement shoulder or sidewalk along the sides of the trench or excavation becomes undermined due to slides and cave-ins of the sides of the excavations, the Permittee or his contractor shall remove the pavement, sidewalk or other improvements over the cave-in and shall take immediate remedial measures to prevent further deterioration of the highway or its appurtenances. The Permittee shall temporarily replace the entire amount of the pavement or sidewalk destroyed by such slides and cave-ins.

5. Blasting

When rock or other hard material must be removed by a Permittee he may blast such

material if the pavement or other structures will not be endangered thereby. The Permittee shall exercise extreme care in blasting operations in order to prevent injury to persons and property.

The contractor shall secure all necessary permits from the Town Fire Marshal and observe all local and state ordinances relating to transportation, storage and handling of explosives. When blasting is to take place near adjacent structures or services, the same shall be carefully protected against damage. The explosives must be of such number and size of charge and be so placed so as not to cause an unduly large excavation or unnecessarily shatter rock adjacent to the excavation. All rock loosened or shattered in the sides of the excavation shall be completely removed by wedging or other approved means.

6. Jacking or Boring

Pipes and conduits shall generally be placed by the open cut method. In individual cases where there is deep installation and heavy traffic or other special circumstances, the Director of Public Works may allow or require that the installation shall be made by jacking or boring when such method is of definite benefit to the traveling public. No jetting or other use of water shall be allowed in connection with jacking or boring. The Permittee shall be responsible for careful investigation of the location of all existing utility, municipal and privately owned pipe or conduit lines. The Permittee may be required to submit plan and profile showing all such lines and detailed plan showing method of operation.

7. Excavations in Grass Areas

Excavations in grass areas shall be backfilled and compacted in accordance with Section IV of these Specifications.

8. Location of Poles and Guys

Whenever existing pole lines, guys, braces or anchors are to be relocated or new poles, guys, braces or anchors set, the proposed location shall be designated by stakes placed at the site. The location of all poles, guys, braces, or anchors shall be approved by the Town.

9. Backfilling

Backfilling of excavations in Town highways shall be performed so that the least possible settling will occur. The acceptability of excavated material to be used in the backfill shall be determined solely by the Director of Public Works or his agent. The excavation shall be backfilled in accordance with these Specifications.

N. Temporary Repair Procedures

1. Road Cuts

As soon as the excavations have been backfilled and tamped, the pavement shall be replaced temporarily by the Permittee. The temporary pavement shall consist of hot laid bituminous concrete, when available at local batch plants, and placed in accordance with these Specifications.

The surface of the temporary pavement shall be reasonably smooth and the Permittee shall be responsible for its maintenance until the permanent surface can be replaced. No work is to be left open to traffic without temporary paving unless approved by the Director of Public Works.

Prior to the placement of the permanent road surface, if the temporary surface has settled one half inch or more, the Permittee shall remove the temporary road surface and reinstall a new temporary patch using compaction prior to placement of paving. If settlement does occur and is less than one half inch, the Permittee may be required to make other repairs as directed by the Director of Public Works.

2. Sidewalk

The Permittee shall temporarily repair all damaged or removed sidewalk in accordance with these Specifications. The Permittee will be responsible for maintenance of temporarily repaired sidewalk.

3. Curbing

The Permittee will permanently repair all damaged or removed curbing upon completion of required work. In the event weather does not allow permanent repairs to curbing, the Permittee will temporarily repair the curbing and make permanent repairs at the earliest possible date.

If, in any case, the Permittee does not maintain the temporary repairs adequately, the Town will make the necessary repairs to prevent accidents and the Permittee will be charged by the Town for this work.

O. Materials and Workmanship

Materials used by a Permittee in connection with the installation or repair of structures and fixtures in the highway right-of-way and those used in the repair and replacement of highway surfaces, structures and road sides shall be equal in every respect to materials specified in the latest edition of these standard Specifications.

P. Permanent Pavement Repairs

In all areas where pavement must be patched or repaired, the following procedures shall be used:

1. Temporary pavement shall be used for all pavement repairs unless specifically excepted by the Director of Public Works (see Section N above).

2. Edges of pavement shall be sawcut to a straight line a minimum of 12" beyond the edge of excavation, and a minimum of 12" beyond areas where undermining of the existing pavement has occurred.

3. In the area of excavation, a full road section in conformance with Section IV-A-6 of these specifications shall be constructed. The maximum lift thickness for compaction shall be 12".

4. All temporary paving and material is to be removed to a depth to the existing pavement thickness, (3" minimum) including pavement that is cutback.

5. The surface shall be graded accurately and recompacted immediately prior to patch paving.

6. Minimum paving thickness shall be two 1 1/2" compacted courses of Class II bituminous concrete. A proper application of tack coat shall be utilized at each lift and on top of the seam between the existing and new pavement. Sand or stone dust shall be applied to the top seam immediately after coating to allow traffic to pass without tracking the tack coat.

7.

   A. For longitudinal trenching, if the 12" cutback line is within 18" of the edge of the existing road pavement, the entire section of pavement (from the 12" cutback line closest to the centerline of the road to the existing edge of pavement) shall be removed and replaced according to the above specifications.

   B. Prior to removing the pavement in a. above, the contractor shall record or otherwise mark the existing edge of the pavement in order to accurately reproduce the previous edge of pavement.

Q. Driveways

As specified above, the construction of the end of a driveway which connects to the pavement of the Town road within the Town right-of-way requires a permit. Specific requirements for the construction of the driveway on the Town right-of-way are listed below. Although portions of driveway located off the Town right-of-way on private

property do not require a permit under these Specifications, other permits may be required from the Planning and Zoning Commission or the Inland Wetland Agency.

1. Specific Conditions

   a. The minimum bond for all driveway permits is $2,000. A signed permit form, application fee and bond (on standard form supplied by the Town) shall be provided.

   b. An insurance certificate stating coverage and amounts of coverage shall be supplied.

   c. Plans for driveways must be reviewed with the Department of Public Works before construction to insure compliance with these specifications.

   d. Bonds are released after satisfactory completion of a 12-month maintenance period after the completion of work.

2. The approval of a permit application for driveway construction shall be contingent on the following conditions:

   a. The driveway shall be constructed in accordance with standard details for driveway openings and these standard Specifications with such changes as may be necessary to fit a particular condition.

   b. Existing driveway openings fronting the property and which will not be in use shall be closed.

   c. Driveways shall not have a greater width than forty feet (40') not including splays. Driveways leading to commercial establishments shall also have the approval of the Traffic Authority of the Town of Mansfield.

   d. The driveway within the limits of the Town right-of-way shall be graded as noted in Section IX.Q.4. The elevation of the driveway at the street line and in relation to the street, shall be noted on the permit application by the Director of Public Works.

   e. Drainage ditches or gutters shall not be altered or impeded in any way and where a driveway shall cross an open ditch, the applicant shall provide suitable drainage structures as determined by the Town Engineer.

   f. The existing road edge shall be restored to a finished condition satisfactory to the Director of Public Works or his designated agent.

   g. On all improved roads, a paved apron 10 feet back from the road edge for the full

width of the driveway is to be provided. On unimproved roads no paved apron is required.

h. The paved apron is to meet the existing pavement at an elevation no higher than the existing pavement so that a snow plow blade will pass without catching the edge of the driveway.

i. Driveways are to be located so that sight distance is acceptable to the Director of Public Works. Specific restrictions on driveway locations may be required due to restricted sight distance.

j. Minimum pipe size under driveways on Town rights-of-way is 12 inches. Pipe may be of reinforced concrete or asphalt coated corrugated metal pipe. Pipes must be placed far enough from the edge of the roadway that no dangerous roadside condition is created.

(See Section VI--Drainage Requirements for Criteria for Drive Culverts)

k. For lots lower than the roadway, a raised berm at the end of the driveway 4" higher than the road edges must be provided to keep water from flowing onto the lot from the road.

l. Under unusual circumstances as decided by the Town Engineer, the above regulations may be varied.

m. Intersection angle of the drive to the street shall be no less than 65 degrees between the center line of the road tangent and the drive center line tangent measured at a point 20 feet from the road's edge.

n. Maximum driveway slope is 15% unless otherwise approved by the Director of Public Works.

3. Required Residential Driveway Layout

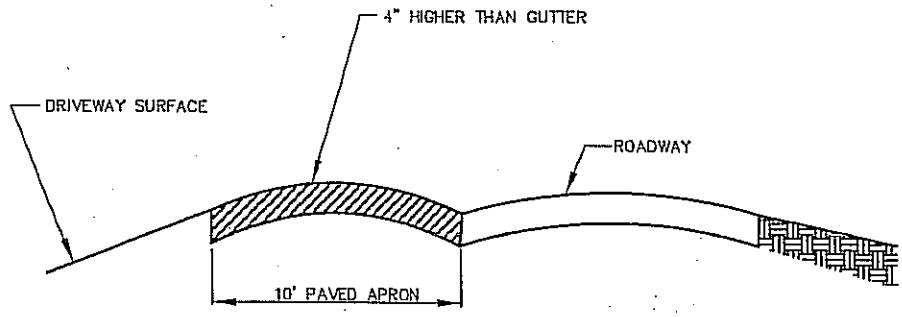
The three requirements are as follows:

a. Water must pass the drive without running into street or onto lot.

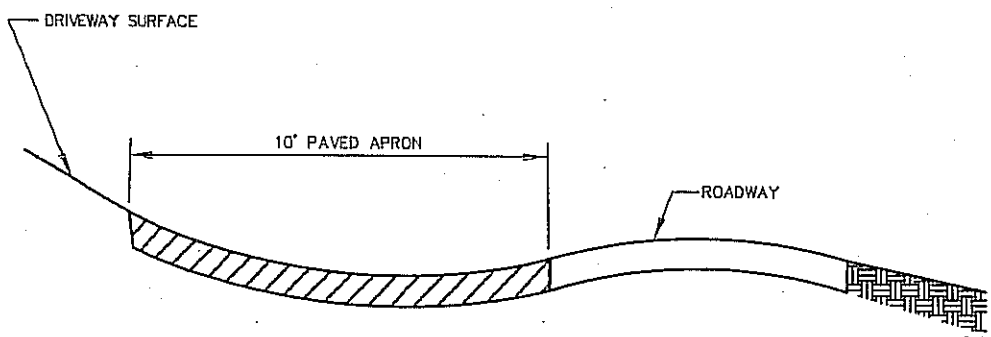
b. Paved apron may not extend into traveled way. A snow plow blade must be able to pass the drive without catching.

c. Paved apron is required for the full width of the driveway for a distance of ten feet back from the pavement edge.

4. Driveway Profiles--Drainage Requirements for drive lower than the roadway:



For drive leading to lot higher than roadway:



When a pipe is to be placed under the drive, sag may not be necessary provided:

a. Edges of drive and gutter are graded so that water will pass the drive without entering the street.

b. Approval of the Director of Public Works is obtained.

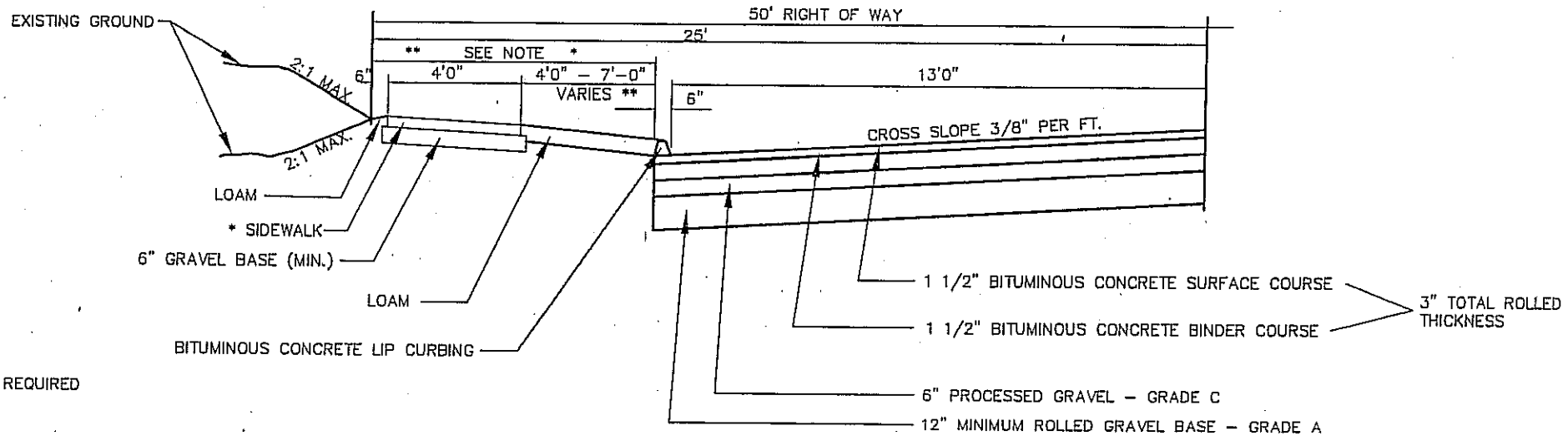
R. Release of Driveway Bonds

The conditions for release of a driveway bond are the same as those outlined in Section VII--Bonding and Acceptance of Work.

Bonds are only released when drives are completed in conformance with the requirements of these regulations and Department Specifications.

When a driveway permit holder has failed to complete a driveway according to permit requirements and the requirements of these Specifications, after receiving written notice from the Director of Public Works or his designated agent specifying the time within which repairs must be made, the bond held for that permit will not be transferred to any other job and a new bond must be supplied for any subsequent permits. Upon failure of the applicant to complete permit improvements when so notified, the Director of Public Works may have the work completed at Town expense, either by Town forces or by private contractor, and the cost of such repairs will be billed to the applicant. Payment for such repairs must be made to the Town by the applicant before the bond held for the permit will be released.

Driveway bonds are released upon satisfactory completion of a 12-month maintenance period after completion of all work on the driveway after the certificate of occupancy is issued by the Building Department. The applicant must notify the Public Works Department when release is desired so that final inspection may be scheduled.



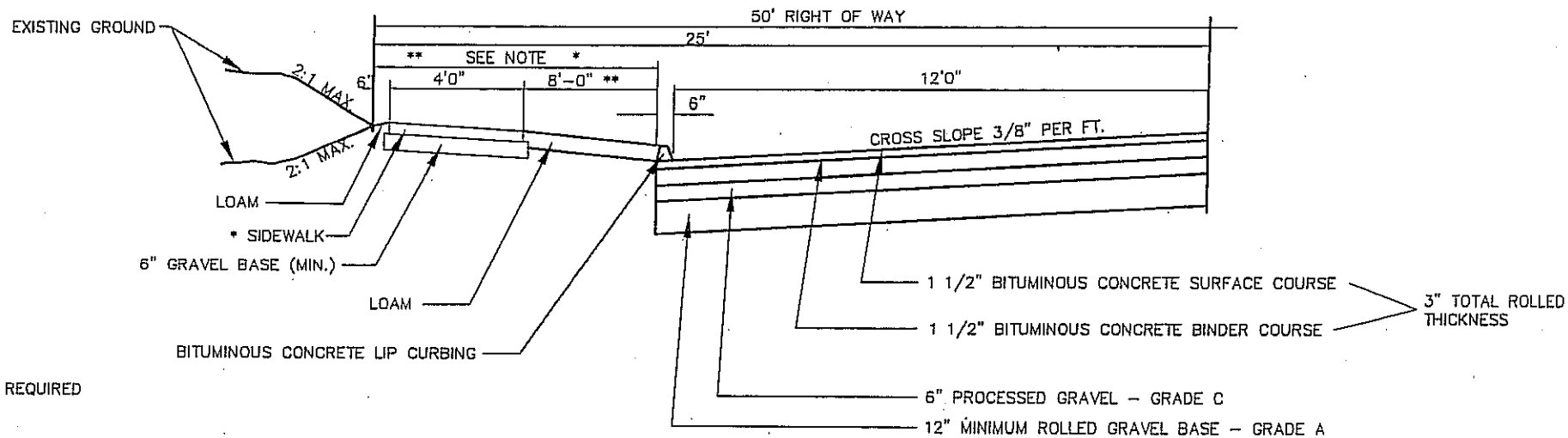
* – WHERE REQUIRED

NOTE:

NATURAL GROUND COVER & TOPOGRAPHY SHALL BE PRESERVED WHERE POSSIBLE

** IN ALL CASES A 3' SNOW SHELF SHALL BE PROVIDED

HALF SECTION
RESIDENTIAL STREET SECTION
THROUGH STREET
N.T.S.



* – WHERE REQUIRED

NOTE:
NATURAL GROUND COVER & TOPOGRAPHY SHALL BE PRESERVED WHERE POSSIBLE

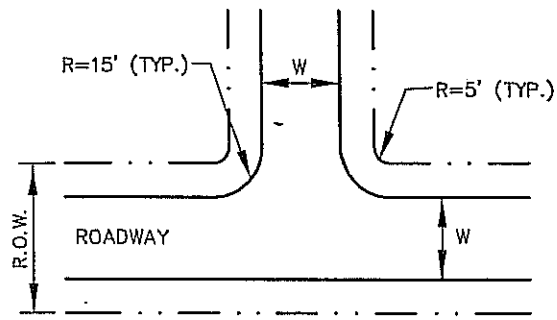
** IN ALL CASES A 3' SNOW SHELF SHALL BE PROVIDED

HALF SECTION
RESIDENTIAL STREET SECTION
DEAD END
N.T.S.

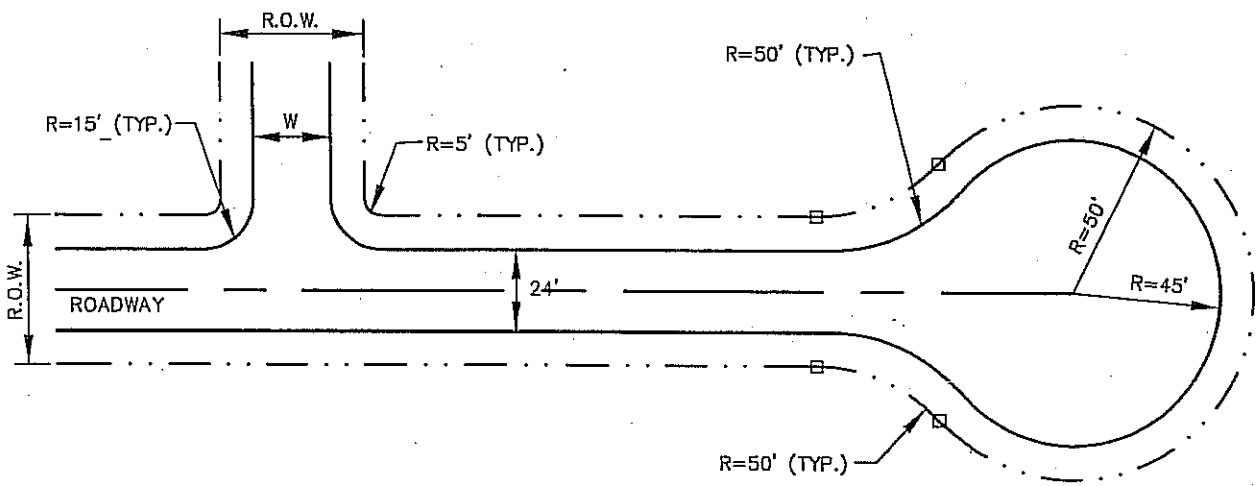
NOTE:
R.O.W. = 50' LOCAL
R.O.W. = 60' COLLECTOR
W = 24' RESIDENTIAL DEADEND
W = 26' RESIDENTIAL THROUGH STREET
W = 32' COMMERCIAL STREET

CENTERLINES OF TRAVELLED WAY SHALL MEET AT 90° UNLESS OTHERWISE APPROVED BT DIRECTOR OF PUBLIC WORKS

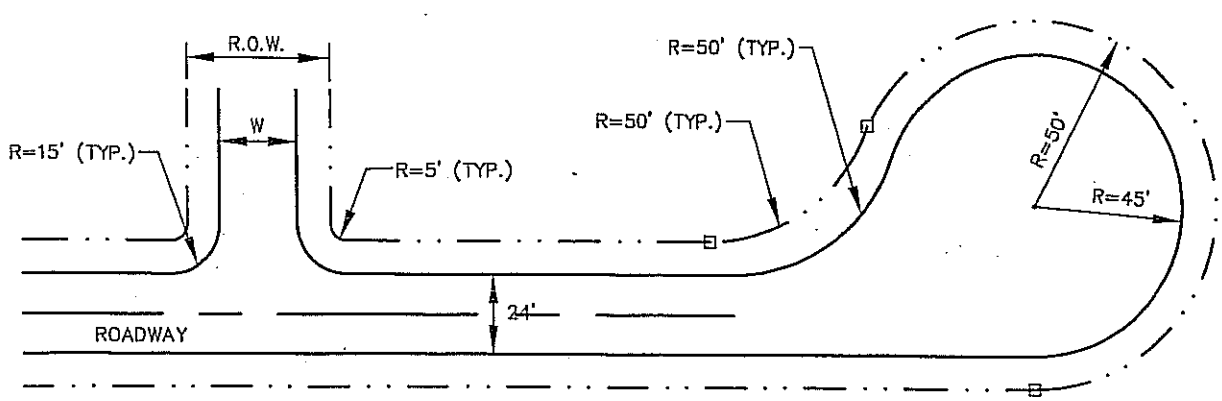
INTERSECTION GEOMETRY

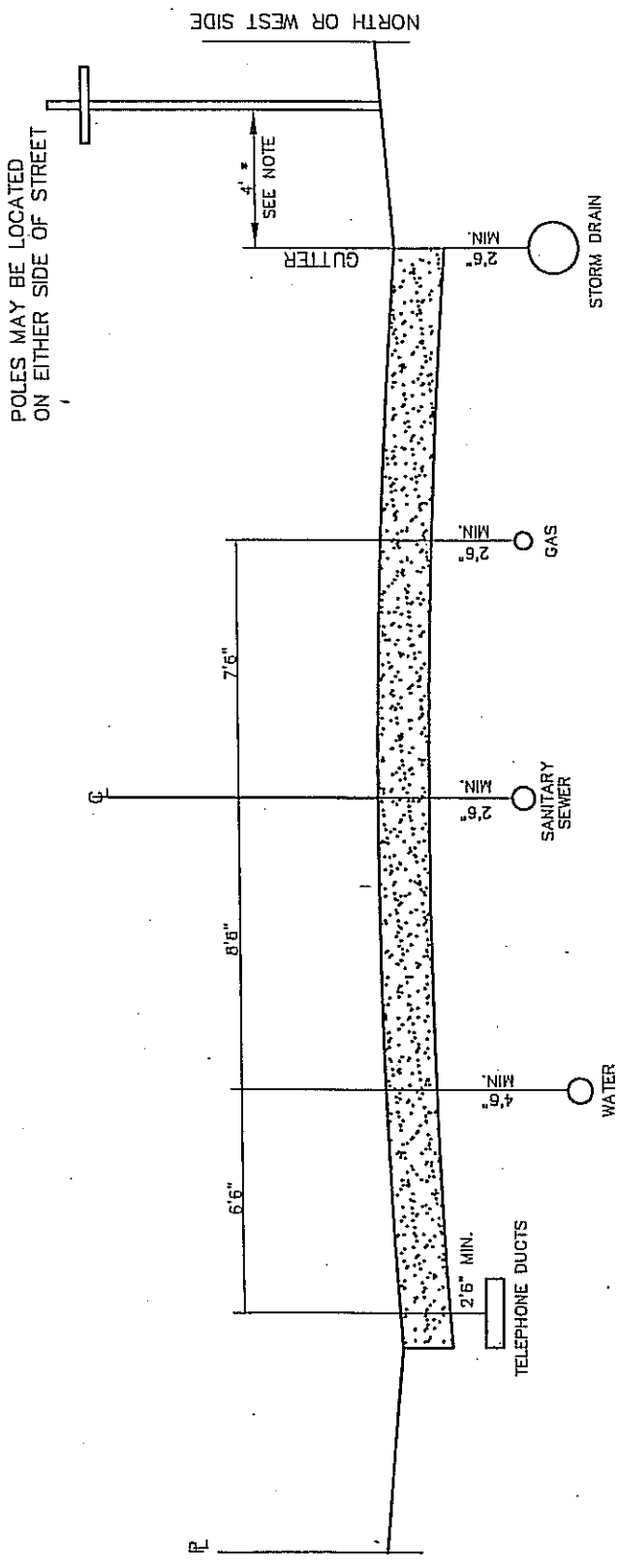


CUL-DE-SAC GEOMETRY
PREFERRED



OR IF TOPOGRAPHY DOES NOT PERMIT THE ABOVE LAYOUT



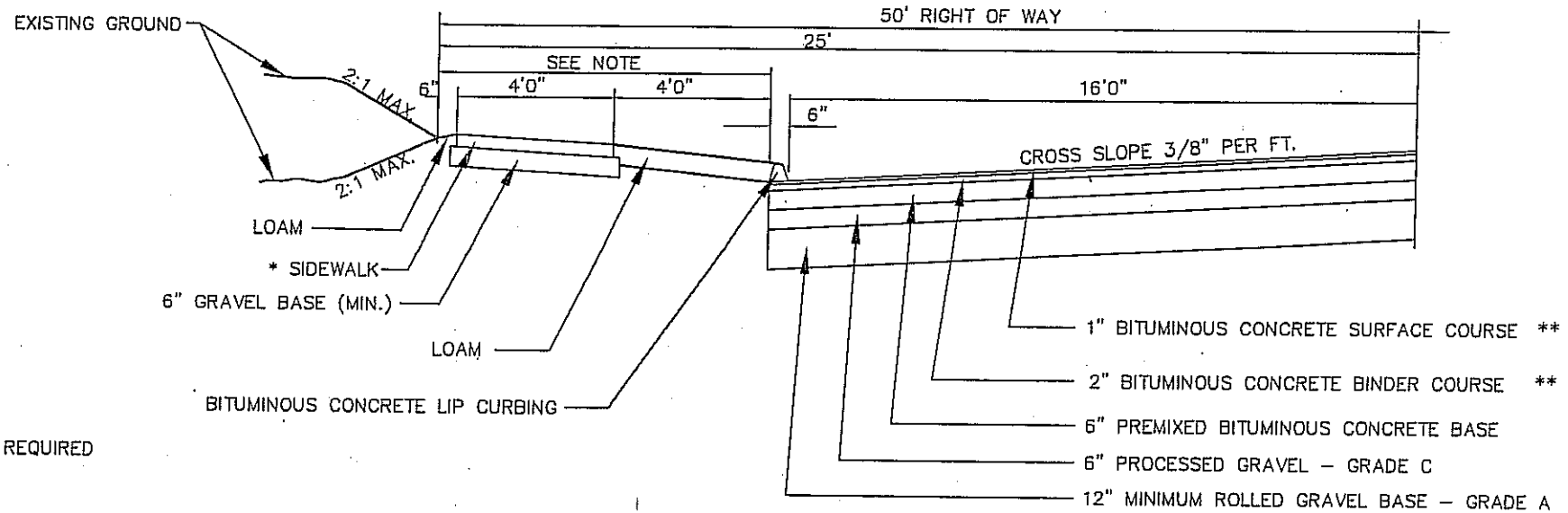


NOTE:
THESE UTILITY LOCATIONS SHALL BE FOLLOWED WHENEVER POSSIBLE

* 1' FOR COLLECTOR STREET WITH 60' R. O. W.

TYPICAL SECTION UTILITY LOCATION

N.T.S.

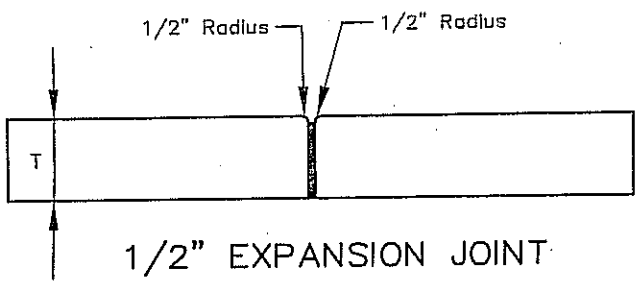


* – WHERE REQUIRED

NOTE:
NATURAL GROUND COVER
& TOPOGRAPHY SHALL BE
PRESERVED WHERE POSSIBLE

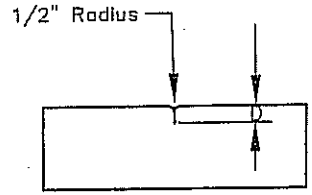
** ALTERNATE:
2" BITUMINOUS CONCRETE SURFACE COURSE
1" SURFACE PENETRATION – 60 DAY CURE

HALF SECTION
COMMERICAL STREET SECTION
N.T.S.



1/2" EXPANSION JOINT

T = 5" FOR SIDEWALK
T = 8" FOR DRIVEWAY RAMP
T = 20" FOR CURB



DUMMY JOINT

D = 1 1/4" FOR SIDEWALK
D = 2" FOR DRIVEWAY RAMP

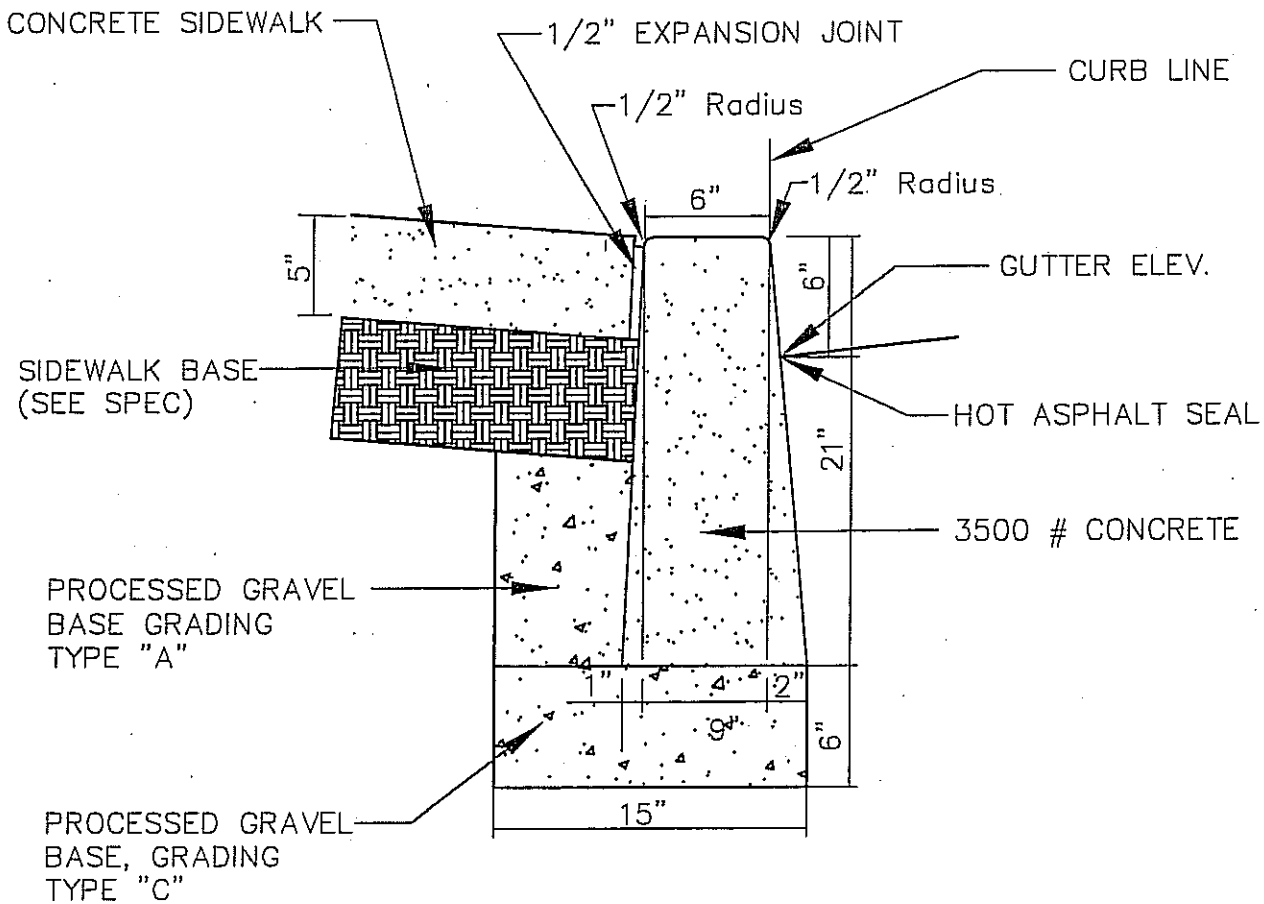
JOINT DETAILS FOR CONCRETE CURBS, SIDEWALKS, AND DRIVEWAY RAMPS

N.T.S.

TRANSVERSE EXPANSION JOINTS are to be set in all concrete curbs and concrete sidewalks at 16' intervals, between a concrete driveway ramp and abutting concrete curb or concrete sidewalk, and in any location deemed necessary by the Town Engineer or the Superintendent of Public Works.

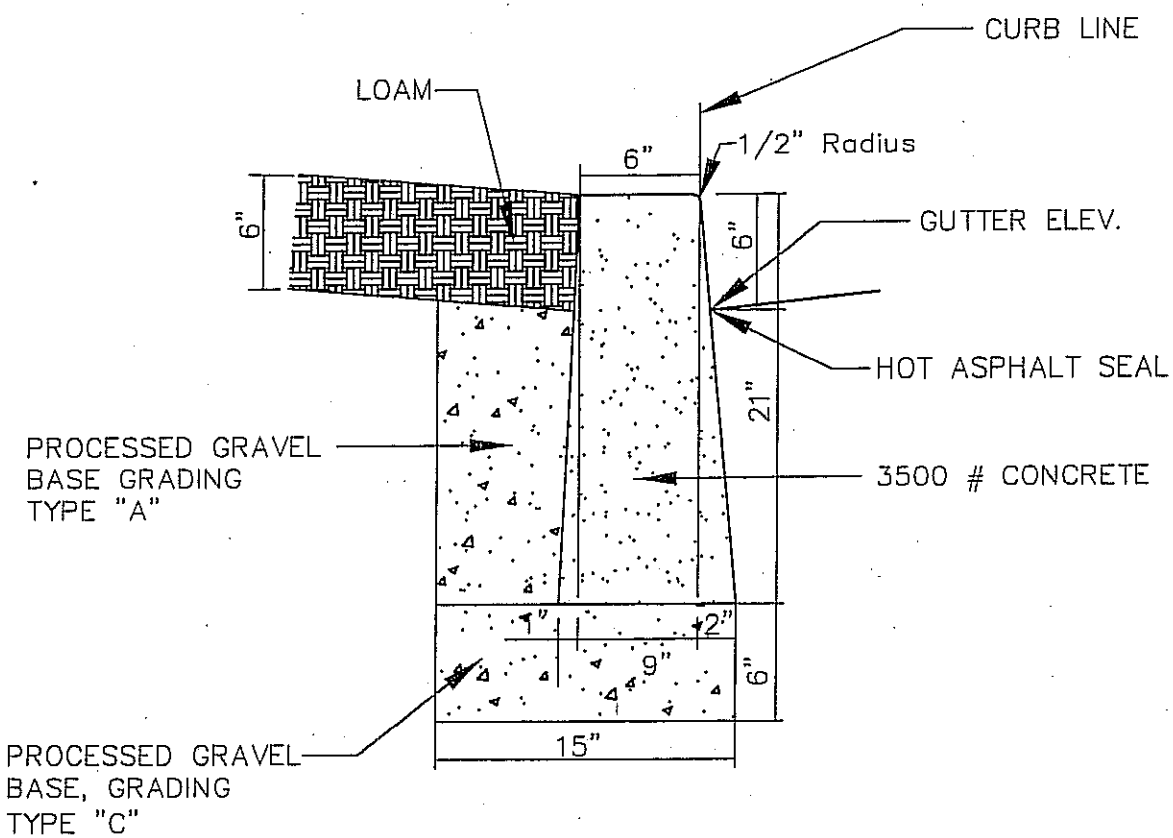
TRANSVERSE DUMMY JOINTS for all sections of concrete sidewalk and concrete driveway ramps, are to be evenly spaced at an interval which best approximates 4' on center.

LONGITUDINAL EXPANSION JOINTS are to be set between all abutting concrete curbs and concrete sidewalks, on street line if a private concrete sidewalk, concrete driveway ramp or wall abutts, and in any location deemed necessary by the Town Engineer of the Superintendent of Public Works.



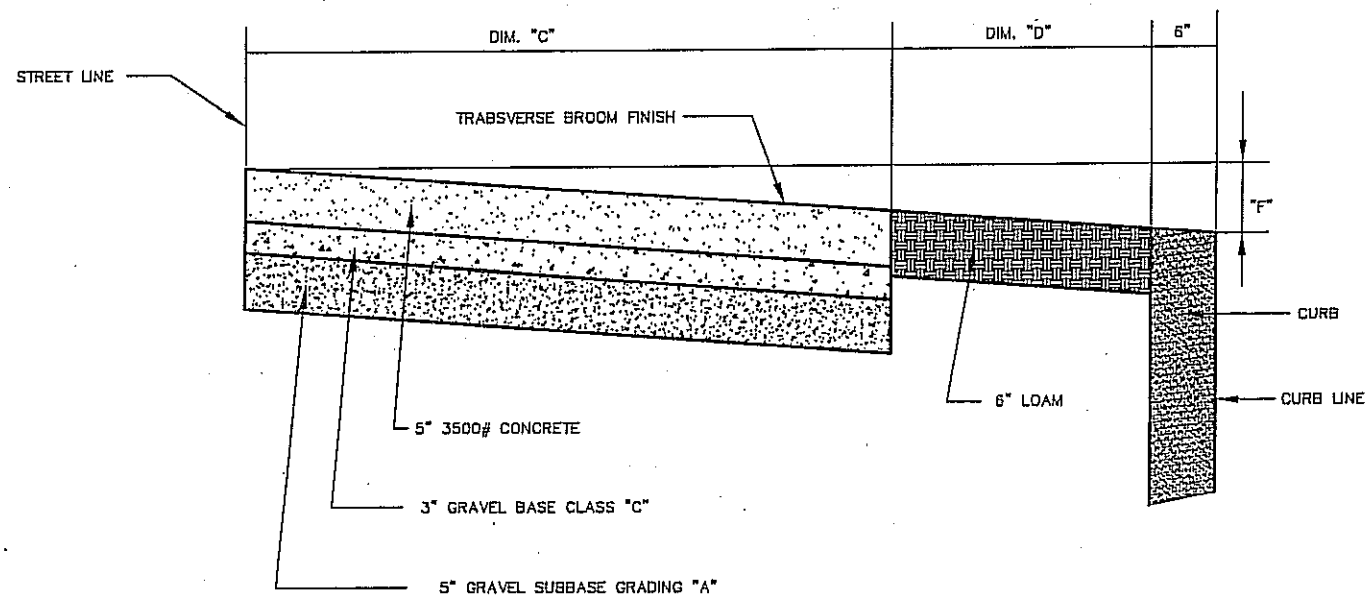
TYPICAL CONCRETE VERTICAL CURB AT SIDEWALK

N.T.S.



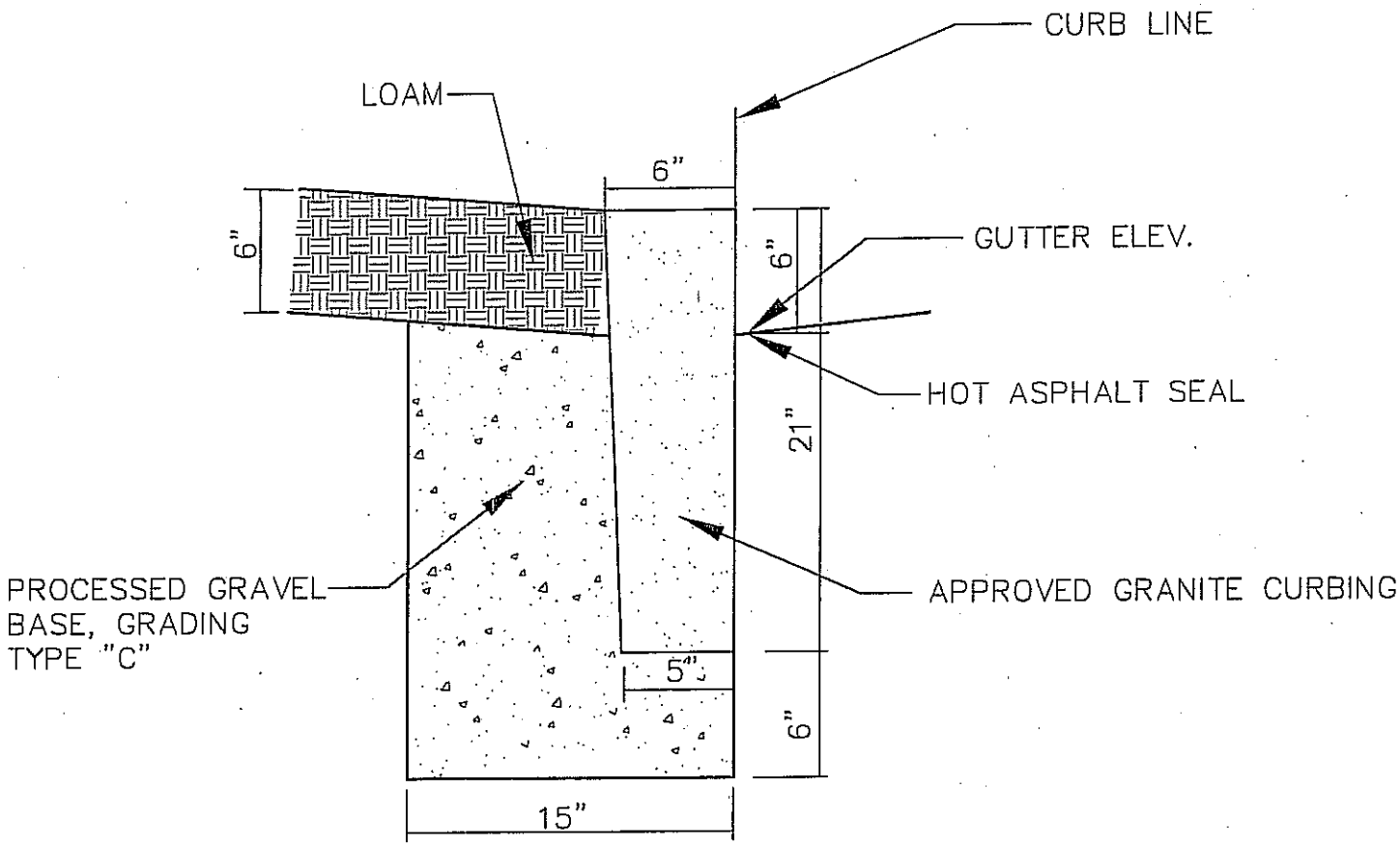
TYPICAL CONCRETE VERTICAL CURB
NO SIDEWALK

N.T.S.



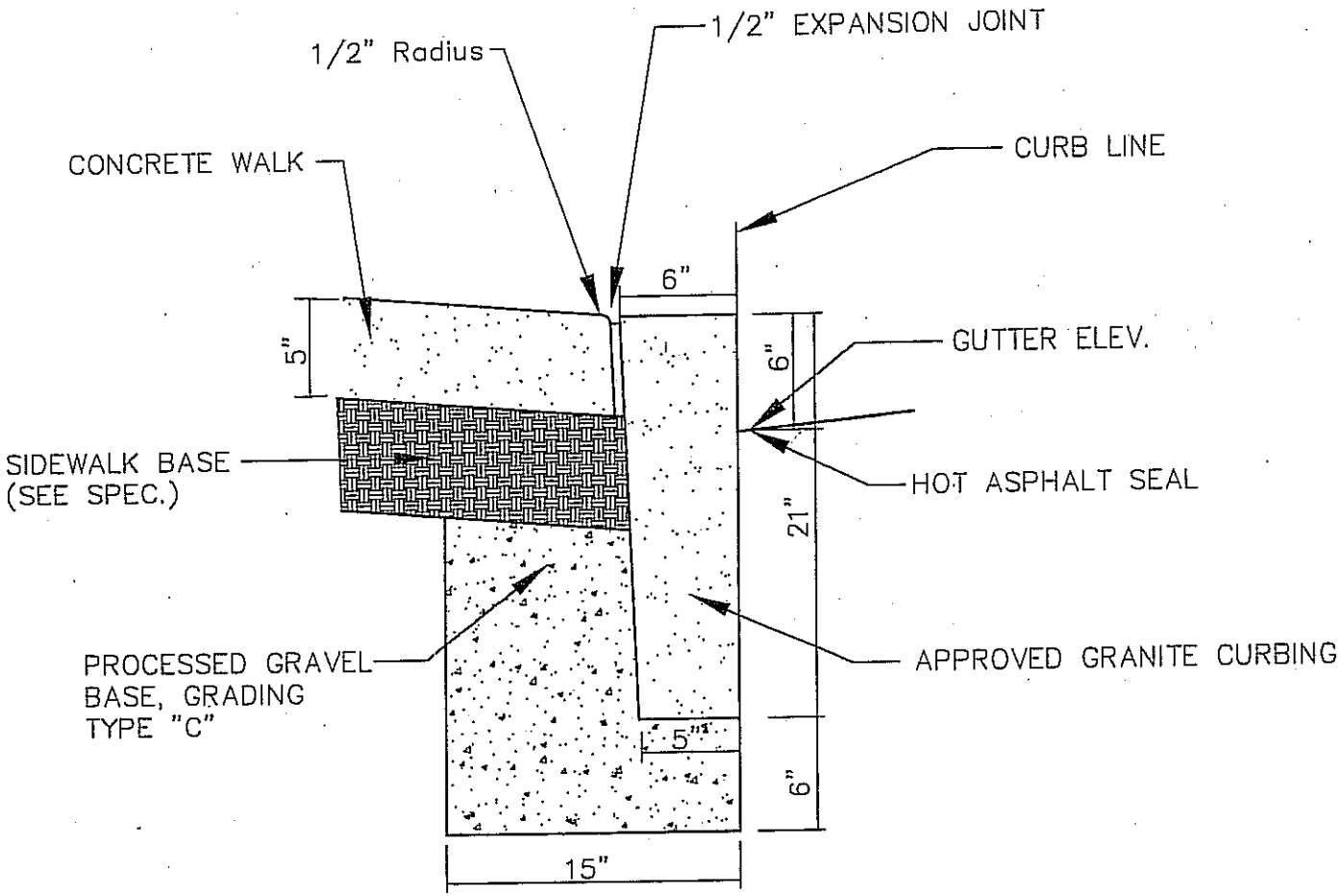
TYPE OF STREET	WIDTH OF WALK C + D + 6"CURB	DIM. "C"	DIM "D"	CROSS SLOPE "F"
50' LOCAL STREET	8.5'	4.0'	4.0'	2.5' IN 8.0'
RESIDENTIAL	8.5' TO 11.5'	4.0'	4.0' TO 7.0'	2.5' IN 8.0'
COMMERICIAL	8.5'	4.0'	4.0'	2.5' IN 8.0'

TYPICAL CROSS SECTION
CONCRETE SIDEWALK
N.T.S.



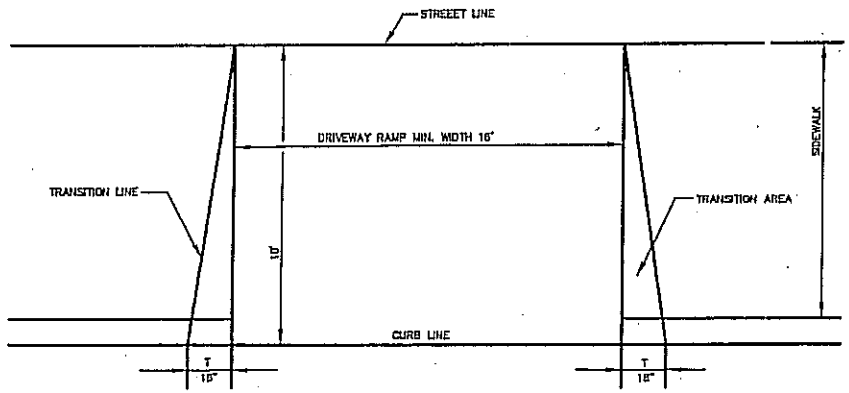
TYPICAL GRANITE VERTICAL CURB
NO SIDEWALK

N.T.S.

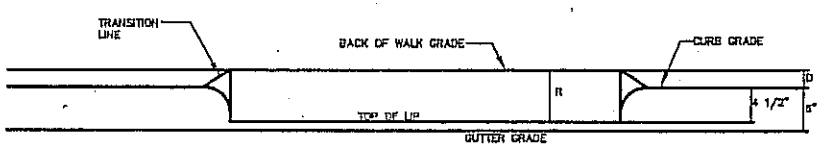


TYPICAL GRANITE VERTICAL CURB AT SIDEWALK

N.T.S.

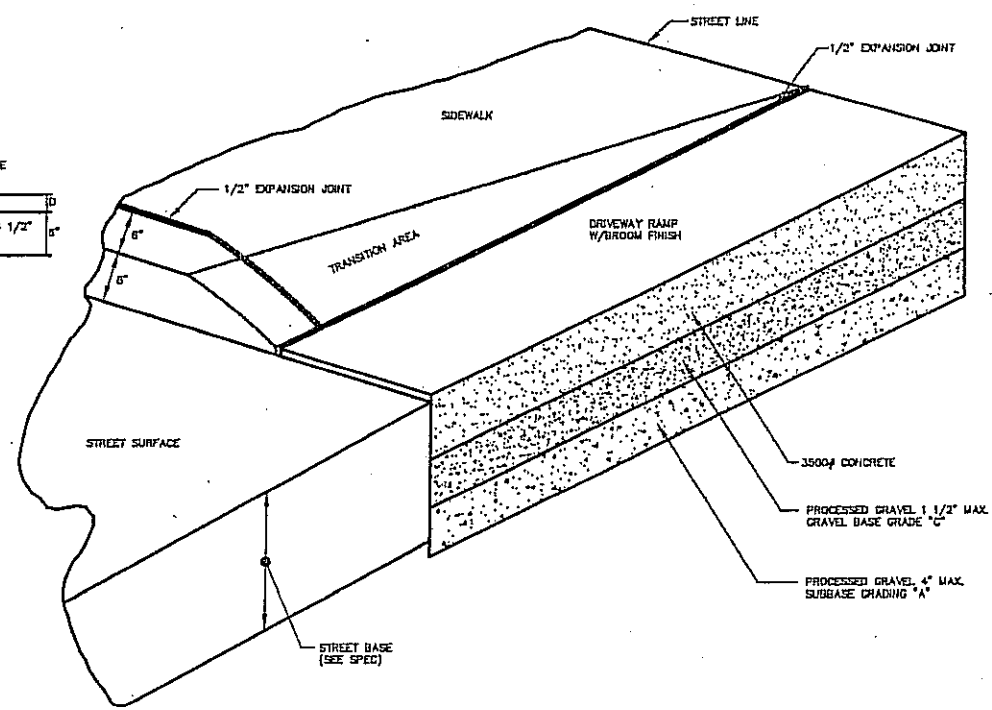


PLAN



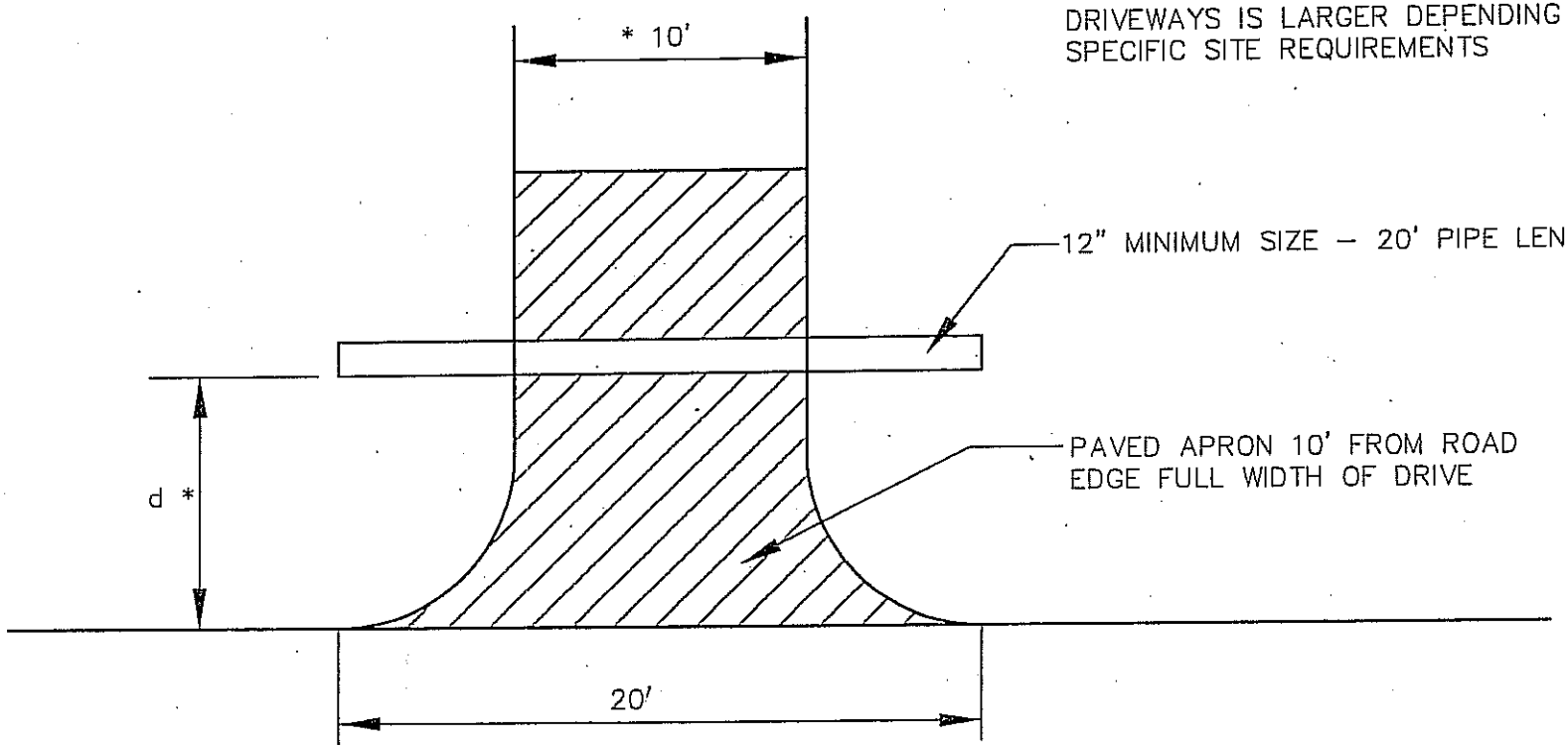
PROFILE

WIDTH OF STREET	WIDTH OF WALK	CROSS SLOPE		DIM (T)
		WALK(d)	RAMP (R)	
50'	6'	2.5" IN 8.0'	7.0" IN 8.0'	18"
60'	10'	3.0" IN 10.0'	7.5" IN 10.0'	18"



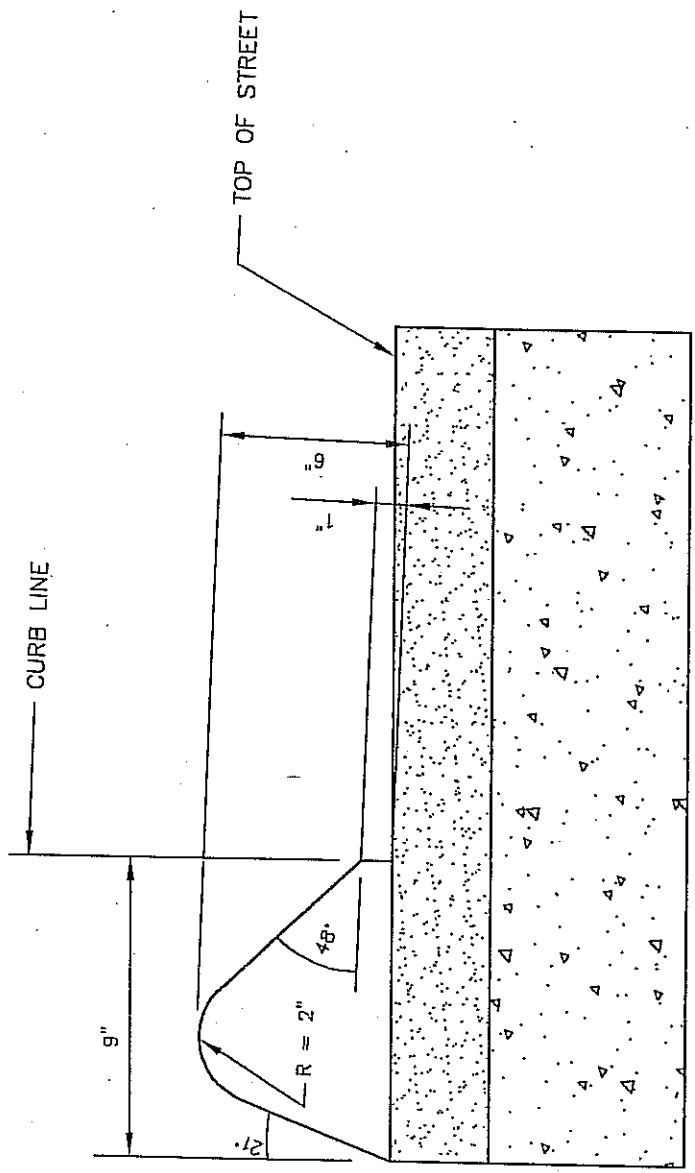
TYPICAL DRIVEWAY RAMP DETAILS
ISOMETRIC

N.T.S.



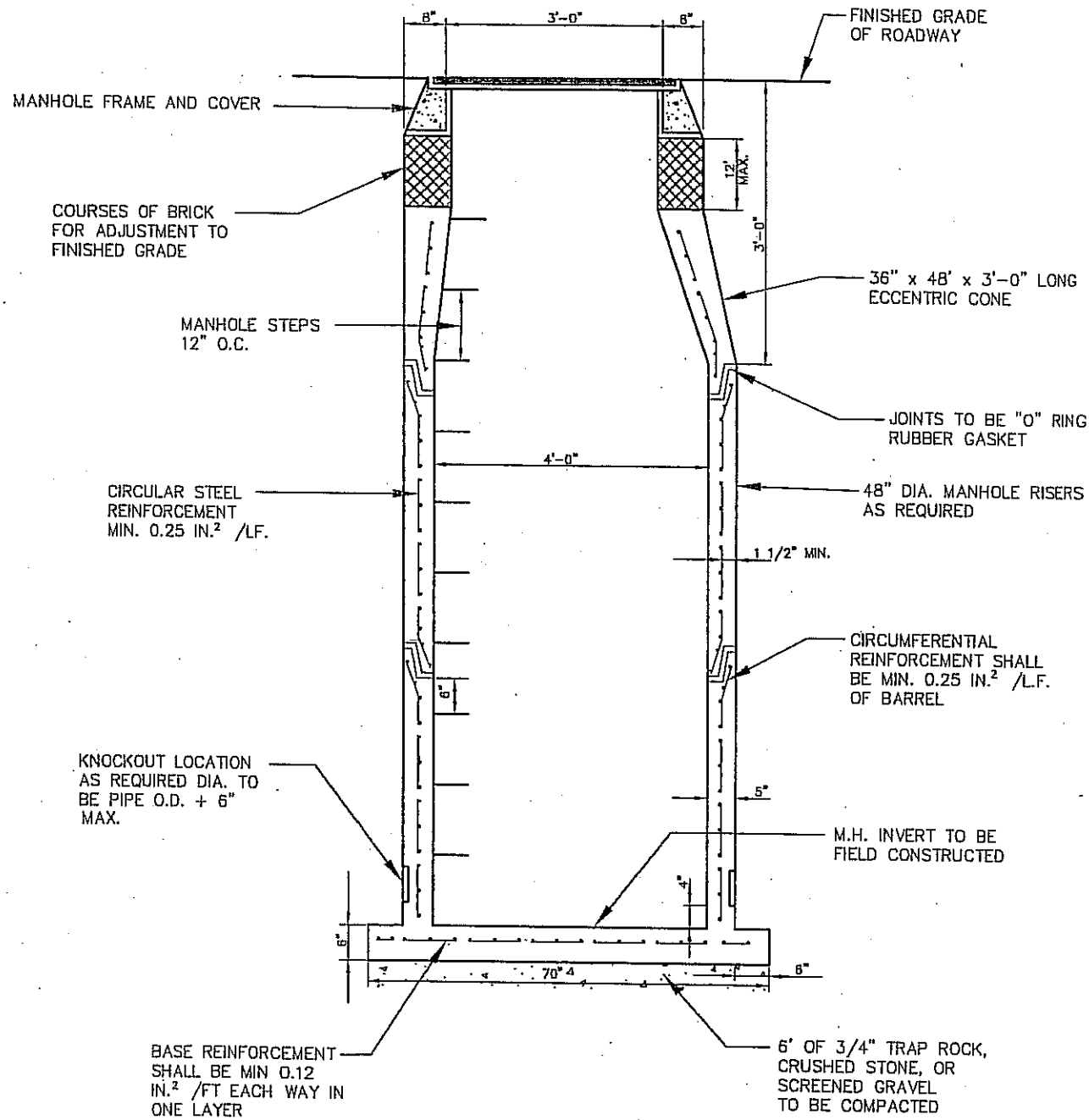
* REQUIRED WIDTH OF NON–RESIDENTIAL DRIVEWAYS IS LARGER DEPENDING ON SPECIFIC SITE REQUIREMENTS

* PIPE SHALL BE PLACED, d, FROM ROAD TO PROVIDE FOR 3:1 SLOPE TO PIPE INVERT FROM THE ROAD EDGE TO AVOID ROADSIDE HAZARD. THIS DISTANCE WILL VARY DEPENDING ON GRADES AT THE ROADSIDE. IF LEVEL AT THE ROADSIDE, THIS DISTANCE IS 5' FEET.



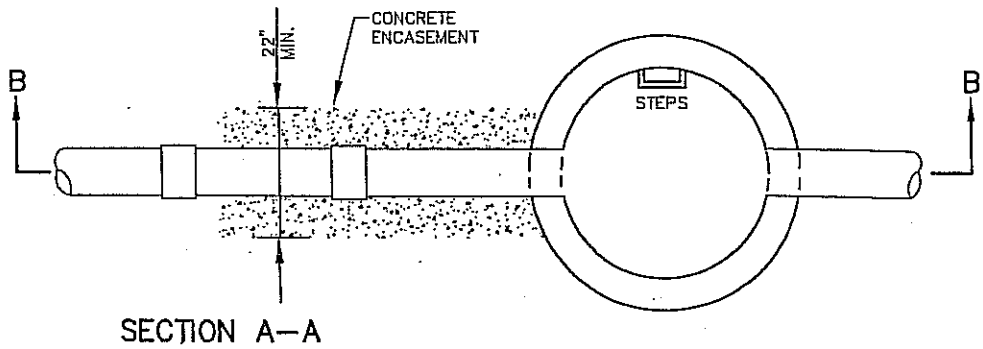
TYPICAL DETAIL OF BITUMINOUS CONCRETE CURB

N.T.S.

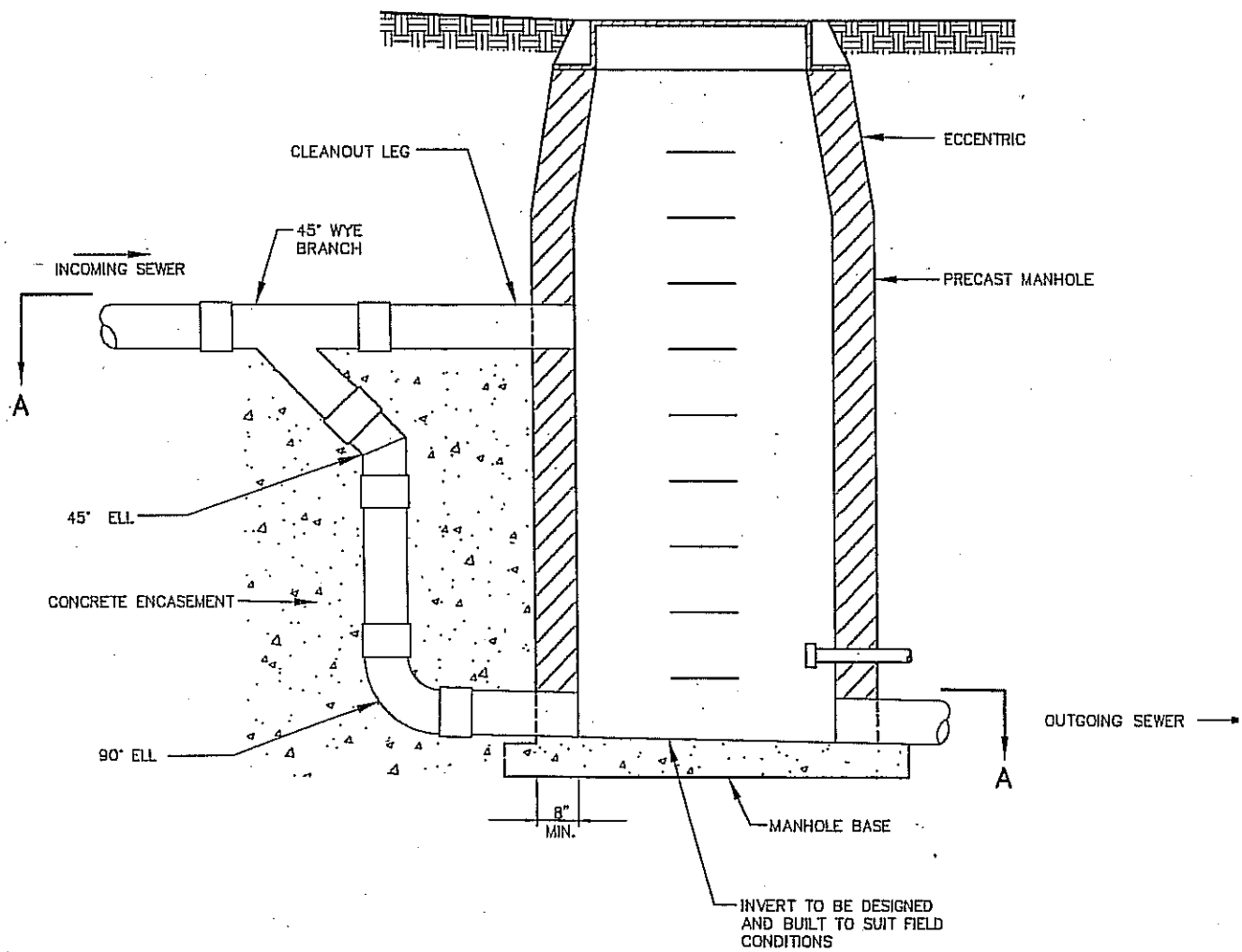


PRECAST MANHOLE SECTION

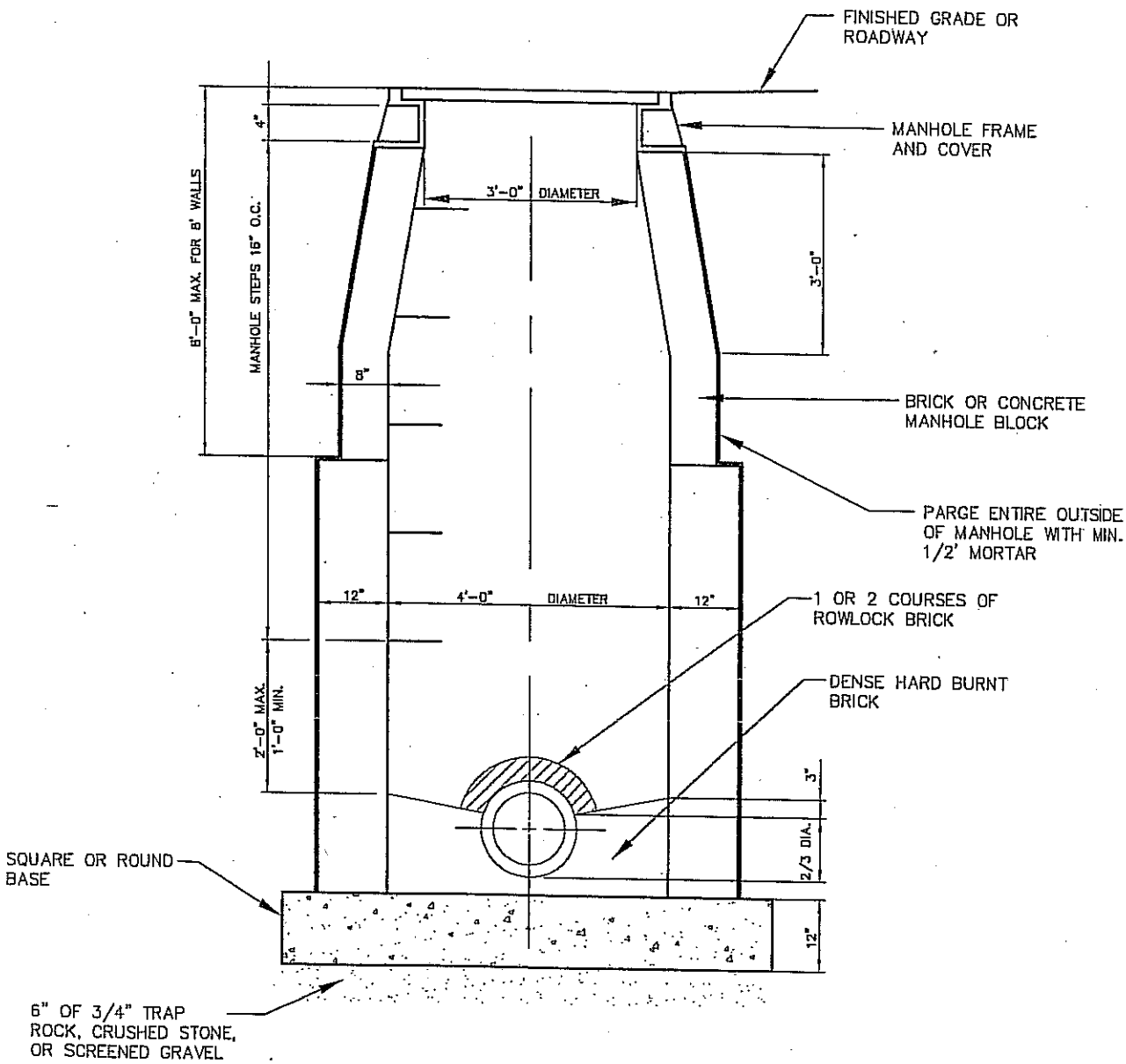
N.T.S.



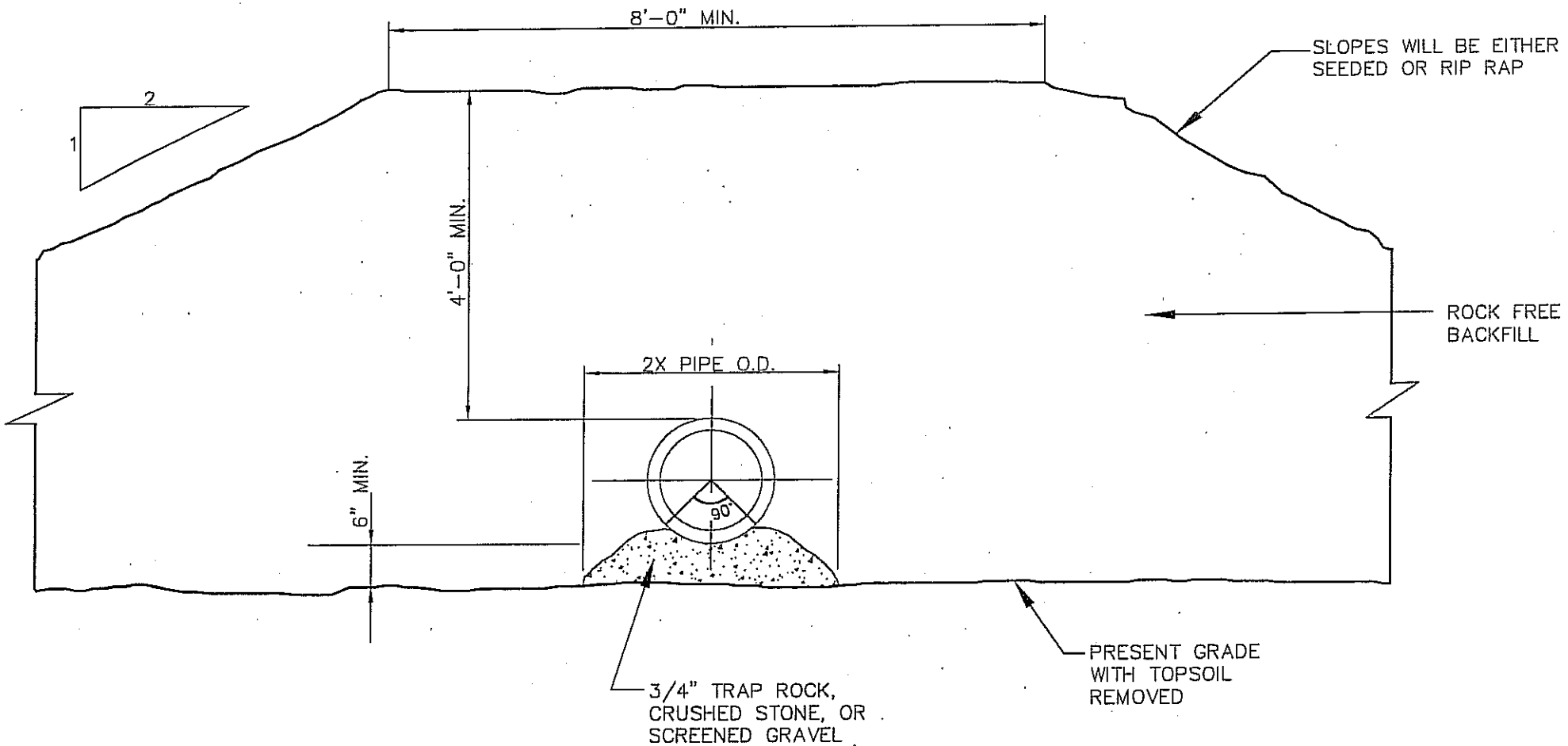
PLAN
N.T.S.



ELEVATION DROP MANHOLE
SECTION B–B
N.T.S.

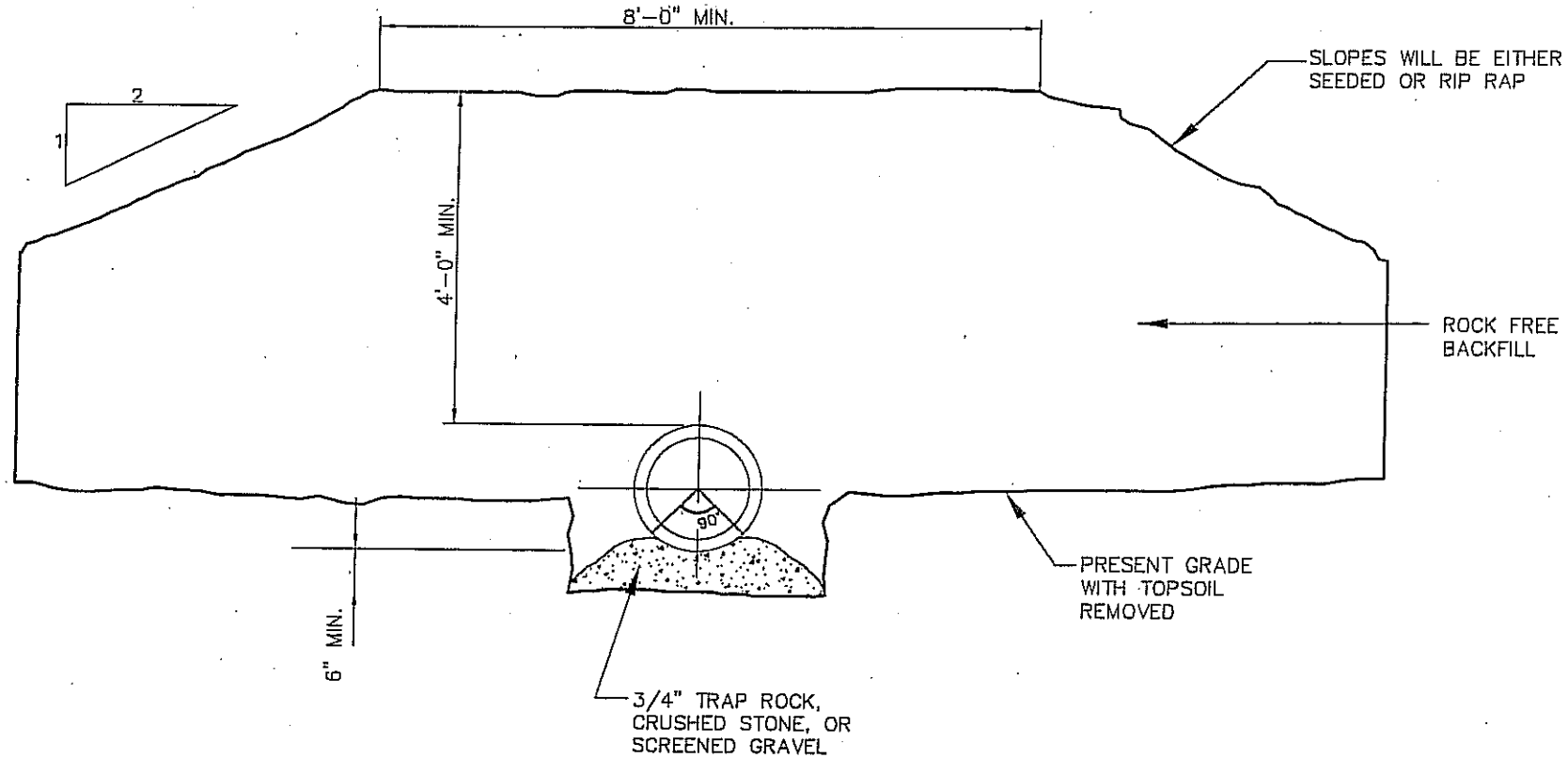


MASONRY MANHOLE SECTION
N.T.S.

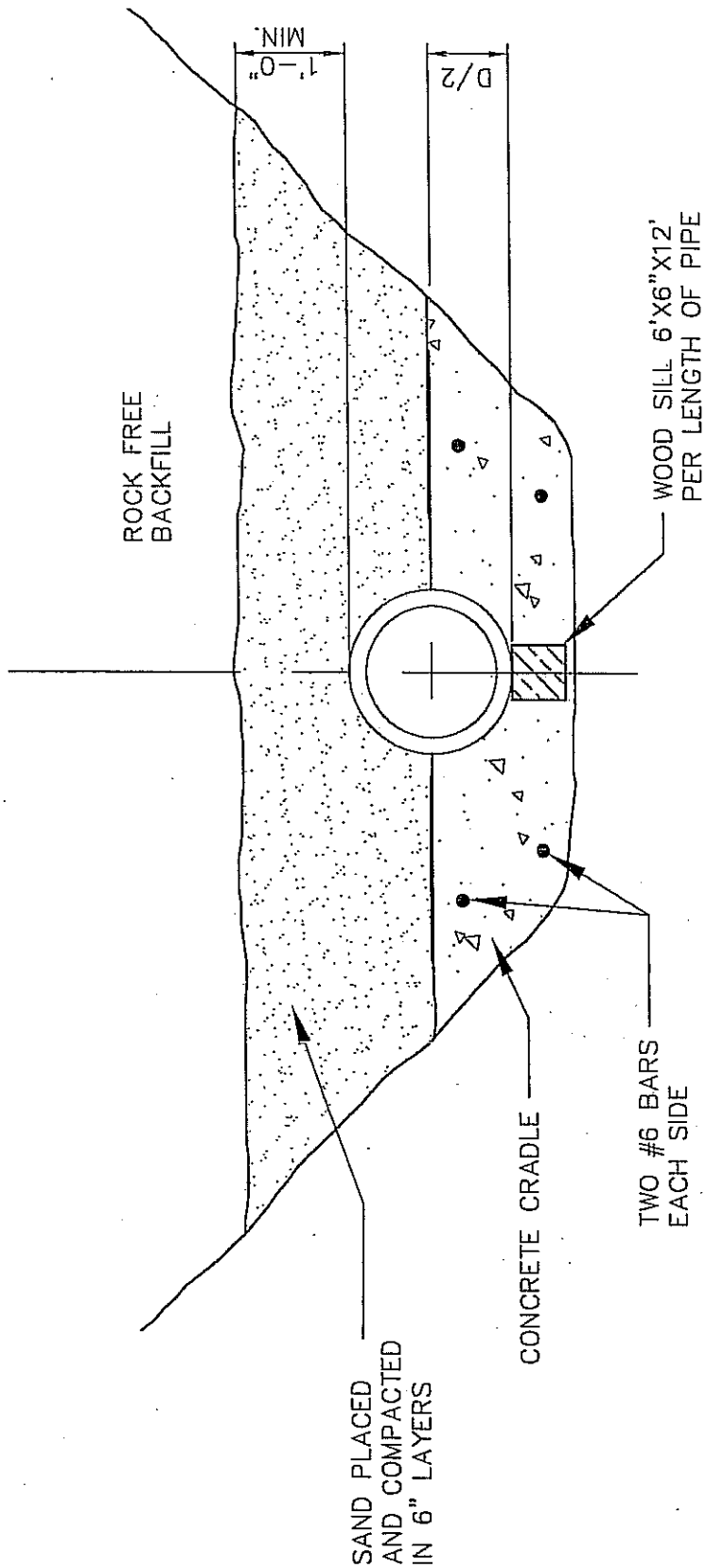


PIPE ABOVE PRESENT GRADE

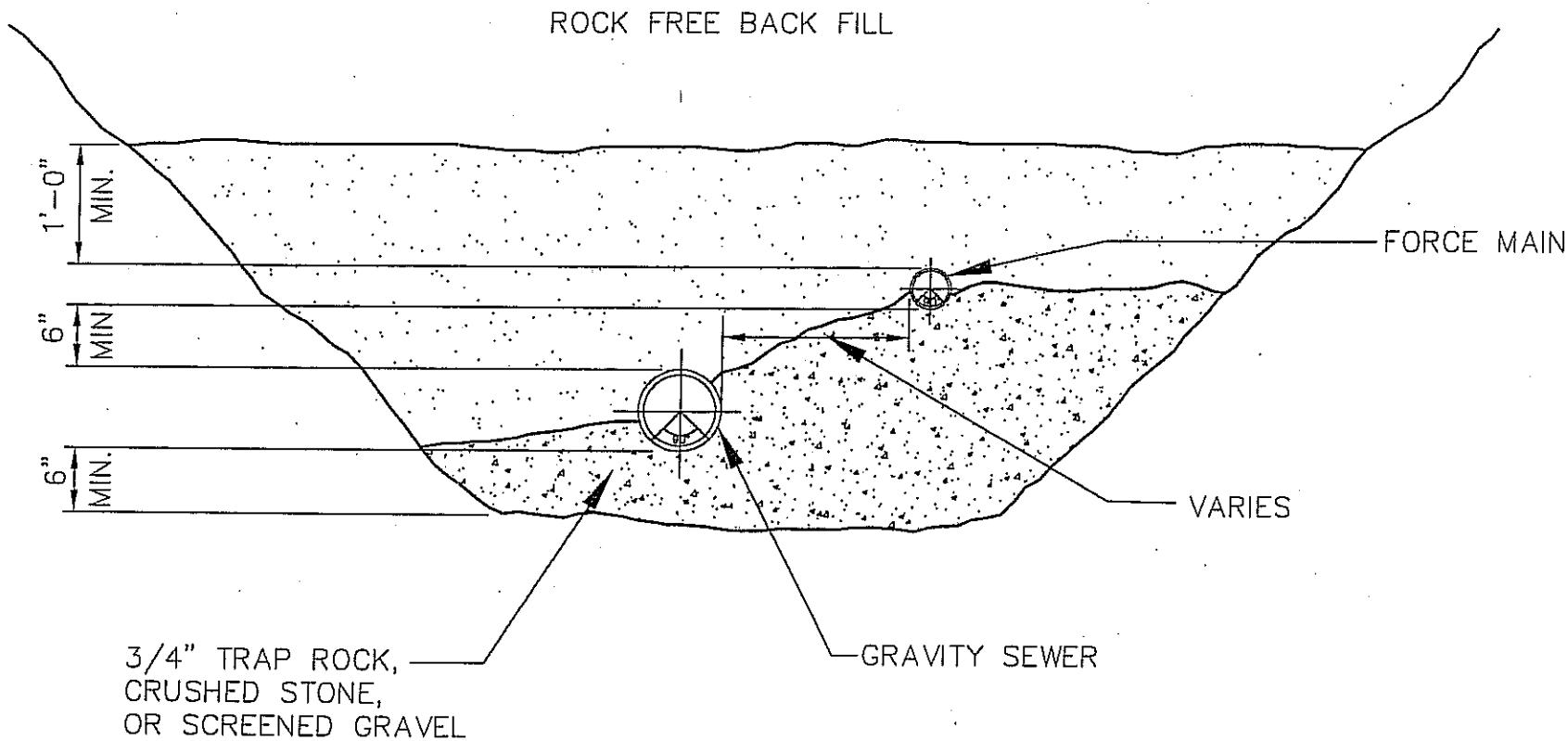
N.T.S.



SHALLOW EARTH TRENCH
N.T.S.

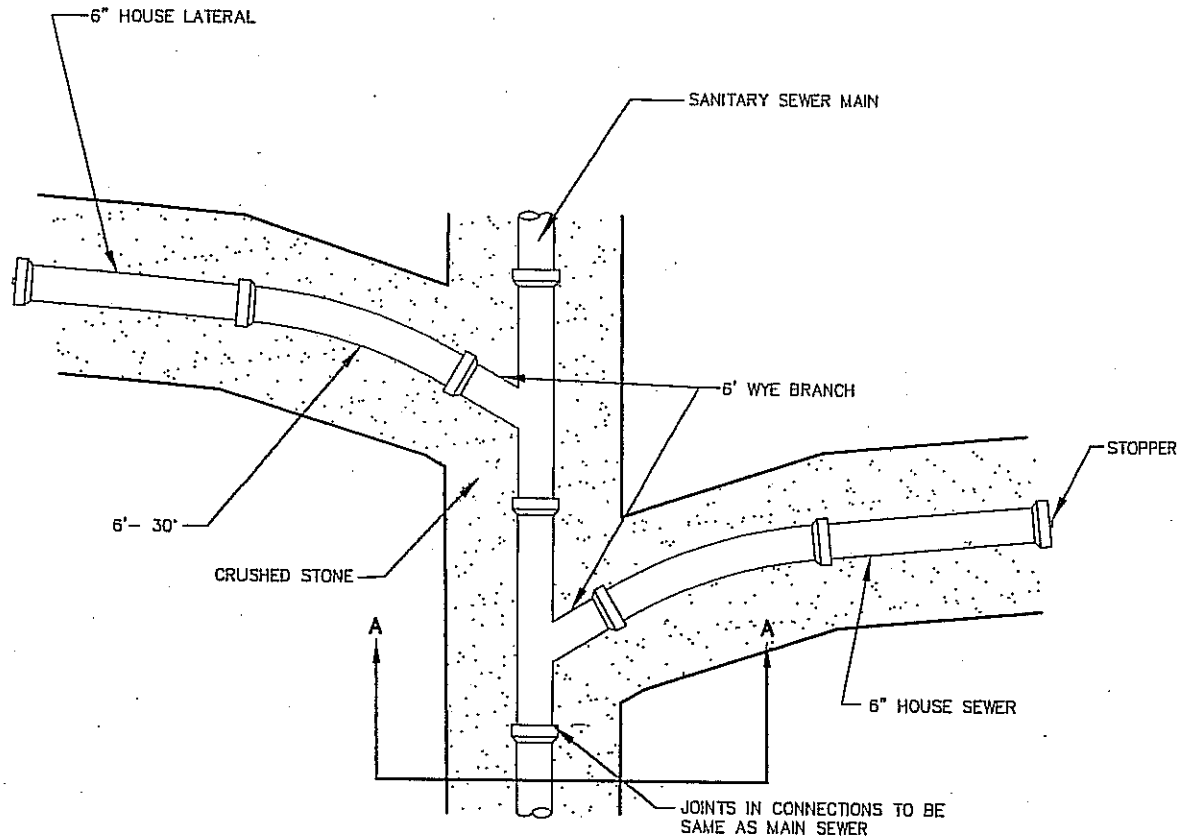


CONCRETE CRADLE
N.T.S.

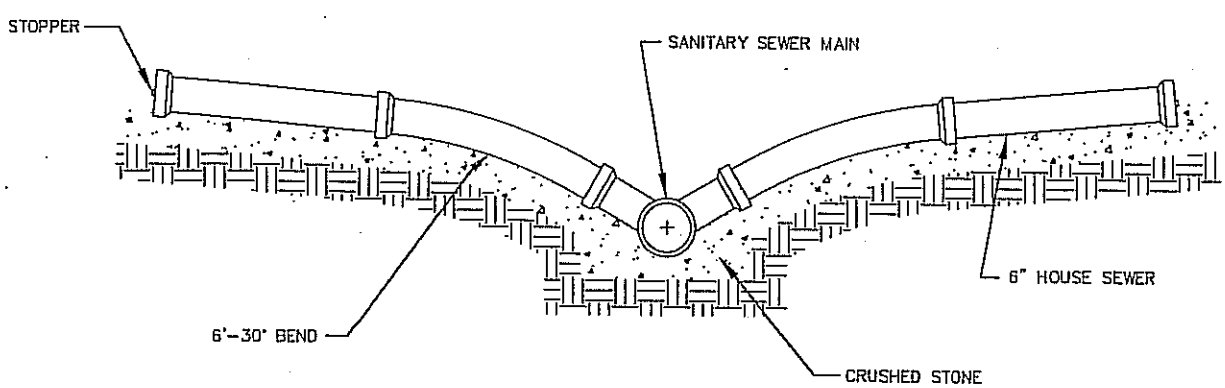


COMBINED GRAVITY SEWER & FORCE MAIN TRENCH

N.T.S.

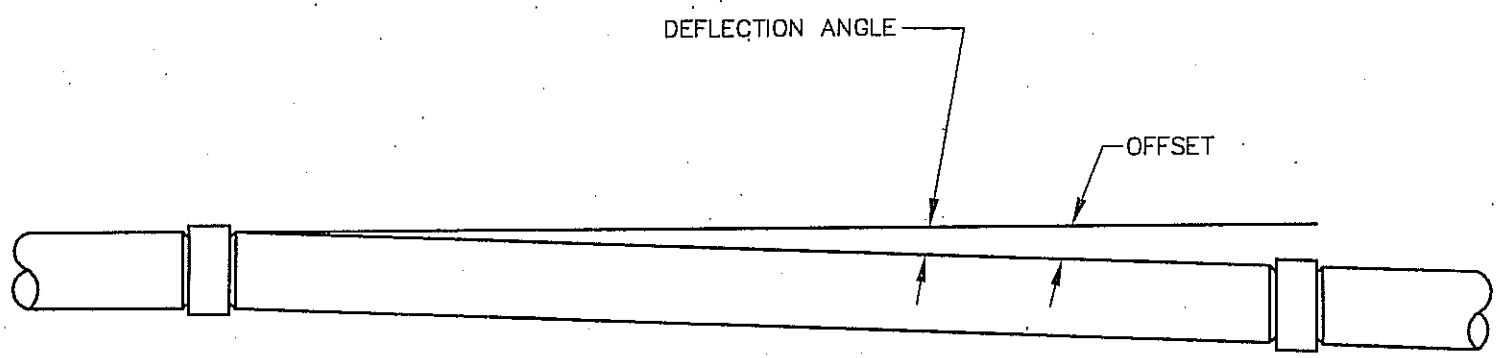


PLAN
N.T.S.



SECTION A – A

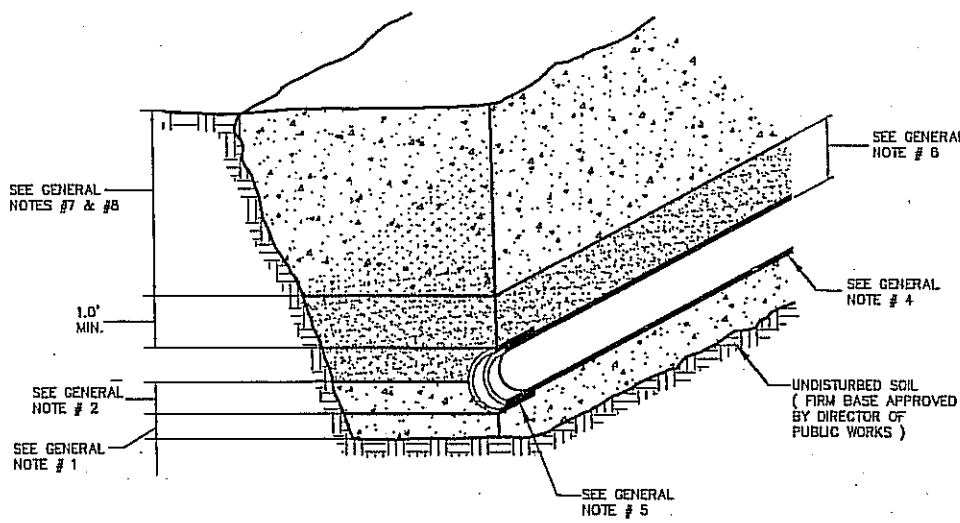
SERVICE CONNECTION FOR SHALLOW SERVICE
N.T.S.



PIPE DIA. (INCHES)	DEFLECTION ANGLE	OFFSET PER PIPE LENGTH (IN INCHES)		
		1 FT.	6 1/2 FT.	13 FT.
8–12	2 1/2°	.5	3.4	8.8
14–16	2°	.4	2.7	5.4
18–24	1 3/4°	.3	2.4	4.8
30–36	1 1/2°	.3	2.0	4.1

FOR EXAMPLE, FOR 2 DEGREES THE OFFSET FOR EACH FOOT OF LENGTH IS 0.4"– SO A 10 FOOT LENGTH WOULD BE 10 TIMES 0.4, MAKING THE OFFSET 4.0".

MAXIMUM ALLOWABLE DEFLECTION
(RING TITE COUPLINGS)

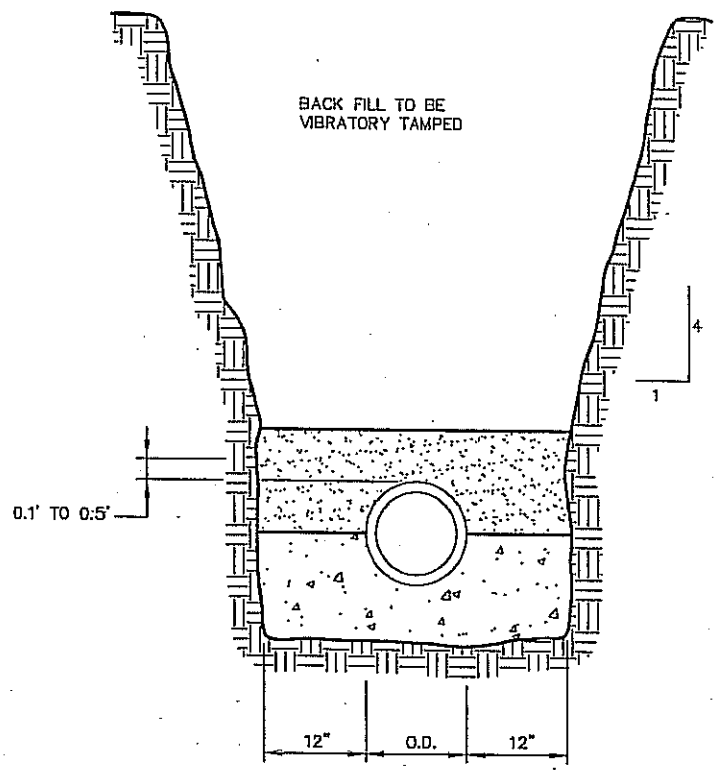


GENERAL NOTES

1. CRUSHED STONE FOUNDATION 3/4" MAXIMUM SIZE SHALL BE PLACED 6" UNDER PIPE AND UP TO THE PIPE GRADE. THE PIPE LAID THEREON, CRUSHED STONE PULLED AGAINST THE PIPE SIDES TO FIRMLY HOLD PIPE IN PLACE.
2. CRUSHED STONE HAUNCHING, 3/4" MAXIMUM SIZE, SHALL BE BROUGHT TO A LEVEL HALFWAY UP THE PIPE, AND OUT TO THE TRENCH WALL AT THIS ELEVATION FOR ALL PIPE.
3. VIBRATING MECHANICAL TAMPERS SHALL NOT BE USED WITHIN THREE PIPE DIAMETERS OVER THE TOP OF THE PIPE.
4. PIPE IS TO BE GIVEN CONTINUOUS BEARING FOR ITS FULL LENGTH. BRIDGING WILL NOT BE ALLOWED.
5. HOLES SHALL BE DUG TO CONTAIN BELL SO THAT PIPE WILL REST UPON ITS BARREL.
6. COARSE SAND OR FINE GRAVEL (3/4" MAX.) SUITABLE FOR BACK FILL SHALL BE PLACED IN LAYERS OF 4" PUDDLED OR TAMPED PER TOWN OF MANSFIELD SPECIFICATIONS AND/OR AS ORDERED BY THE DIRECTOR OF PUBLIC WORKS.
7. 1' ABOVE PIPE TO ROADWAY BASE WITH FREE DRAINING MATERIAL (6" MINUS) AND BACK FILL SHALL BE PLACED IN LAYERS NOT TO EXCEED 12" AND PUDDLED OR TAMPED PER TOWN OFF MANSFIELD SPECIFICATIONS AND AS ORDERED BY THE DIRECTOR OF PUBLIC WORKS.
8. IN EXCESS OF 8'–0" SHORING AND BRACING SHALL BE REQUIRED.

TYPICAL TRENCH CROSS SECTION SHOWING CRUSHED STONE FOUNDATION, HAUNCHING AND BACK FILL

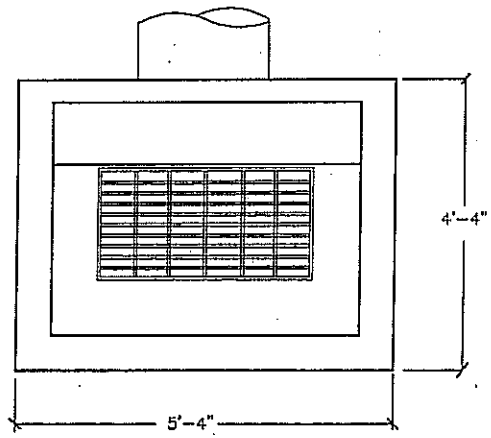
N.T.S.

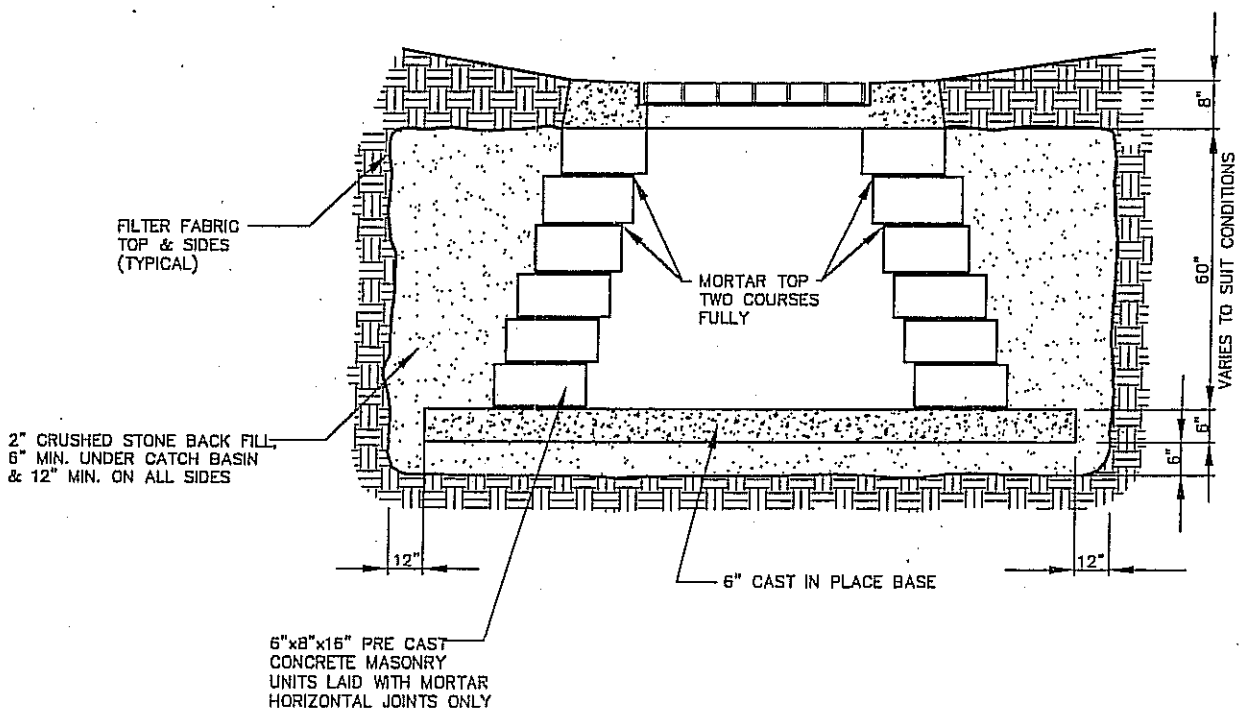


THE STRENGTH OF PIPE REQUIRED BY THIS SPECIFICATION IS DESIGNED TO CARRY THE DEAD AND LIVE LOADS AS CALCULATED AT A POINT ONE-FOOT ABOVE THE TOP OF THE PIPE. WHERE THE SPECIFIED TRENCH WIDTH IS EXCEEDED BY THE OPERATIONS OF THE CONTRACTOR, THE ENGINEER WILL RECHECK THE DESIGN OF THE PIPE.

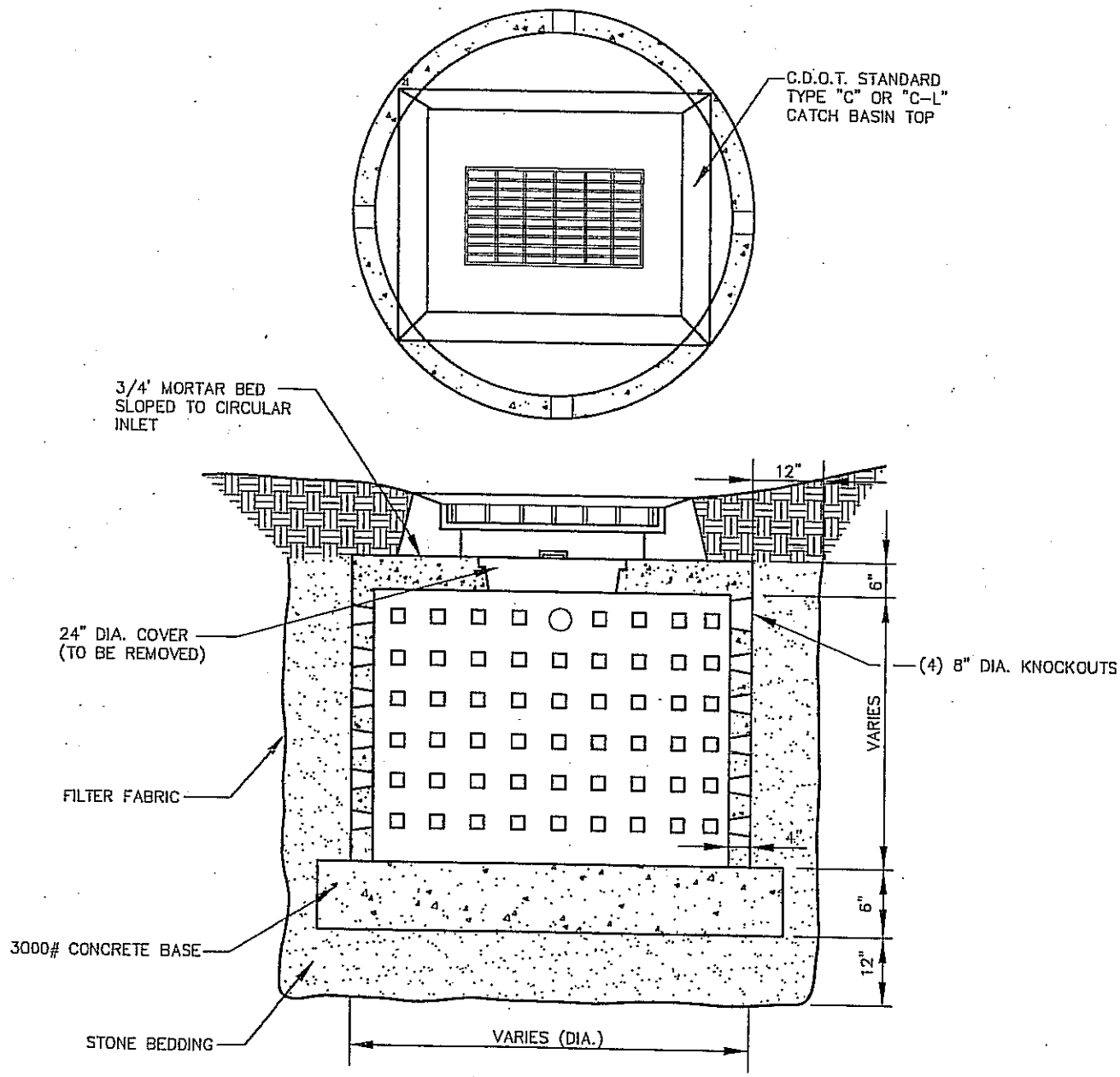
TYPICAL TRENCH WIDTH
N.T.S.

CONN. TYPE 'C' TOP SHOWN
TYPE 'C–L' TOP

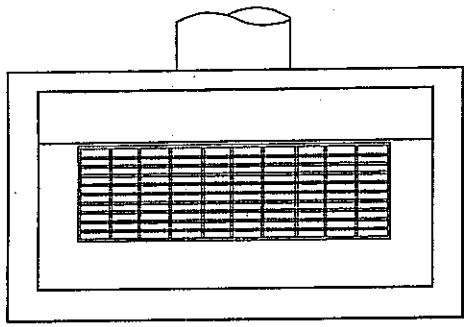




CONCRETE BLOCK DRY WELL CATCH BASIN
NTS

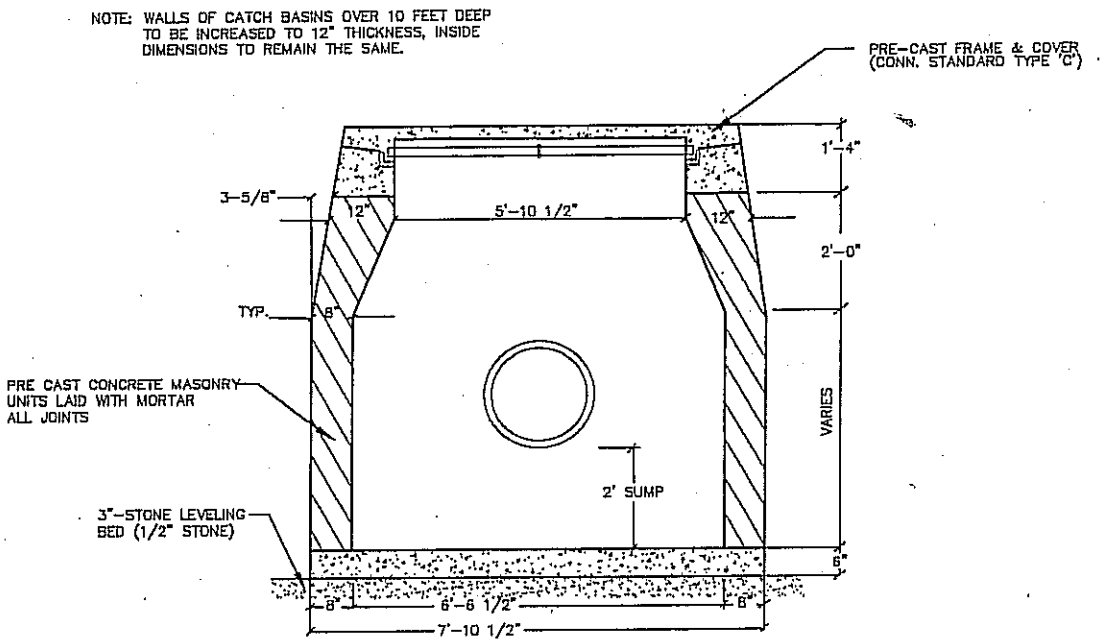


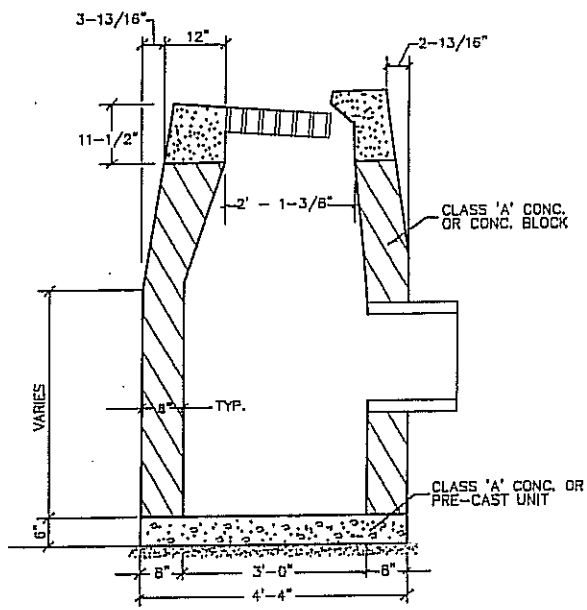
PRE CAST DRY WELL CATCH BASIN
N.T.S.



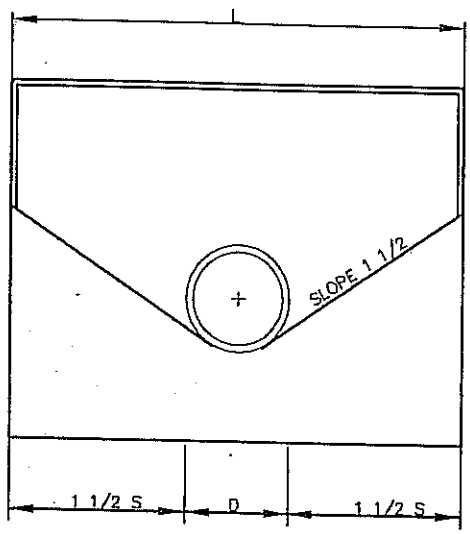
CONN. TYPE 'C' DOUBLE GRATE TOP SHOWN
TYPE 'C-L' DOUBLE GRATE TOP TOP

CONN. STATE STANDARD
DOUBLE GRATE CATCH BASIN
N.T.S.





EXPOSED HEIGHT OF BACK OF WALL ABOVE SLOPE TO BE
7' FOR SLOPES OF 1 1/2 AND 4
9' FOR SLOPES OF 2:1



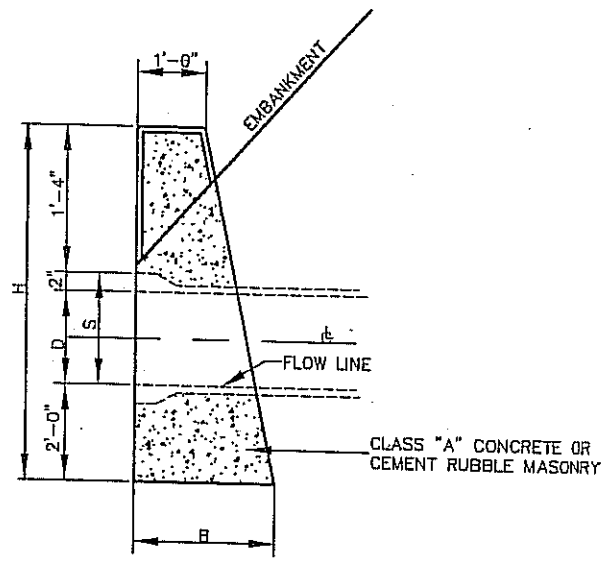
FRONT ELEVATION
N.T.S.

H = TOTAL HEIGHT OF END WALL
B = BASE
D = INSIDE DIAMETER OF PIPE
S = HEIGHT OF SLOPE ABOVE FLOW LINE AT FACE OF WALL MINIMUM = D+2
L = LENGTH OF WALL = 3S+D

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL–BASE ON S=D+2"						
D	S	H	L	BATTER	B	VOL.
INS.	FT.&INS.	FT.&INS.	FT.&INS.	INS./FT.	FT.&INS.	CU. YD.
12"	1'–2"	4'–6"	4'–6"	2 1/2"	1'–11 1/4"	1.10
15"	1'–5"	4'–9"	5'–6"	2 1/2"	1'–11 7/8"	1.45
18"	1'–8"	5'–0"	6'–6"	2 1/2"	2'–0 1/2"	1.83
24"	2'–2"	5'–6"	8'–6"	2 1/2"	2'–1 3/4"	2.72
30"	2'–8"	6'–0"	10'–6"	2 1/2"	2'–3"	3.79
36"	3'–2"	6'–6"	12'–6"	3"	2'–7 1/2"	5.45
42"	3'–8"	7'–0"	14'–6"	3"	2'–9"	6.40*
48"	4'–2"	7'–6"	16'–6"	3"	2'–10 1/2"	8.00*

* VOLUME BASED ON "D" AND WALL THICKNESS AT CENTERLINE OF PIPE HAS BEEN DEDUCTED

ALL EDGES OF EXPOSED SURFACES TO BE CHAMFERED APPROXIMATELY ONE INCH

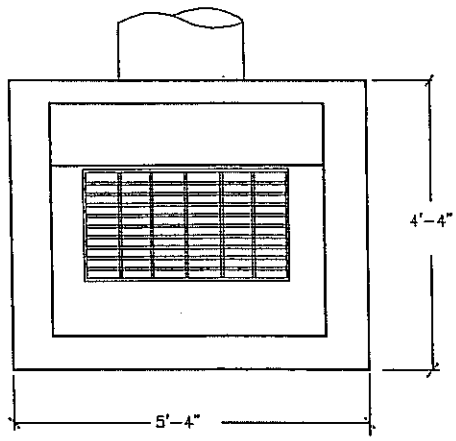


WALL AT FOOT OF SLOPE
N.T.S.

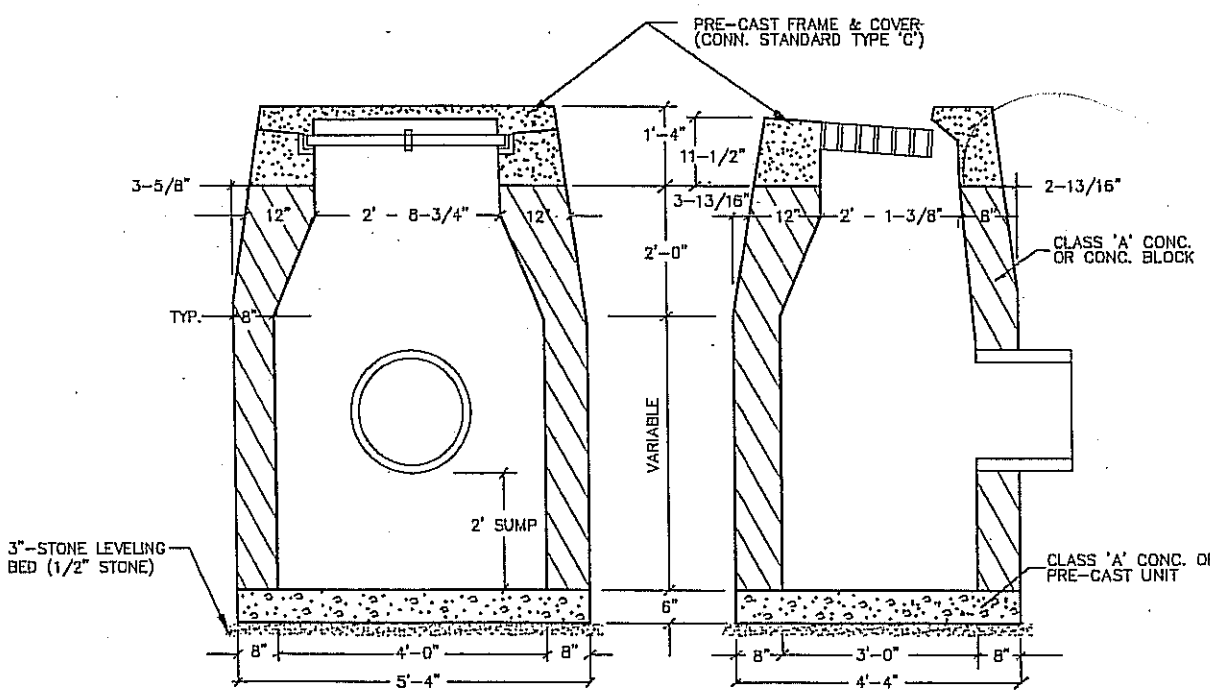
NOTE

ALL CONSTRUCTION DIMENSIONS ARE NOMINAL

WHEN ONE END WALL IS TO BE USED FOR TWO PIPES, THE DIMENSIONS OF THAT END WALL SHALL CONFORM TO THAT REQUIRED FOR THE LARGER PIPE, EXCEPT THE DIMENSION "L" SHALL BE INCREASED BY THE OUTSIDE DIAMETER OF THE SMALLER PIPE PLUS ONE FOOT.



CONN. TYPE 'C' TOP SHOWN
TYPE 'C-L' TOP



CONN. STATE STANDARD
CATCH BASIN
N.T.S.