

CITY OF AZLE
DESIGN CRITERIA MANUAL

OVERVIEW.....	2
SECTION 1 PUBLIC WORKS CONSTRUCTION.....	2
A. APPROVALS	2
B. OTHER UTILITIES.....	4
C. DEVELOPMENT CONTRACTS.....	4
D. INSPECTION FEES.....	5
E. PRE CONSTRUCTION MEETING	6
F. MATERIAL SUBMITTALS.....	7
G. CLEARING & GRADING PERMIT	7
H. TRAFFIC CONTROL PLAN.....	7
I. EXCAVATION PROTECTION PLAN	7
J. NOTIFICATIONS OF CONTRACTOR	7

Overview

These rules and criteria shall be known as the City of Azle Construction Criteria. The purpose of these construction criteria is to establish standard principles for construction within the City of Azle, Texas and within its extraterritorial jurisdiction where applicable. The standards and procedures are intended for use only as guides and to establish minimum criteria. Responsibility for actual document preparation and construction standards and practices remains with the engineer, contractor and/ or owner. Users of this criteria manual should be knowledgeable and experienced in construction principles and practices. In addition, these criteria are not intended to be a complete set of criteria. The City of Azle Development Code, North Central Texas Council of Governments Standard Specifications for Public Works Construction, City of Azle Addendum to the NCTCOG Specifications, The City of Azle Standard Detail Sheets, and the latest adopted Building, Electrical, Mechanical, Plumbing and Energy Conservation Codes including local amendments shall be consulted for additional criteria. Any deviation from the criteria in this manual will require approval of a variance by the appropriate deciding body where applicable as described in the Procedures section of the Development Code except where specifically noted otherwise in this manual. The criteria in this manual does not supersede the criteria contained in the Azle Development Code and any revisions to the Azle Development Code shall supersede the criteria in this manual. The items contained in this section of the Construction Criteria Manual are presented to help the reader become more familiar with various processes related to public works construction in the City of Azle. Adopted Local Amendments to the latest adopted version of the North Central Texas Council of Governments Standard Specifications for Public Works Construction may only be changed by ordinance.

Section 1 Public Works Construction

A. Approvals

1. Zoning: Before any public works construction relative to a development may commence, staff will verify that the subject development has appropriate/ correct zoning. If the subject zoning is not appropriate for the development, construction may not take place until the appropriate zoning for the development has been approved in accordance with the development code.
2. Plat: Before any public works construction relative to a development may commence, staff will verify that the subject development is platted. If the property is not appropriately platted, construction may not take place until a plat for the development has been approved and has been filed in accordance with the Development Code.
3. Construction Plans:
 - a. General: Before any public works construction relative to a development may commence, staff will verify that the construction plans have been approved. If the plans have not been approved, construction may not take place until all required corrections have been made.
 - b. Responsibility: The project engineer is responsible for the accuracy, completeness and conformance to city standards. The purpose of the city review is limited to facts as presented on submitted plans. The city has no project engineering responsibility. The engineer certifying the plans is responsible for the accuracy and completeness of the documents submitted for review and actual construction. The city reserves the right to require corrections to actual conditions in the field, which is found to be contrary to, or omitted from submitted plans.
 - c. Format: Construction plans shall be digitally drawn on twenty-four (24) inch by thirty-six (36) inch size sheets. Each sheet shall contain no more than two (2) individual improvements.
 - d. Plan Requirements: Construction Plans must contain the following before they can be approved:
 1. Plans are to be designed, signed and sealed, dated by a professional Civil Engineer registered in the State of Texas and furnished in the following format:

- a. Cover sheet containing:
 - Project title
 - Legal property description
 - City name
 - Vicinity map
 - Owner, Engineer, and Surveyors name, address and telephone number
 - Project title in small print placed vertical along the right border
 - Sheet index
 - Public Works signature block
 - b. Copy of current plat bound with plans. The signed plat shall be bound with the as-built drawings.
 - c. Drainage Area Map and calculations with all existing contours, existing and proposed storm drains, and/ or other drainage facilities.
 - d. Site Plan indicating the location and width of all proposed and existing street and driveway approaches noting the back of curb radii.
 - e. Utility Plan indicating the location and size of all existing and proposed water and sanitary sewer lines with adjacent existing or proposed top of curb grades. Also show the location of all existing and proposed fire hydrants adjacent to the site including the maximum coverage radius of each as outlined in later sections of this manual.
 - f. Plan and Profile Sheets for roads, sewers, storm drains, flumes, water lines, and channels. Stationing shall be generally left to right and with stationing beginning at the downstream end for all sewers, storm drains, and channels.
 - g. Stationing shall be included on the plan view as well as the profile for all roads, water, sewer, storm drain and channel sheets. Elevations shall be calculated and provided in all profiles as indicated below.
 1. Straight grade – provide elevations at a maximum interval of 100 feet.
 2. Vertical curve – provide elevations at the beginning and ending points and at a maximum interval of 25 feet in between.
 - h. Details for improvements which are to become public.
2. Plan and profile sheets shall be a maximum of twenty- four (24") inches wide by thirty- six (36") inches long.
 3. Horizontal scale shall be one (1") inch equals forty (40') feet or larger, i.e. 1" = 40'. Vertical scale shall be one (1") inch equals five (5') or larger.
 4. Appropriate hydraulic grade line or water surface profile shall be plotted with all drainage design. Capacity, design discharge, velocity, velocity head shall be noted on each segment of drainage facility in the profile whenever one or more of the parameters changes.
 5. Construction plans will be reviewed by Public Works and signed after all comments have been resolved. Construction must start within three (3) years following the Public Works signature. Plans for projects which have not started construction within this time must be submitted to Public Works for a new review.

6. General. North arrow, scale, date and mean sea level elevations of all improvements. Plans should be drawn with a horizontal scale of one (1) inch equals forty (40) feet or larger, and appropriate corresponding vertical scale. The plans shall provide for a reference to elevation benchmark or monumentation used in the development of the plans. The construction plans shall be signed and sealed by the professional engineer licensed by the State of Texas prior to bidding the project for construction and before a pre construction conference is held.
7. Streets: The plan and profile of streets showing proposed and existing grades at each side of the right-of-way, showing the top of curb grades at one-hundred-foot-intervals for straight grades and twenty-five-foot-intervals for vertical curves. Typical right-of-way cross sections of streets, sidewalks, and alleys showing the width and type of pavement, base, and subgrade, the location within the right-of-way, and specific street crown information, including the pavement transition to split curbs, valley gutters, and storm water inlets.
8. Sanitary sewer systems: Plan and profile for each sanitary sewer line showing existing and proposed ground level elevation at center line of pipe, pipe size, flow line elevation at all drops, and turns, and station numbers at fifty foot intervals, with a section showing embedment.
9. Water systems: Plan view and profile for lines 12 inches in diameter and larger, of the water distribution system showing pipe sizes and the location and stationing of valves, fire hydrants, fittings and other appurtenances, with a section showing embedment.
10. Storm water management systems: Plans and profile of all proposed channels, ditches, underground systems, detention areas, and any other storm water improvements, modifications, or facilities proposed to serve the development. The plans shall specify in detail the materials, sizing, location and stationing for all channels or ditches, storm water pipes, pipe connections, inlets, outlets, manholes, culverts, bridges and any other drainage structures and improvements. Each improvement shall show the hydraulic data on which the design of the improvement was based.
11. Grading: A grading plan showing the existing and proposed topography in two-foot contours, proposed or minimum finished floor elevations, and the 100-year flood limits, if any. The grading plan shall consist of contours and spot elevations with water directional arrows to define the flow patterns.
12. Erosion control: The location, size and character of temporary and permanent erosion and sediment control facilities with specifications detailing all on-site erosion control measures which will be established and maintained during all periods of development and construction.

B. Other Utilities

The developer shall furnish all easements and right-of-way (ROW) necessary for the construction of electrical, gas, cable TV, and telephone service to the proposed subdivision.

C. Development Contracts

1. General: Before a plat will be filed or related construction begins, a development contract must be executed.
 - a. Contract Form: Developers/ Contractors are strongly encouraged to use the standard contract form provided by the City of Azle, available at the City of Azle Public Works Department. Use of the standard documents will expedite review of the contracts and ensure that they will ultimately be approved and executed. Use of contract forms other than those provided by the City of Azle will result in increased review time and may result in the City's inability to execute such contract.

- b. Exhibit "A": A copy of the contractors proposal or an engineers estimate for the associated public improvements is to be attached to the development contract.
 2. Required Bonds or Escrows: The requirements for sureties to issue bonds and the standards for additional or substitute bonds as set forth in NCTCOG standards referenced above are incorporated into this section of the manual for all purposes and shall be controlling in all aspects unless in conflict with the terms set forth in this section.
 - a. Performance bond. That the owner or contractor shall provide a performance bond as required by the Texas Government Code Ann. And in conformance with the most current edition of the Standard Specifications for Public Works Construction adopted by the North Central Texas Council of Governments (NCTCOG), as amended by city, in the amount of one hundred (100) percent of the cost of constructing the public improvements. The bond shall be furnished on the form provided by the City of Azle which shall include a provision insuring the repair and replacement of defects in the improvements due to faulty materials and workmanship that appear within a period of two (2) years from the date of acceptance of the improvements by the city. The performance bond shall be issued by a surety company authorized to do business in the State of Texas, Treasury Listed and acceptable to the City of Azle. If the cost of constructing the improvements is less than fifteen thousand dollars (\$15,000.00), the city may execute an escrow agreement with the owner or developer in lieu of the bond. Cash money in the amount of the cost of completing the improvements, as determined by the city engineer may be deposited with a bank as escrow agent pursuant to an agreement, the form and provisions thereof to be approved by the City Manager and City Attorney, to insure completion of the improvements.
 - b. Payment bond. That the owner or contractor shall provide a payment bond as required by Texas Government Code Ann. As amended, in the amount of one hundred (100) percent of the cost of constructing the public improvements. The bond shall be furnished on a form provided by the City of Azle and shall be issued by a bonding company authorized to do business in the State of Texas, Treasury Listed and acceptable to the City of Azle. If the cost of constructing the improvements is less than twenty-five thousand dollars (\$25,000.00), the payment bond is not required but in exchange, the contractor must supply the City an affidavit of payment prior to acceptance of the project.
 3. Contractors Liability Insurance. The owner or contractor will comply with the insurance requirements applicable to the city's public works specifications and provide certificates evidencing such insurance coverage to the Director of Public Works or his/ her representative.
 4. Approvals. The contract and supporting documents signed by the Owner, contractor and surety company representatives or escrow officer shall be submitted to the City of Azle Public Works Director in triplicate all with original signatures. Upon a cursory review and determination of completeness by the Public Works Department, the contracts and supporting documents will be forwarded to the City of Azle Legal Department for a detailed review of the documents. Once the Legal Department approves and signs the contracts, they will be forwarded to the City Manager to be executed.

D. Inspection Fees

1. Applicability: All private developments where the effective preliminary plat was approved are subject to a public works inspection fee.
2. Amount: The public works inspection fee is equal to 4% of the construction amount as provided in "exhibit A" of the development contract.
3. Time of Payment: The public works inspection fee must be paid prior to filing the plat if applicable and before the beginning of construction.

E. Pre Construction Meeting

1. General: Prior to beginning construction of public works improvements, the contractor or owner will contact the City of Azle Public Works Director to schedule a pre construction meeting. The meeting will be scheduled by the Public Works Director and must be held prior to the beginning of construction.
2. Pre requirements: Prior to holding a pre construction meeting the following needs to be completed:
 - a. Development Contracts submitted to the Public Works Department.
 - b. Four sets of approved construction plans submitted to the Public Works Department.
 - c. Material submittals submitted to the Public Works Department.
 - d. Traffic Control Plan submitted to the Public Works Department.
 - e. Excavation Protection Plan submitted to the Public Works Department.
 - f. Clearing and Grading permit applied for with Building Inspections
3. Topics: The following topics will be covered at the pre construction meeting:
 - a. Proposed start date
 - b. Required Notifications
 - c. General review of City of Azle construction specifications
 - d. Review of the status of any supplementary information/ documents required by the owner/ contractor
 - e. Chain of command for both the contractor/ owner and City of Azle interest
 - f. Page by page review of the construction plans
4. Types
 - a. Formal: Developments with public improvements where the total value of the public improvements is over \$15,000.00 are required to have a formal pre construction meeting. A formal pre construction meeting will be held in a meeting room and will require attendance by all required personnel as described below. In some instances, developments with a total value of public improvements under \$15,000.00 may also be required to have a formal pre construction meeting based on the opinion of the Director of Public Works.
 - b. Informal: Developments with public improvements where the total value of the public improvements is under \$15,000.00 may be required to have an informal pre construction meeting. Generally, an informal pre construction meeting can be held at the site and requires an abbreviated list of attendees. Required attendees for an informal pre construction meeting will be determined by the Director of Public Works and will be based on the type, location and nature of the improvements.
5. Required Attendance: The following individuals are required in attendance at a pre construction meeting:
 - a. Owner/ Developer
 - b. General Contractor
 - c. Sub Contractors
 - d. Developers Engineer
 - e. The City of Azle will invite to the meeting:
 - f. Development Review Engineer
 - g. Construction Inspector
 - h. Representatives from all applicable franchise utility companies

- i. Any other City of Azle Staff representative deemed necessary by the Director of Public Works

F. Material Submittals.

Three sets of material submittals must be submitted to the Public Works Department for review prior to the pre construction meeting. Submittals are required for all materials to be placed on, or in the ground. Concrete batch design is only required if the contractor plans to set up their own batch plant or obtain concrete from a concrete company outside of Azle. Asphalt batch design is not required as all asphalt is required to meet requirements for Texas Department of Transportation (TxDOT) type A for base or TxDOT type C for the surface coat.

G. Clearing & Grading Permit

A clearing and grading permit shall be issued prior to beginning construction and shall be applied for with the City of Azle Building Inspections Division

H. Traffic Control Plan

In the event that a traffic control plan is not included in the approved construction plans for all construction in the public right of way, the contractor shall submit prior to the pre construction meeting, a traffic control plan to be used during construction of the project. The traffic control plan should address the phasing of construction and all closures and detours that are considered necessary over the course of the construction. In the event that there will be road closures/ detours, please note section H below (Notifications of Contractor) concerning proper notification of street closures and detours.

I. Excavation Protection Plan

Prior to the pre construction meeting, the contractor shall submit a copy of the site specific excavation protection plan for the project to the Public Works department. The Excavation Protection plan should outline what methods of excavation protection the contractor will use, where each type of protection measure is anticipated to be used, the specific protection equipment the contractor plans to use including any limitations that may apply, the site soil conditions as well as any other minimum OSHA standards that apply to excavation protection. The City of Azle will review the document in an attempt to understand how the contractor will protect workers in and around the excavation and may make specific comments about limitations noted or omissions in the report, but in no way assumes responsibility for the excavation protection or adequacy of the plan. It should be noted that the "slope" or Minimum Angle of Response" method is not an acceptable method in an existing public right-of-way.

J. Notifications of Contractor

1. Inspector: the contractor must notify the inspector at least 48 hours in advance of beginning construction of the project.
2. Affected Property Owners: All property owners/ residents that are directly adjacent to the construction must be notified by the contractor that construction will begin at least 48 hours prior to the beginning of construction. The Director of Public Works or his representative may require notification of additional property owners/ residents depending on the scope, type, location or nature of the construction.
3. General Public: If in the opinion of the Director of Public Works or his representative the construction will have a regional impact including but not limited to disruption of traffic on an arterial or collector street, the contractor may be required to give longer than 48 hours notice to the project inspector so that the proposed construction may be listed in the Azle News newspaper prior to the start of construction.
4. Street Closure: If a street will need to be completely closed for more than 2 hours at a time.

**CITY OF AZLE
TRANSPORTATION DESIGN CRITERIA MANUAL**

Section 1	Overview	2
Section 2	Street System	3
2.2	Streets Required	3
2.3	Street Design Criteria	3
Section 3	Sidewalks	4
Section 4	Driveways and Approaches	5
4.1	Residential Driveway Approaches	5
4.2	Commercial/ Industrial Driveway Approaches	5
4.3	Driveways Crossing Bar Ditches	6
4.3.1	General	6
Section 5	Miscellaneous Standards	7
Section 5.1	Pavement Patching	7
5.1.1	Asphalt Pavement Patching	7
5.1.2	Concrete Pavement Patching	7
Section 5.2	Street Lighting	7
5.2.1	Installation	7
5.2.2	Location	7
5.3	Street Signage & Traffic Control Devices	8
5.3.1	Street Signs	8
5.3.2	Traffic Control Devices	8
5.4	Earthwork	8
5.4.1	Definitions	8
5.4.2	Unplatted Multi-Lot Subdivision	9
5.4.3	Platted Multi-Lot Subdivision	9
5.4.5	Testing	9

Section 1 Overview

These rules and design criteria shall be known as the City of Azle Transportation Design Criteria. The purpose of these transportation criteria is to establish standard principles and practices for the design and construction of transportation infrastructure within the City of Azle, Texas and within its extraterritorial jurisdiction.

The standards, charts and procedures are intended for use only as engineering guides and to establish minimum standards. Responsibility for actual design remains with the design engineer. Users of this criteria manual should be knowledgeable and experienced in the theories and application of Transportation Engineering principals. In addition, these criteria are not intended to be a complete set of design criteria. The Azle Development Code, North Central Texas Council of Governments Standard Specifications for Public Works Construction, the City of Azle Zoning Code and the City of Azle Standard Detail Sheets shall be consulted for additional criteria.

Any deviation from the criteria in this manual will require approval of a variance by the appropriate deciding body as described in the Procedures section of the Development Code except where specifically noted otherwise in this manual. The design criteria in this manual does not supercede the criteria contained in the Azle Development Code and any revisions to the Azle Development Code shall supercede the criteria in this manual.

Section 2 Street System

2.2 Streets Required

All streets constructed within the City shall be required to be constructed with curbs and gutters. The required widths of all streets within the City shall be determined by the "Functional Classification" of the streets as contained in the most current revision of the Master Thoroughfare Plan of the City of Azle.

2.3 Street Design Criteria

1. All streets within or abutting the proposed subdivision shall be paved, with curbs and gutters installed, in accordance with the City's Standards and Specifications. All paving shall be to the width specified in the Master Thoroughfare Plan and shall be constructed under the inspection of the Public Works Department. The construction costs of all street improvements shall be borne by the developer unless participation by the City has been approved.
2. Underground City owned utilities required in the subdivision shall be placed under or across all streets after the rough grades are made, but prior to the paving being placed. Paving operations will not be allowed to start until the utility work is complete.
3. Street grades shall be designed such that excessive sand deposition from too low a water velocity or pavement scouring from too high a velocity is avoided. The minimum street grade permitted shall be 0.50%. The maximum street grade shall not exceed 8.0%. Any deviation from this range of permissible grades shall require written approval of the Public Works Director.
4. Standard roadway widths from face-of-curb to face-of-curb shall be according to the following table:

STANDARD PAVEMENT WIDTHS				
Street Type	Number of Traffic Lanes	Lane Width (Feet)	Median With (Feet)	R.O.W Width (Feet)
Divided Arterial	4	18'	20'	120'
Undivided Arterial	3	15'		80'
Collector	2	18'		60'
Minor, Curb & Gutter	2	13'		50'
Minor, No Curb & Gutter	2	15'		60'

5. The minimum classified width of a proposed street shall be enlarged under the following conditions:
 - a. Adjacent to commercial or multi-family land uses where, in the opinion of the Public Works Department, additional width is necessary for proper access and circulation.
 - b. Where, in the opinion of the City or in the opinion of the Developer, with the concurrence of the City, the aesthetic value achieved from extra width is dictated by special conditions.
6. The proposed streets shall be located in the center of the right-of-way to allow both parkways to be the same width. The final grade of all parkways, existing and proposed, shall be 1/4" per foot from the top of curb to the property line. All parkways shall drain to the street.
7. All cul-de-sacs shall be installed with a one hundred (100') foot radius ROW.

8. Standard reinforced concrete curb height and width is six (6") inches with a twenty four (24") inch integral gutter section measured from the face of the curb. Any deviation from this section will require the approval of the Public Works Director.
9. The minimum pavement and subgrade thickness for the various streets shall be as indicated in the standard details.
10. The minimum horizontal curve radii for design of street centerlines shall be as follows:

Residential	200 feet
Collector	400 feet
Arterial	800 feet

All street intersections shall be constructed to form a ninety (90) degree angle.

11. In order to maintain an adequate sight distance, the minimum "k" values for the computation of vertical curves in the formula $L=KA$, where L is the length of the vertical curve in feet, and A is the algebraic difference of the street grades in percent (%) are listed below:

Design Speed (MPH)	Crest Vertical Curve "K" Value	Sag Vertical Curve "K" Value
30	28	35
40	60	60
50	110	90

12. The minimum radius for curb returns at intersections shall be twenty (20') feet to the face of the curb.
13. A tangent of at least one hundred (100') feet long shall be introduced between reverse curves on arterial and collector streets.
14. At all street intersections, there shall be provided a minimum ten (10') foot by ten (10') corner clip sidewalk and utility easement.
15. Reinforced concrete valley gutters shall be required at all asphalt street intersections where gutter flowlines cross another street or at low points where water flow crosses the street.
16. Median openings shall be spaced a minimum of six hundred (600') feet center-to-center or five hundred (500') feet curb-to-curb, whichever is greater.

Section 3 Sidewalks

1. Sidewalks shall be constructed of four (4") inch thick, three thousand (3,000) psi compressive strength concrete reinforced with #3 steel bars laid on a maximum of eighteen (18") inch centers.
2. Sidewalks shall be a minimum of four (4') feet in width. The sidewalk shall be located on the City parkway adjacent to the private property line. Sidewalks shall be graded at one-quarter (1/4") inch per foot such that the sidewalk at the property line shall be no greater than two and one-half (2-1/2") inches higher than the top of curb on a typical ten (10') foot parkway.

Section 4 Driveways and Approaches

4.1 Residential Driveway Approaches

- a. Residential driveway approaches shall be constructed of five (5") inch thick three thousand (3,000) psi compressive strength concrete reinforced with #3 steel bars on eighteen (18") inch centers each way. The driveway shall begin at the street curb and extend to the property line or to a point ten (10') feet from the face of the curb whichever is greater. The drive approach shall be constructed such that the height of the drive approach at the property ROW, with a normal ten (10') foot parkway, shall be two and one-half (2 ½") inches higher than the top of the curb.
- b. Width of Driveway Approaches: Residential driveway approaches shall not be less than twelve (12') feet in width nor more than twenty (20') feet wide measured at the property line. Specific variance to this criteria may be requested by the property owner. Any variance to this criteria may be requested by the property owner. Any variance granted based on a specific design submittal must have the approval of the Public Works Director.
- c. Radius: Residential driveways shall be constructed with the return curbs having a rolled face at the sidewalk and joining the street curb with a minimum five (5') foot radius and a maximum ten (10') foot radius.
- d. Provision for Joint Approaches: Driveway approaches shall be located entirely within the frontage of the premises the serve except that joint, or cooperative, driveways with adjoining property holders may be permitted and may be required by the Public Works Director. When the joint drive approach is proposed by the developer, the request must be made be all the interested parties and all property owners involved. The design of the joint driveway facilities must be submitted with the request to be approved by the Public Works Director.
- e. Residential Driveway Approaches at Street Intersections: The drive approach on corner lots must be located to approximately line up with the side of the house or garage that is farthest from the intersection. The drive approach edge farthest from the street intersection must be within 3 feet of the far side of the house or garage.

Only drive approaches in accordance with the above criteria will be allowed onto residential streets or the minor street at a street intersection. If both streets are residentially classified, a circular drive will be allowed on a corner lot if one of its two approaches meets the above location criteria. The other drive approach can have its near side no closer than 15 feet to the property corner closest to the intersection. If both streets have the same classification, other than residential per the currently adopted City Thoroughfare Plan, the Public Works Director shall make the determination as to which street access will be allowed.

4.2 Commercial/ Industrial Driveway Approaches

- a. Commercial and Industrial driveway approaches shall be constructed of six (6") inch thick three thousand (3,000) psi compressive strength concrete reinforced with #4 steel bars on eighteen (18") inch centers each way. The driveway shall begin at the curb of the street and extend to the property line or to a point ten (10') feet from the face of the curb, whichever is greater. The drive approach shall be constructed such that the height of the drive approach at the property line shall be two and one-half (2 ½") inches higher than the top of the curb at the street.
- b. Width of Driveway Approach: The width of any commercial or industrial driveway approach shall not be less than twenty (20') feet nor more than thirty-five (35') feet measured along the property line. Specific variance to this criteria may be requested by the Developer. Any variance granted based upon a specific design submittal must have the approval of the Public Works Director.

- c. Radius: Commercial and Industrial driveways shall be constructed with the return curbs having a rolled face disappearing at the sidewalk and joining the street curb with a minimum ten (10') foot radius and a maximum thirty (30') foot radius.
- d. Allowable Spacing for Driveway Approaches: On streets classified as Collector Streets, the minimum centerline spacing between driveways shall be at least three hundred (300') feet. On streets classified as Arterials, minimum spacing shall be at least five hundred (500') feet. This spacing criteria shall be applied irrespective of the number of individual properties located within the intervening distance. Deviation from this criteria may be requested by the Developer. Any deviation granted will be based on a specific design submittal and must have the approval of the Public Works Director.
- e. Provision for Joint Approaches: Driveway approaches shall be located entirely within the frontage of the premises and shall be located no closer than ten (10') feet from each side property line except that joint, or cooperative, drive approaches with adjoining property holders may be permitted in order to conform with the provisions of paragraph (d) above. Any request for joint drive access must be by agreement of all parties involved and a specific plan submittal must be included for approval of the Public Works Director. Both properties will be required to dedicate public ingress and egress easements to cover the approach and joint area.
- f. Approaches on Properties other than Residential: The driveway for the corner lot, if allowed, must be located a minimum of one hundred (100') feet from the point of intersection of the curb lines of both streets.
- g. Angle of Driveway Approach: The angle of the driveway approach with the curb line shall be ninety (90) degrees.
- h. Sidewalk to be Removed: Where a driveway approach is to be built, the sidewalk shall be removed and the entire area replaced as a driveway. The drive approach shall extend to the property line.

4.3 Driveways Crossing Bar Ditches

- a. The minimum culvert pipe size shall be 18" diameter for reinforced concrete pipe (RCP). The ends of all culvert pipe shall be cut at a 6:1 slope.
- b. Radius: Driveways shall be constructed with the return curbs joining the edge of pavement at the street with a minimum ten (10') foot radius.
- c. The maximum slope from the edge of driveway to the top of the culvert pipe shall be 6:1. The sloped area around the end of the culvert pipe shall be sodded or hydromulched to resist erosion.
- d. The minimum cross slope on the drive shall be 1/8 inch per foot. The minimum longitudinal slope between the edge of pavement at the street and the valley over the culvert pipe shall be 1/4 inch per foot.
- e. Future maintenance of the drive approach and culvert pipe is the responsibility of the property owner.
- f. During the drive approach installation, all ditch grading upstream and downstream of the proposed driveway culvert is the responsibility of the property owner.

4.3.1 General

- a. Driveway Approaches at Pedestrian Crossings: Driveway approaches shall not be located in street intersections or at established pedestrian crossings.
- b. Driveway Approaches at Obstructions: Driveways shall be kept at a minimum of five (5') feet away from obstructions such as street light posts, fire hydrants, traffic signals, etc..

- c. Driveway Approach not to be Obstructed: Driveway approaches shall not be constructed or designed for parking of vehicles or for use as angle parking.
- d. Accumulative Width of Approaches: Driveway approaches shall not occupy more forty (40%) percent of the frontage of a lot or tract.

Section 5 Miscellaneous Standards

Section 5.1 Pavement Patching

5.1.1 Asphalt Pavement Patching

Refer to Technical drawing number 3070

5.1.2 Concrete Pavement Patching

Refer to Technical drawing number 3070

Section 5.2 Street Lighting

5.2.1 Installation

Street lights in all subdivisions shall be installed on approved poles.

1. Poles must be approved by the public electric utility holding a City franchise and the Public Works Director.
2. Poles shall be contracted and paid for by the Developer during the construction phase of a subdivision and before building permits are issued.
3. Poles not purchased thru a public electric utility holding a City franchise, shall be certified in writing by an engineer to meet the specifications as required by the public electric utility holding a City franchise.

5.2.2 Location

The location of street lights shall be as follows:

1. At all intersections.
2. Where a new street intersects an existing street.
3. Where a block is six hundred (600') feet or longer, a street light shall be installed every six hundred (600') feet or mid-block, whichever is the shortest distance.
4. If more than one mid-block light is required, they shall be installed to create an equal balance of light throughout the entire length of the block.

5. If a cul-de-sac is four hundred (400') feet or longer, a street light shall be installed in the end of the cul-de-sac.
6. Street lights shall be installed at any other location as may be directed by the Public Works Director for the welfare and safety of the community.

5.3 Street Signage & Traffic Control Devices

5.3.1 Street Signs

It shall be the responsibility of the Developer to install all street signs within the development prior to completion of the development. Street signs shall conform in size, style and color with all other street signs in the City.

5.3.2 Traffic Control Devices

The Developer is responsible for installing all necessary traffic control devices including lane markings, stop signs, speed limit signs, traffic signals and other devices required by the Public Works Department.

5.4 Earthwork

This section shall apply to all subdivisions which are proposed for development; are existing and require additional grading; or are single lot subdivisions (platted or unplatted) which are proposing excavation or fill.

5.4.1 Definitions

1. Conceptual Grading Plan - A topographical map of the subdivision with sufficient perimeter area to provide a clear definition of the initial elevations, watercourses, and drainage patterns. In addition, the plan includes proposed flow arrows, cross sections and spot elevations sufficient to control the magnitude of excavation and fill. The plan must be sealed and signed by a Registered Professional Engineer licensed by the State of Texas.
2. Excavation - The removal of turf, soil, rock or weeds such that the surface is six (6") inches lower than the initial elevation.
3. Fill - The deposition of rock, concrete, soil or sod such that the cumulative thickness of all materials is equivalent to six (6") inches or greater.
4. Final Grading Plan - A topographical map of the subdivision with sufficient perimeter area to provide a clear definition of the initial elevations, watercourses and drainage patterns. In addition, the plan includes one (1' foot contours, spot elevations and flow arrows. The plan is in sufficient detail and scale to determine limits and depths of excavation or fill. The plan must be signed and sealed by a Registered Professional Engineer licensed by the State of Texas.
5. Grading - The movement of dirt, top soil, grass, native material, brush, trees, landscaping or other forms of surface material which will result in long term difference of six (6") inches or greater from the initial elevation.
6. Initial Elevation - The mean sea level elevation as it existed 5 years prior to the current date.

7. Multi-Lot Subdivision - A division of any tract of land into two or more parcels.

5.4.2 Unplatted Multi-Lot Subdivision

When a multi-lot subdivision has been proposed for platting, but has not yet been approved by the City Council, the following provisions shall govern the excavation and fill process.

1. A conceptual grading plan shall be submitted to the Public Works Department. The plan will be reviewed for consistency with City ordinances and policies. If the concept is approved, a 30-day permit will be issued to allow grading to begin.
2. the process must be inspected by a Public Works Department representative and all fill shall be tested for compaction.
3. Areas which fail the compaction tests shall be excavated, the material replaced (or new material imported, depending on moisture content) recompacted and retested.
4. Areas which have been filled without adequate compaction tests or without inspection by a City Representative shall be considered as areas which have failed the compaction tests.

5.4.3 Platted Multi-Lot Subdivision

When a multi-lot subdivision has been platted in accordance with the existing Subdivision Ordinance and the plat has been filed with the County, the following provisions shall apply.

A final grading plan shall be submitted to the Public Works Department. The plan will be reviewed for consistency with City ordinances and policies. If the plan is approved by the Public Works Department, the applicant will be allowed to begin the excavation and fill process.

The process must be inspected by a City Representative and all fill shall be tested for compaction.

Areas which fail the compaction tests shall be excavated, the material replaced (or new material imported, depending on moisture content) recompacted and tested.

Areas which have been filled without adequate compaction tests or without inspection by a City Representative shall be considered as areas which have failed the compaction tests.

Areas of a multi-lot subdivision which are not graded at the same time as the rest of the subdivision will be required to comply with the provisions of a single-lot subdivision.

5.4.4 Single-Lot Subdivision

All single lot subdivisions shall be required to obtain a Grading and Excavation Permit as required by current City of Azle Building Code. Note that a single-lot subdivision shall be considered multi-lot if the subject parcel and any adjacent parcels are owned by the same individual or entity.

5.4.5 Testing

All compaction shall be tested by an approved soil testing laboratory.

1. All fill must be compacted to 95% Standard Proctor Dry Density.

2. Samples shall be taken at the rate of one (1) per lift per 500 cubic yards of fill, or; one (1) per lot, whichever is greater.
3. Slopes created by excavation or fill shall not exceed 3 horizontal to 1 vertical.

CITY OF AZLE
STORM DRAINAGE IMPROVEMENTS DESIGN CRITERIA

Section 1 Storm Drainage Improvements	12
Section 1.1 General	12
Section 1.2 Basis of Design.....	12
1.2.1 Rational Method	12
1.2.2 Unit Hydrograph Method.....	12
1.2.3 Runoff Coefficient.....	12
1.2.4 Time of Concentration.....	13
1.2.5 Rainfall Intensity – Duration – Frequency	13
1.2.6 Design Storm Frequency (See Table V-3)	13
1.2.7 Flow in Streets	14
1.2.8 Storm Drain Inlets	14
1.2.9 Storm Sewer Systems.....	15
1.2.10 Open Channels	16
1.2.11 Full Concrete Lining.....	16
1.2.12 Partial Concrete Lining	17
1.2.13 Earthen Channels	17
1.2.14 Bridges and Culverts	18
Section 2 Lot Grading	18
Section 2.1 Residential lot grading.....	18
Section 2.2 Commercial lot grading.....	18
Section 2.3 Finished floor elevations	18
Section 2.4 Off-site Drainage	18
Section 3 Preliminary Drainage Analysis Guidelines	19
Section 3.1 Drainage Study Guidelines	20

Section 1 Storm Drainage Improvements

Section 1.1 General

The criteria herein provided shall govern the design of storm drainage improvements within the City of Azle. Improvements shall include streets, alleys, storm sewers, channels, culverts, bridges, swales, and any other facilities through which storm water flows. All drainage improvements shall be constructed in accordance with City specifications and be in dedicated right-of-way (ROW) or drainage easement. The Developer shall provide all the necessary easement and ROW required for drainage structures, including storm sewers and open channels with access ramps. Easement width for storm sewer pipe shall not be less than fifteen (15') feet, and easement width for open channels shall be at least twenty-five (25') feet wider than the top of the channel with twenty (20') feet on one side to serve as an access way for maintenance purposes.

The Developer shall be required to install at his own expense all storm sewers and drainage structures. This policy is applicable to all required drainage facilities. The Developer shall be responsible for excavation and channel liner improvements based on the fully urbanized one hundred (100) year frequency discharge for the channel.

Section 1.2 Basis of Design

1.2.1 Rational Method

The method of calculation for storm runoff for drainage areas less than seven hundred fifty (750) acres will be the Rational Method. The method is expressed by the following equation:

$$Q = CIA$$

Q = storm discharge at the design point in cubic feet per second

C = runoff coefficient representing the ratio of peak runoff to the rainfall.

I = average rainfall intensity for the time of concentration at the design point in inches per hour (see Technical Paper No. 40).

A = area contributing runoff to the point of design in acres.

1.2.2 Unit Hydrograph Method

Peak discharges for drainage areas exceeding seven hundred and fifty (750) acres shall be determined by using the unit hydrograph method. The unit hydrograph for this method shall be developed by using the criteria as outlined in "Flood-Hydrograph Analysis and Computation", U.S. Army Corps of Engineers, Engineering and Design Manuals, EM 110-2-1405, Washington D.C. dated August 31, 1959. Typically a unit period of fifteen (15) minutes should be used for the determination of the unit hydrograph. In lieu of this procedure, there are several public domain micro-computer programs available which will provide satisfactory results.

1.2.3 Runoff Coefficient:

Storm drainage improvements shall be designed based on the drainage areas being fully developed. The zoning as shown on the current City Zoning maps or the City's Master Land Use Plan, whichever is more restrictive, shall determine the particular coefficient value selected. The table below indicates the runoff coefficients for the different land uses.

Runoff Coefficient "C"

Single Family Zoning Districts	0.55
Duplex Zoning Districts	0.60
Townhome Districts	0.65
Multi-family Districts	0.75
Commercial Districts	0.90
Industrial Districts	0.85
School, Church & Institutional Districts	0.65
Parks & Agricultural Districts	0.30

1.2.4 Time of Concentration

The time of concentration shall be defined as the time required for a drop of water to flow from the upper limits of a drainage area to the point of concentration. Times of concentration shall be calculated for all inlets, pipe junctions, and other critical design points in the proposed storm sewer systems. The following minimum inlet times of concentration may be used in place of calculated times. When calculating inlet times, consider overland flow channelized at such time as the distance traveled exceeds one hundred (100') feet.

TABLE V-2

Minimum Inlet Time of Concentration

Type of Area	Minimum Inlet Time
Business and Commercial	10 Minutes
Industrial	10 Minutes
Multi-family	10 Minutes
Residential	15 Minutes
Parks and Open Spaces	20 Minutes

1.2.5 Rainfall Intensity – Duration – Frequency

The rainfall intensity – duration – frequency compiled in Technical Paper No. 40 by the U.S. Weather Bureau, Department of Commerce shall be utilized in compiling rainfall intensity.

1.2.6 Design Storm Frequency (See Table V-3)

Storm frequency to be used in design shall be as shown in the following table:

TABLE V-3

Design Storm Frequency

Type of Facility	Minimum Design Frequency
Storm Sewers	5 Years
Streets	5 Years
Culverts, Bridges, Channels, Underpasses, and Creeks	100 Years

A storm sewer shall be designed to pick up flow from the street when the runoff from a five (5) year frequency storm exceeds the capacity of the street to its top of curb, or a spread of water on a collector street does not leave one (1) traffic lane dry, or the spread of water on an arterial street does not leave two (2) traffic lanes dry, whichever is more restrictive. The combined capacity of the street and ROW and/ or drainage easements and the storm sewer pipe shall be adequate to safely convey the runoff from a one hundred (100) year frequency storm.

1.2.7 Flow in Streets

Street capacity shall be determined by utilizing Manning's equation.

$$Q = \frac{1.486 AR^{2/3} S_0^{1/2}}{N}$$

Q = discharge in cubic feet per second

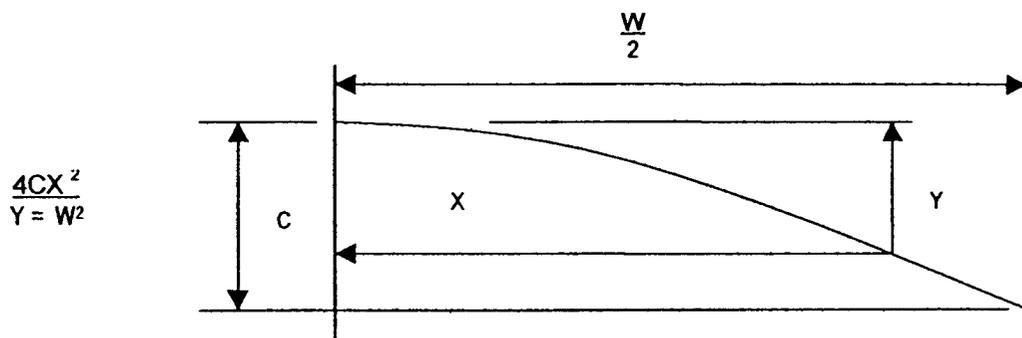
n = Mannings roughness coefficient, use 0.016 for pavement and gutters

A = cross-sectional area of flow in square feet

R = hydraulic radius in feet

S) = street or gutter slope in feet per foot

For parabolic crown streets, the cross slope shall be represented by the following formula:



All discharge of runoff from street to an open channel shall be in a flume or through an inlet with adjoining pipe and headwall.

1.2.8 Storm Drain Inlets

The capacity of a depressed curb inlet on grade will be based on the following equation:

$$q_1 = 0.7 \frac{1}{H_1 - H_2} (H_1)^{5/2} - (H_2)^{5/2}$$

q_1 = discharge into inlet per foot of inlet opening in c.f.s. / ft.
(maximum allowable is 1.0 c.f.s. / ft.)

H_1 = $a + y_0$

H_2 = a = gutter depression in feet

Y_0 = depth of flow in approach gutter in feet

The capacity of low point or drop inlets will be (maximum allowable is 2.0 c.f.s / ft) determined based on the broadcrested weir formula:

$$Q_1 = 3.0 (H_1)^{3/2}$$

1.2.9 Storm Sewer Systems

Storm sewers shall be designed using the continuity equation and Manning's equation.

$$Q = AV \text{ and}$$

$$Q = \frac{1.486}{N} AR^{2/3} S_f^{1/2}$$

Q = discharge in cubic feet per second

A = cross-sectional flow area normal to pipe in square feet

V = mean velocity of flow in feet per second

n = Manning's roughness coefficient

R = hydraulics radius in feet

S_f = friction slope in feet per foot

The coefficient of roughness to be used in design shall be as shown below:

Pipe Material

Reinforced Concrete Pipe

0.012

Storm sewer pipes shall be designed so that the mean velocity of flow is equal to or greater than two and one-half (2.5') feet per second and equal to or less than fifteen (15') feet per second. Pipes may be designed on a horizontal radius provided that the minimum centerline radius is equal to thirty (30) pipe diameters and the cumulative degree of curvature does not exceed sixty (60) degrees between points of entry. Pipes shall not be designed with vertical curves. The minimum pipe size is twenty-four (24") inches in diameter. If a lateral does not exceed fifty (50') feet, an eighteen (18") inch diameter pipe may be used.

The appropriate hydraulic grade line shall be plotted for all storm drainage design. The elevation of the hydraulic grade line shall in no case be closer to the gutter flow line than one and one-half (1.5') feet.

The head loss for each structure shall be computed as:

$$\frac{V_2^2}{2g} - K_j \frac{V_1^2}{2g} = h_j \quad \text{where;}$$

V₂ = outflow velocity

V₁ = inflow velocity

g = 32.2 ft. / sec²

K_j = head loss coefficient

h_j = head loss (minimum = .2 ft.)

Head Loss Coefficients (K_j)

Manhole or Inlet in line	0.50
Manhole or Inlet with lateral	0.25
Lateral only	0.75
Enlargements or contractions	0.30

$$h_j \text{ for beginning inlet is } \frac{1.25V_2^2}{2g}$$

Points of entry into the main storm drain shall be provided at least every five hundred (500') feet.

1.2.10 Open Channels

When the runoff exceeds the capacity of a seventy-two (72") inch diameter concrete pipe or equivalent cross sectional pipe area (i.e., 2-51 inch diameter concrete pipe) the discharge shall be carried in an open channel. Open channels shall be designed to carry the one hundred (100) year frequency storm runoff from a fully urbanized watershed with one (1') foot of freeboard.

1.2.11 Full Concrete Lining

All open ditches in all subdivisions that are used to carry runoff from more than two (2) lots shall be fully concrete lined. Lining of drainage ditch floors is to be a minimum of 8 feet wide and a minimum of six (6") inch thick, 3000 psi compressive strength concrete. Walls are to be lined with five (5") inch thick concrete, sloped no steeper than one (1') foot vertically to (1.5') feet horizontally. All concrete slabs are to be reinforced with a minimum of #4 steel reinforcing bars placed eighteen (18") inches or less on center each way, and provided with a minimum of two (2") inch diameter weep holes with approved filter media placed at intervals no greater than twenty-five (25') foot centers. One (1') foot wide concrete wings shall be provided at the top of each concrete side slope with four (4") inch diameter, PVC plastic sleeves formed in the wings for constructing fences along the top of the channel on each side. Vertical concrete retaining wall sections shall be designed with adequate footing and reinforcing steel to support all anticipated soil and water pressure loads acting on each side of the structure. In addition, retaining walls shall be designed to support at least a "high surcharge" load unless otherwise approved by the Public Works Director.

The height of concrete channel liner shall be at least one (1') foot above the fully urbanized one hundred (100) year water surface profile. Such profile shall be determined by backwater calculations using the HEC-2 computer program or other approved modeling methods which take into account backwater effects from downstream bridges, culverts, and other obstructions. Additional lining height may be required in areas of super critical flow or super-elevation.

In cases where the top of the channel liner must be constructed above natural ground level as required to fully contain the one hundred (100) year flow and where construction of levees or berms are permitted, provision shall be made for draining the local runoff which ponds behind the levees after the water surface in the channel recedes. Finished floor elevations may be established at least 1.5 feet above the peak one hundred (100) year water surface which ponds behind the levees, if approved by the Public Works Director.

If levees are not approved by the Public Works Department, then compacted earthen fill shall be placed along side of the channel within the entire flood plain area as required to concrete line the channel to a height of one (1') foot above the fully urbanized one hundred (100) year water surface elevation. Side slopes of the channel banks behind the concrete channel liner shall be no steeper than five (5') foot horizontal to one (1') foot vertical within the drainage channel easement, or for a distance of twenty (20') feet behind the top of channel whichever is greater. Side slopes beyond the twenty (20') foot minimum shall be no steeper than three (3') horizontal to one (1') foot vertical unless concrete lined or covered with approved soil erosion protection materials. Fencing shall be placed along the top of the concrete channel liner unless a sanitary sewer main or water line is located within an easement along the channel bank, in which case the fence shall be located on the easement line to permit Public Works unrestricted access to the utility line.

1.2.12 Partial Concrete Lining

If the one hundred (100) year fully channel contained water surface is above the natural ground line and levees are not approved or flood plain fill is not feasible, the concrete channel liner shall be extended to the natural ground line along each side of the channel. In no case shall the concrete lined capacity provided be less than required to convey the twenty-five (25) year frequency discharge. Drainage easements shall be provided along the sides of the concrete lined channel sufficient to encompass all areas beneath the water surface elevation resulting from a fully urbanized one hundred (100) year frequency storm discharge, plus such additional width easements as may be required to provide ingress and egress to allow maintenance and to protect adjacent property against erosion, caving-in of over-banks, etc., as determined and required by the Public Works Department. The Developer shall be responsible for furnishing complete cross-sections, grading plans, HEC-2 computer runs and all other documentation requested by the Public Works Department which is required to justify less than full section concrete channel lining and to establish the limits of the one hundred (100) year overflow flood plain lines. Water surface profile calculations shall be based on backwater effects created by an existing bridge, culvert or other obstruction regardless of future downstream proposed improvements.

1.2.13 Earthen Channels

Earthen channels may be constructed on the main channels of Ash Creek, Reynolds Branch of Ash Creek, and Walnut Creek. Approval of plans may be given by the Public Works Director only if the following stipulations are met:

1. The velocity of flow will not exceed eight (8) feet per second.
2. That reinforced concrete liner or other approved material is used to protect outside slopes in channel curves.
3. That sufficient energy dissipation is designed and constructed at all locations where concrete lining meets earthen slopes and bottoms.
4. That sufficient easements are dedicated to provide protection of adjacent properties or facilities.
5. That drainage easements are dedicated to encompass the area below the elevation of the water surface profile of a fully urbanized one hundred (100) year frequency storm, plus one foot of freeboard and any additional area necessary to provide access for maintenance, but not less than sixty (60) feet in width.
6. That arrangements have been made for perpetual maintenance of the channel by the adjacent property owners or the channel has been dedicated and accepted for City Park purposes.
7. That, in the opinion of the Public Works Director, the appropriate use of the neighboring property or the health and safety of persons affected will not be substantially injured.

Earthen channels, when approved, shall be constructed with a trapezoidal shape and a minimum bottom width of twelve (12) feet and side slopes not steeper than four (4) feet horizontal to one (1) foot vertical (5 to 1 preferred). A reinforced concrete pilot channel not less than twelve (12) feet in width or, as determined by the Public Works Director, shall be constructed. The side slopes shall be smooth, free of rocks, and contain a minimum of six (6") inches of top soil. Gobi blocks, rock rubble riprap, or other such similar materials, shall be placed a minimum of four (4) feet along both sides of the pilot channel to a depth of at least two (2) feet. Size and gradation of such material shall be determined based on peak discharge velocity requirements. The pilot channel shall be constructed as approved by the Public Works Department. The easement width for an earthen channel shall extend at least twenty (20) feet beyond the top of each bank and shall not be cross-fenced. The top of bank areas shall remain open for maintenance purposes.

After proposed earthen side slopes are cut, slopes shall be covered by grass according to the City's specifications but no less than one 2-inch high spring per half square inch of slope and bottom. The grass shall be planted to twenty (20') feet outside the top of banks.

The water surface profile (hydraulic grade line) for the one hundred (100) year frequency storm shall be shown. Maximum permissible mean velocities for the one hundred (100) year frequency discharge shall be eight (8) feet per second in partially lined concrete channels while in fully concrete lined channels, the maximum permissible mean velocities shall be fifteen (15) feet per second.

Special consideration should be given to outlet structures on channels where concrete lining meets earthen banks.

One reinforced concrete access ramp shall be provided at all intersections of every open channel with a public street. Access ramps shall be a minimum of twelve (12') feet wide with a maximum slope of sixteen (16%) percent.

1.2.14 Bridges and Culverts

All bridges and culverts shall be designed in accordance with the current edition of the "Hydraulic Manual" prepared by the Texas Department of Transportation, Bridge Division. The fully urbanized one hundred (100) year frequency storm hydraulic grade line shall be plotted. All culverts shall have headwalls and wing walls and wing walls upstream and downstream. All culverts shall pass the fully urbanized one hundred (100) year frequency storm runoff without allowing runoff to pass over the road. All bridges shall have the channel bottom and slopes concrete lined. The low point on the bridge structure shall be at least one (1') foot above the fully urbanized one hundred (100) year frequency storm water surface.

Section 2 **Lot Grading**

Section 2.1 Residential lot grading

Shall be conducted in a manner which will not allow runoff to cross more than two (2) lots (including the lot on which the drainage originates) before it enters a street or drainage easement. If this is not possible, then a drainage easement must be provided and any necessary facilities shall be constructed by the developer.

Section 2.2 Commercial lot grading

Will be conducted in a manner which will take all runoff to the adjacent streets or drainage easements. No lot will drain onto adjacent properties without the approval of the Public Works Director.

Section 2.3 Finished floor elevations

Shall be set a minimum of one (1') foot above the top of curb at the centerline of the lot or one and one-half (1.5') feet above the one hundred (100) year frequency storm water surface elevation, whichever is higher.

Section 2.4 Off-site Drainage

In respect to offsite drainage, the following provisions shall apply:

- a. The Developer shall be responsible for all runoff from property upstream of his proposed development as though it were fully developed. Runoff coefficients utilized to design drainage systems for the properties involved shall use the current zoning and/ or the future use of the property as shown in the Future Land Use Plan, whichever is the most intensive use.
- b. Effect of the development's drainage design on downstream properties and adjacent properties shall be given proper consideration. Water concentrated in streets, pipes, drains, culverts, and channels will be moved to a recognized watercourse without damage to intervening structures or undue spreading across intervening land.

A "recognized watercourse" shall herein be defined as either an open channel with hydraulic characteristics which provide capacity for at least a ten (10) year frequency storm after ultimate development of its watershed, or an underground storm drain with a capacity for at least a five (5) year frequency storm plus overland relief sufficiently to safely discharge up to a combined ten (10) year frequency flow (based on ultimate watershed development) without damage to adjacent property. Such ten (10) year capacity shall extend at least one hundred (100') feet downstream from the point of discharge or from the Developers property line, whichever is the greater distance. Typical examples of such "recognized watercourses" are the main channels of Walnut, Ash and Reynolds Branch of Ash Creek, or those tributary creeks, streams, channels, or underground storm drains which meet the hydraulic capacity requirements of a "recognized watercourse".

The Developer is responsible for constructing all offsite channelization or underground storm drain with overland relief required to discharge concentrated storm water from the low end of his development to the recognized watercourse, and also obtain all the necessary easements from intervening land owners. Calculations will be required to show that connecting offsite drainage ways are capable of handling any increase in runoff due to development, concentration, or diversion for at least the ten (10) year storm frequency.

Any drainage easements necessary due to the Developer's alteration of existing concentrated discharge locations (i.e., existing creeks, channels, or storm sewers) shall be acquired by the Developer at no cost to the City.

- c. Where the preliminary drainage analysis by the Developer indicates that additional runoff from the developing property will overload downstream drainage facilities and result in hazardous conditions, the City may withhold approval of the development until appropriate provisions have been made. These provisions shall include any drainage studies or plans necessary to indicate the offsite drainage problem will be corrected by offsite drainage construction,
- d. When required, the Developer will furnish to the City, a "hold harmless agreement" and a release of liability" indemnifying the City of Azle from liabilities due to damages caused to the downstream property owner by the discharges of storm drainage water from the said development.

Section 3 *Preliminary Drainage Analysis Guidelines*

The purpose of a Preliminary Drainage Analysis is to determine the need for drainage facilities and drainage easements either within the proposed development or offsite. These guidelines shall be used as the minimum for a Preliminary Plat. When requested by the Public Works Department, a Preliminary Drainage Analysis shall be submitted with a Replat or Short Form Plat. The Preliminary Drainage Analysis shall consist of the following items:

1. A topographical map drawn at a scale of 1" = 200' and depicting the watershed which drains to and across the subdivision. The map must include the subdivision and an area extending for 200' in all directions from the proposed subdivision as a minimum. The map must also include contour lines at one or two foot vertical intervals. Data from USGS Quad sheets will be acceptable only where City topo maps are not available. City topo maps may be obtained thru the North Central Texas Council of Governments office in Arlington, Texas.

The map shall indicate any offsite or adjoining areas outside the limits of the area being platted which are relevant to onsite drainage. Show any proposed or existing drainage and utility easements, water bodies, streams, parks, cemeteries, and drainage ditches. Show location of existing utilities including gas and petroleum lines, electric, telephone and TV cable. Also, the location of any existing structures located within the area being proposed for subdivision.

The datum for all topography shall be that of the United States Coast Geodetic Survey or of the City of Azle GIS datum. The Preliminary Analysis shall be sealed by a Registered professional Engineer licensed by the State of Texas.

2. Calculation of the drainage areas, time of concentration, and storm water runoff rate for the 5,10, 25 and 100 year frequency storms.
3. Identification of special flood hazard areas as defined by the Flood Damage Ordinance and as located by the current Flood Insurance Rate Map.

Section 3.1 Drainage Study Guidelines

A Drainage Study is required when it is determined that the area being developed will require storm water drainage facilities or drainage easements either within the development or offsite. The following criteria shall be used for the engineer to prepare a Drainage Study.

1. The study shall analyze the effect of the subdivision on existing downstream drainage facilities. The study shall be sufficient to verify compliance with the criteria contained in Subsection B, paragraphs 6,7, and 10 above.
2. The study shall include a topographical map as defined above in Subsection C, "Preliminary Drainage Analysis Guidelines"
3. Delineation and calculation of drainage areas together with proposed flow arrows shall represent flow patterns from runoff after all proposed improvements have been installed. Surface water drainage patterns shall be shown for each and every lot in the proposed subdivision and for each lot adjacent to the proposed subdivision.
4. In addition to those calculations required by the Preliminary Drainage Analysis, this study shall also include:
 - a. Hydraulic calculations to each lateral, manhole, inlet and outlet structure on the pipe. Head losses shall be calculated as described in Subsection B.
 - b. Inlet calculations utilizing the minimum time of concentration for the zoning type which is contributing the largest "CA" to the inlet.
5. If any of the portion of the proposed subdivision or its offsite improvements (including pipes or ditches) fall within the limits of a Federal Emergency Management Agency (FEMA) floodplain, additional backwater calculations may be required. Additional calculations in the form of a Conditional Letter of Map Revision will be required if:
 - a. Any portion of the proposed subdivision is determined to be located within a FEMA Zone "A" floodplain; or
 - b. Any portion of the proposed subdivision is determined to be located within a FEMA Zone "AE" floodplain and the overall subdivision (including all phases) is 5 acres or larger; or

- c. Any portion of the proposed improvements from a subdivision include dredging or filling within a FEMA designated floodway.

Backwater calculations shall comply with normally accepted standards as required by FEMA for application for a Letter of Map Revision (LOMR). In addition, the calculations must begin with a previously defined Base Flood Elevation (BFE). The calculations shall continue upstream through the project until the proposed BFE is within .01 feet of the existing BFE or the limits of the existing Zone "A" have been reached.

- 6. The Drainage Study shall be sealed by a Registered Professional Engineer licensed by the State of Texas. The following certification shall be included on the study and signed and sealed.

<p>I, _____, a Professional Engineer registered in the State of Texas, have prepared this drainage study in compliance with the latest published requirements and criteria of the City of Azle, and have verified that the topographic information used in this study is in compliance with said requirements and is otherwise suitable for developing this workable Plan of Drainage which can be implemented through proper subsequent detailed construction planning</p> <p>Signature _____, P.E. (Seal)</p>

CITY OF AZLE

WATER & WASTEWATER DESIGN CRITERIA MANUAL

Section 1 – Introduction..... 24

 1.1 Purpose..... 24

Section 2 - Preliminary Design 24

 2.1 General..... 24

 2.2 Project Folder 24

 2.3 Internal Coordination 24

 2.4 Record Research..... 25

 2.5 Utility Coordination..... 25

Section 3 – Water Design Guidelines 25

 3.1 General..... 25

 3.2 Water Main Separation From Wastewater Mains 25

 3.3 Size of Water Distribution Mains 26

 3.3.1 Fire Hydrant Spacing..... 27

 3.3.2 Private Fire Mains 27

 3.3.3 Public Fire Mains..... 27

 3.4 Depth of Cover for Water Mains 27

 3.5 Pipe Material 27

 3.6 Meters and Meter Vault 28

 3.7 Water Main Horizontal and Vertical Alignment..... 28

 3.8 Water Pipe Embedment 28

 3.8.1 Highway Crossings 29

 3.9 Creek Crossings..... 29

 3.10 Tunneling, Boring and Jacking 29

 3.11 Elevated Crossings 29

 3.11.1 Specific Utility Bridge..... 30

 3.12 Existing Water Main Replacement 30

 3.13 Methods of Connection 30

 3.13.1 Tapping Sleeve and Valve 30

 3.13.2 Type “D” Connection 31

 3.14.3 Cut-In Connection 31

 3.13.4 Main Extensions..... 31

 3.14 Valving..... 31

 3.15 Dead-end Mains 31

 3.16 Fire Hydrant Installation and Coverage 32

 3.17 Requirements for Abandoning Water Mains..... 32

 3.17.1 Replacement Mains 32

 3.17.2 Extension Mains..... 32

 3.17.3 Fire Hydrants 32

 3.17.4 Valves..... 32

Section 4 – Wastewater Design Guidelines 32

 4.1 General..... 32

 4.2 Estimated Wastewater Flows..... 33

 4.3 Separation and Spacing of Sewer Mains From Water Mains 34

 4.4 Size and Slope of Sewer 35

 4.4.1 High Velocity Protection..... 36

 4.5 Sewer Main Depth 36

 4.6 Recommended Cover 36

 4.7 Sewer Alignment 37

 4.8 Sewer Laterals..... 37

 4.9 Gravity and Force Main Sewer Pipe Material 37

4.10 Sewer Pipe Embedment.....	37
4.11 Manholes	38
4.11.1 Manhole Locations.....	38
4.12 Highway Crossings	39
4.13 Tunneling, Jacking, and Boring	39
4.14 Creek Crossings.....	39
4.15 Siphons.....	39
4.16 Abandonment of Sewer Mains	39
4.17 Abandonment of Manholes	39
4.18 Lift Stations.....	40
4.18.1 Preliminary Design Submittal.....	40
4.18.2 Site Layout.....	41
4.18.3 Hydraulic Design	42
4.18.4 Pumps.....	44
4.18.5 Mechanical	44
4.19.6 Electrical Requirements for New Lift Stations	45
4.19.7 Electronic Requirements for New Lift Stations	46
Section 5 – Right of Way	47
5.1 Right of Way Approvals and Requests prior to Contract/Work Order	47
5.2 Within Existing Public R.O.W.	47
5.3 Easement and R.O.W. Acquisition	48
Section 6 – Addenda, Plan Revision and Change Orders.....	48
6.1 General.....	48
6.2 Addenda	48
6.3 Plan Revisions	49
6.4 Change Orders	49
6.5 Method of Plan Modification	49
6.6 Distribution of Modified Plans or Specifications.....	49
Section 7 – Submittals	49
7.1 General.....	49
7.2 Submission of Submittals.....	49
7.3 Standards for Pipe	50
7.4 Submittal Review.....	50
7.5 Nonconformance of Submittal	50
7.6 Submittal Acceptable with Minor Exceptions	50
7.7 Acceptable Submittal.....	50
7.8 Submittal Records	50
Section 8 – Addenda, Plan Revision and Change Orders.....	51
8.1 General.....	51
8.2 Addenda	51
8.3 Plan Revisions.....	51
8.4 Change Orders	51
8.5 Method of Plan Modification	51
8.6 Distribution of Modified Plans or Specifications.....	52
Section 9 – On-Site Sewage Facilities.....	52
9.1 General	52
9.2 Permits Required	52
9.3 Site Evaluations.....	52
9.4 Planning Requirements.....	52
9.5 On-Site Sewage Facility Land Use Requirements.....	52

Section 1 – Introduction

1.1 Purpose.

The purpose of the manual is to provide a set of minimum guidelines for the design and construction of sanitary sewers and water distribution systems within the City of Azle, Texas and within its extraterritorial jurisdictions. The criteria established in this manual have been developed from a review of various publications, North Central Texas Council of Government Standards (NCTCOG) (as amended by the City of Azle), regulatory requirements, and City of Azle Public Works divisions that oversee the design, construction and maintenance of the water distribution and wastewater collection systems. These guidelines are to be used by designers in the City of Azle Public Works Department, consulting engineers employed by the City and subdivision and land development projects proposed for construction within the City and within its extra-territorial jurisdictions. The criteria established in this design manual provide the basic guidance, however, responsibility for actual design remains with the design engineers. Users of this manual should be knowledgeable and experienced in the theory and application of water and sanitary engineering. The Director of Public Works must approve any deviations from criteria established in this manual. Along with this design manual, the Azle Subdivision and Land Development Regulations shall be consulted for additional criteria. The criteria established in this manual do not supersede the criteria contained in the Azle Subdivision and Land Development Regulations and any revisions to the subdivision regulations shall supercede the criteria in the manual.

Section 2 - Preliminary Design

2.1 General

The success of any project can be attributed to the thoroughness of the initial investigations undertaken by the designer. This section describes the general steps that are essential when beginning a project to develop the vision required for preparing the final engineering plans and specifications.

2.2 Project Folder

The designers shall keep a project folder for each project. The folder shall contain all pertinent correspondence including, but not limited to the following items:

- A. Assignment memo for the project, if applicable.
- B. Copies of form memos from other City divisions.
- C. Correspondence to and from the private sector, e.g., consulting engineers, developers, etc.
- D. Correspondence to and from other utilities such as gas, electric, cable, telephone, etc.
- E. Engineering calculations used to determine the size of pipe, alignment, cost, etc. of the project.
- F. Notes to file concerning conversations with citizens, consultants, etc.

2.3 Internal Coordination

Internal coordination among departments within the City is necessary to prevent duplication of work and to inform other sections of activity in the project area. A form memo shall be used for the internal coordination process. This form is to be completed by the designer and forwarded to the following:

1. Engineering & Capital Projects Administrator
2. Engineering Administrator, Electric Utility

3. Director, Parks and Recreation

2.4 Record Research

A thorough search for and review of existing design tracings is required for all design projects. These include water and wastewater construction plans, map books and as-built information. Verification of main location and/or depth may be obtained by field trips by the designers. The designer should visit all sites of proposed construction prior to and during design.

2.5 Utility Coordination

- A. The designer shall initiate the utility coordination process prior to survey or design.
- B. The designer will furnish for submittal to the utilities a description of the proposed project and the project
- C. location maps (water, sewer, or Mapsco), highlighting in pink or blue the proposed route or location of the project. The following utility companies will be contacted:
 1. General Telephone Company
 2. Texas Utilities (TXU)
 3. Marcus Cable
 4. CoServ
 5. Dig Tess
- E. If the designer is in need of a specific location of a facility, a field determination shall be coordinated with the specific utility company. The requesting party shall be responsible for any excavation required to locate existing facilities, unless the owner of the existing facility desires to make the excavation, or as governed by the existing franchise law. In any case the owner of the utility shall be contacted prior to excavation and shall be afforded the opportunity to have a representative on site to ensure protection of the owner's interests.

Section 3 – Water Design Guidelines

3.1 General

It is the responsibility of the designer to ensure that the final design of a water main is in conformance with the following:

- A. North Central Texas Standard Specifications for Public Works Construction (COG Specs)
- B. COG Standard Drawings for Public Works Construction
- C. City of Azle addendum to COG specifications and Standard drawings
- D. Azle City Code, and Subdivisions and Land Development Regulations
- E. Rules and Regulations for public water systems established by the Texas Natural Resources Conservation Commission (TNRCC).

3.2 Water Main Separation From Wastewater Mains

Water main shall be separated by a minimum of nine feet from wastewater mains as set forth in the TNRCC Article 317 & 290 guidelines. When the nine feet separation is unattainable and the wastewater main is in poor condition, or constructed with non-pressure joints, the replacement of the wastewater main shall be considered. Refer to Section 4.3 "Separation and Spacing of Sewer Mains from Water Mains".

3.3 Size of Water Distribution Mains

Water mains shall be sized according to the City of Azle's water distribution system master plan. The designers shall contact the Public Works Department to obtain the latest version of the water distribution system model and determine the size of water main required. For all residential, commercial, industrial and developments of any other kind tying into the City's water distribution system, the following guidelines shall be used:

- A. The designer shall obtain the as-built water maps from the Public Works Department and use the following criteria for sizing the water lines.
 - 1. Average daily demand per capita per day = 180 GPCD
 - 2. Maximum daily demand / Average daily demand = 2.2
 - 3. Peak hour demand / Maximum demand = 1.7
 - 4. For single Family Residential – Use 3.2 people/unit
 - 5. For Multi Family Residential – Use 2.5 people/unit
- B. Water system shall be provided with a sufficient number of outlets and shall be of sufficient size to furnish adequate water supply to furnish fire protection to all lots and conform to the City master water plan.
- C. Water pipe shall be minimum 6-inch diameter. The standard sizes that shall be used are 6", 8", 12", 16", 20", 24", 30", 36" and 42." The 10", 14", 18", 21", 33" pipe sizes are considered non-standard by the City and shall not be used.
- D. Every development shall provide adequate water capacity for fire protection purpose. The procedure for determining fire flow requirements for building or portions of buildings here after constructed shall be in accordance with Appendix III-A of the Uniform Fire Code. For any platted lot where the end use is not defined, the following standards shall apply:

Area	GPM
One and two family dwellings less than 3,600 SF	1,000
Buildings other than one and two family dwellings less than 3,600 SF	1,500
Medium-intensity commercial and light industrial	3,000
High-intensity commercial and industrial	4,000

All fire flows to be calculated with twenty (20) pounds residual pressures.

In addition to the fire flow requirements specified above, the development shall provide adequate water capacity to satisfy the following demand conditions:

Peak day – Peak hour demand

Peak day – Average demand plus fire flow.

The water system shall be designed in accordance with the City's Water Distribution System Master Plan and the design standards specified in the City's Water and Sanitary Sewer Design Criteria Manual.

Mains are to be sized to ensure less than 1 foot of head loss per 1000 feet of water main at Hazen Williams coefficients of C = 100 except for fire flows demands within the subdivision internal distribution system.

Special and unique exceptions to the above standards may be made by the planning and zoning commission after recommendation from the public utilities board.

3.3.1 Fire Hydrant Spacing

Fire hydrants shall be maximum of six hundred (600) feet apart in residential areas and three hundred (300) feet apart in commercial / industrial areas.

3.3.2 Private Fire Mains

Fire flow requirements for Buildings shall be in accordance with the City of Azle Code of Ordinance and Appendix IV of the current Uniform Fire Code. Private fire protection water mains shall be installed in accordance with N.F.P.A. 24 and Uniform Fire Code requirements. Private fire protection mains shall be permitted by the Fire Marshall Office.

3.3.3 Public Fire Mains

Fire Flow requirements for Buildings shall be in accordance with Chapter 29 of the City of Azle Code of Ordinance and Appendix IV of the current Uniform Fire Code.

Public fire protection water mains shall be installed according to the City of Azle Water Utilities Design Criteria.

3.4 Depth of Cover for Water Mains

The following guidelines apply to water main installations in public right-of-way or unimproved areas without permanent paving surfaces with base (such as asphalt streets without permanent base, gravel or unimproved streets, or streets without curb and gutters).

Pipe Size	Minimum Depth of cover to top of pipe
6" through 12"	5'
16" and larger	6'

For water main installation in proposed or existing permanent pavement (such as improved streets with curb and gutter) the following guidelines shall apply:

Pipe Size	Minimum Depth of cover to top of pipe
6" through 12"	42"
16"	5'
20" and larger	6'

Additional depth of cover may be required for low lying areas where drainage improvements are anticipated.

3.5 Pipe Material

The specification of pipe material is the responsibility of the designer based on the analysis of specific site and loading conditions, and pressure requirements. The following guidelines are based on pipe size only and in no way relieve the designer of the responsibility of pipe material specifications applicable to the particular job:

Pipe Size	Pipe Material
6" through 12"	PVC AWWA C-900, minimum DR 18 (150 Pressure Class). Ductile Iron AWWA C-150 Special Thickness Class 51 (cement mortar lined polyethylene encased).
16" through 20"	Ductile Iron AWWA C-150, Special Thickness Class 51 (cement mortar lined, polyethylene encased). Bar Wrapped Concrete Steel Cylinder, AWWA C-303, working pressure of 150 psi with 100 psi surge pressure. Cement Mortar Interior and Exterior Lined Steel Pipe, AWWA C-200, working pressure of 150 psi working pressure and 100 psi surge pressure.
24" and larger	Ductile Iron AWWA C-150, Special Thickness Class 51 (cement mortar lined, polyethylene encased). Bar Wrapped Concrete Steel Cylinder, AWWA C-303, working pressure of 150 psi with 100 psi surge pressure. Cement Mortar Interior and Exterior Lined Steel Pipe, AWWA C-200, working pressure of 150 psi working pressure and 100 psi surge pressure.

The designer shall also specify pipe material based on restrictions due to special construction methods, such as follows:

- A. No PVC pipe for elevated crossings

3.6 Meters and Meter Vault

All meters supplied by the City of Azle will be at contractor's expense. For larger meters, the type of meter, whether compound or turbine will be at the City of Azle's discretion.

Meter vaults are to be provided by the contractor.

3.7 Water Main Horizontal and Vertical Alignment

The following guidelines should aid the designer with placement of water lines:

- A. In existing streets water lines shall be placed in the pavement 2 feet inside from the curb and gutter line intersection. For new development, water lines shall be placed on the north and east side where possible, 2 feet inside from the curb and gutter line intersection.
- B. All water lines shall be laid as straight as possible. Avoid excessive number of high points and low points between cross street connections as they trap air pockets.
- C. Minimum radius of curve and maximum deflection angle of pipe joints will be restricted to 80% of manufacturer's recommendation, after which the use of horizontal or vertical bends will be required.
- D. All vertical and horizontal bends shall be restrained joints. When multiple vertical bends are required for utility clearances, all fittings are to be designed with restrained joints in addition to concrete thrust blocking.

3.8 Water Pipe Embedment

The type of embedment for water mains shall be shown in Drawings W201 and W203 in Appendix-A.

3.8.1 Highway Crossings

The designer shall, prior to the design of any highway crossing, contact the appropriate regulatory agency and determine if there are any special requirements.

3.9 Creek Crossings

Where water mains are laid under any flowing stream or semi-permanent body of water, such as a marsh or pond, the water main shall be installed in a separate watertight encasement pipe or installed with valves on each side of the crossing to allow the isolation and testing of that portion of the water main to determine if there are any leaks.

A primary consideration in the design of creek crossings is the prevention of soil erosion at the areas of trench backfill. The designer shall determine the need and limits of any special embedments and also determine and specify the limits for specialized backfills.

3.10 Tunneling, Boring and Jacking

Tunneling, jacking and boring are methods used for water line placement under restrictive conditions when open cut construction is not allowed. Only straight pipe alignments for both horizontal and vertical alignment are allowed.

Designers should consider the location, size and depth of boring and receiving pits when choosing the beginning and ending stations for boring. A bore pit is over 20 feet in length to accommodate one joint of pipe. Width of the bore pit can vary depending on the depth and size of pipe, with the narrowest width about 5 feet. The preferred location for the bore pit is the lower elevation end of the tunnel. This allows any groundwater and/or boring slurry to drain from the tunnel into the bore pit. The water can then be removed by pumping.

The casing pipe thickness design shall be based on the following criteria:

- Pipe diameter <16-inch – casing thickness 3/8 - inch.
- Pipe diameter >16-inch – casing thickness 0.5 - inch.

3.11 Elevated Crossings

Elevated crossings create special design problems in which no set of circumstances is duplicated from one design to another. Two methods of elevated crossings acceptable for consideration by the designer are 1) hanging the water main on a roadway bridge or 2) designing a specific utility bridge for the support of the water main crossing.

The following basic criteria must be addressed by the designer for all elevated crossing:

- A. Provisions for thrust restraints at the points of transition from a buried conduit to an elevated conduit and for all elevated changes of alignments and fittings.
- B. Increased loading effects on the bridge created by a full main and its supports.
- C. Access to main for maintenance purposes.
- D. Coatings or methods of corrosion control for elevated pipe sections and pipe supports.
- E. P.V.C. pipe is not to be used for any exposed sections of elevated crossing because of the deterioration caused by the ultraviolet rays present in direct sunlight.
- F. Evaluate the freeze potential of small diameter or low flow mains.

- G. To ensure positive restraint in all directions, each joint of pipe is to have (2) support straps. Spacing of pipe supports is to be in accordance with the length of pipe joints specified and one of the supports should be placed near the bell end of the pipe.
- H. Air relief provisions are required where high points are created in the main.
- I. A minimum of one expansion joint fitting is recommended for a water main crossing on a roadway bridge. Placement of the expansion joints should coincide with the expansion joints of the road way bridge.

3.11.1 Specific Utility Bridge

In addition to the guidelines for all elevated crossings, the following criteria must be addressed for the designs of specific utility bridges for elevated crossings:

- A. Height is required to clear specific crossing (Example: 2 feet above 100 year flood elevation for creeks.)
- B. Required length of spans and spacing of bridge piers to clear desired physical crossing.
- C. Soil conditions in regard to design of the piers.
- D. Lateral loadings created by winds or open bodies of flowing water.
- E. Potential hazards of facility to the general public, both pedestrian and vehicular.

3.12 Existing Water Main Replacement

To replace an existing main, the new main should be designed parallel to, and two to three feet away from the main being replaced. The designer shall undertake a field investigation to determine pavement condition over the existing main. The pavement may have been on occasion patched due to the existing main's breaks over the years. Based on this field investigation, the designer shall include additional quantities for pavement replacement if needed. Also, it is advisable to locate the proposed main at least five feet away from the existing curb so as to avoid damaging the curb during installation of the proposed main.

3.13 Methods of Connection

Prior to the design connection points between a proposed main and any existing main, the designer is to investigate and determine if his proposed water main crosses the boundary between any pressure zones. Even though there are physical continuations of water pipes between pressure zones, they are designed with valves that are closed at the boundary points so that each pressure zone is isolated. Proposed mains that approach pressure zone boundaries should be designed to loop within their designated pressure zones and also should be designed with a minimum length of dead-end main. The designer can determine the pressure zone boundaries by consulting the as-built water maps that show the designated closed valves between pressure zones and by consulting the Public Works Department.

3.13.1 Tapping Sleeve and Valve

Tapping sleeves with tapping valves should be used whenever possible for connections to existing mains in order to avoid interruption of water services.

- A. Size on size taps are allowed up to 12"

(Example: 12" X 12")

- B. Size, less one standard pipe size taps, are the largest allowed on 16" and larger connections. See Figure 3.2.

(Example: 16" X 12", 16" X 8" and 16" X 6" taps are allowed).

3.13.2 Type "D" Connection

When two mains, 12" and over are designed such that they cross each other, they should be connected by means of a Type "D" connection instead of the installation of a cross.

3.14.3 Cut-In Connection

On occasions when connecting to an existing main, it may be desirable to have an additional valve on the existing main. In this situation, the designer should consider using a cut-in connection with a tee and valve being cut into the existing main.

3.13.4 Main Extensions

It is recommended, though not required, that a new valve be installed at the point of connection for water main extensions. This will facilitate the testing and chlorination of the new main prior to its placement into service.

3.14 Valving

The designer should place valves on proposed water mains so that they may be easily be located in the future by the valve operating crews. Valves should also be placed in such a manner so that the isolation of sections of main will not unduly impact water customers or reduce fire coverage. All isolation valves shall be gate valves. The following guidelines should aid the designer in placement of valves on proposed water mains:

- A. Valves are to be located at street intersections at the projection of property lines. An exception to this is when the main connection is by the tapping sleeve and valve method. This specific type of construction requires the placement of the valve at the point of connection.
- B. Valves for line sizes 12" in diameter or less should be not spaced any farther apart than one thousand (1000) feet. For city blocks that are longer than one thousand (1000) feet between street intersections, placement of a valve will be required between street intersections.
- C. Valves should be generally located so that no more than four valves are required to isolate a section of main. For mains larger than 12" in diameter, valves spacing and placement shall be subject to alternate criteria approved by the City of Azle.
- D. All fire hydrant leads are to be designed with a valve that is positively anchored to the main line.

3.15 Dead-end Mains

Dead-end main situations should be avoided whenever possible. These situations create a stagnant water condition that can cause taste and odor problems as well as low chlorine residuals. These mains create maintenance problems because they have to be flushed. If a dead-end main situation is unavoidable, it should be designed so that it may be periodically flushed of stagnant water. The following two design methods are considered acceptable for the provisions of flush points.

- A. Locate a fire hydrant near the main's end.
- B. Install a 2" valve assembly to serve as a flush point at the main's end.

It is recommended that a dead-end main should have no more than one blow off fire hydrant connected to it. If the length of the dead-end main is such that a fire hydrant is required along it, then the designer should consider any additional fire hydrants that need to be placed on the cross feed mains.

3.16 Fire Hydrant Installation and Coverage

The designer should locate fire hydrants as close as possible to street intersections but out of the radius of the curb turnout. This positioning of fire hydrants provides coverage along several streets. When spacing requirements necessitate the installation of fire hydrants between street intersections, they should be placed at the projection of lot lines between property owners. For main replacement projects in established neighborhoods, Fire hydrants should be designed as close as possible to the old fire hydrant location, provided coverage is adequate. Neighborhood residents are familiar with the fire hydrant being at that location are not likely to complain when a new fire hydrant is put at the same location. Fire hydrants are not to be installed closer than nine (9) feet to any wastewater main or any wastewater appurtenance.

3.17 Requirements for Abandoning Water Mains

The designer is to note the limits and appropriate conditions for the abandoning of existing water mains that to be replaced by the construction of any proposed water mains. The designer should also make allowances in his designs so that the existing and proposed mains may be in service simultaneously thereby providing a means for transferring customer's services from the old main to the new main with minimum interruption. If the construction of a proposed main necessitates the abandoning of the existing main prior to the new main's placement into service, then provisions for a temporary water main with services must be addressed with the design.

3.17.1 Replacement Mains

On mains being abandoned, the designer should note and locate points of cut and plug as close as possible to the main that remains in service.

3.17.2 Extension Mains

If a design requires that an existing main is to be cut by a connection with a proposed main, then no cut and plug is to be specified.

3.17.3 Fire Hydrants

Fire hydrants located on mains being abandoned are to be removed and delivered to the City of Azle Water Department.

3.17.4 Valves

Valves located on mains being abandoned shall be removed and delivered to the City of Azle Water Department.

Section 4 – Wastewater Design Guidelines

4.1 General

It is the responsibility of the designer to ensure that the final design of a sewer main is in conformance with the following:

- A. North Central Texas Standard Specifications for Public Works Construction (COG Specs)
- B. COG Standard Drawings for Public Works Construction
- C. City of Azle addendum to COG specs and drawings
- D. Azle City Code, and Subdivisions and Land Development Regulations
- E. Rules and Regulations for public water systems established by the Texas Natural Resources Conservation

F. Commission

4.2 Estimated Wastewater Flows

- A. For sewers in new developments, sewer lines and lift station shall be designed for the estimated future population to be served, plus adequate allowance for institutional and commercial flows. TNRCC Table 4.1 on page 21 – Design Organic Loadings and Flows for New Wastewater Treatment Systems should be used as a guide to generate wastewater flows. However, minimum flow capacity for sizing of sewers for peak flow condition shall not be less than as follows.
- B. Delineate the proposed development that will drain into the sewer main and lift station. Add drainage areas from up stream sub basins.
- C. To calculate sewer flows, use the following design parameters:
 - 1. Use 4 houses per acre for off-site area and add the number of proposed lots for the development to establish total number of lots.
 - 2. Use 3.2 capita per lot
 - 3. Use average daily flow of 100 gal/capita/day.
 - 4. Peak 2-hour flow factors are as follows:
 - a. For flow less than 0.5 MGD use 5 peaking factor
 - b. For flow above 0.5 MGD use 4 peaking factor

For replacement of existing sewer and construction of parallel sewers for additional capacity, wastewater flow data will be provided by the City from data generated by sewer shed computer models developed by the City.

Table 4.1 - Design Flows per TNRCC Criteria

Source	Remarks	Daily Wastewater Flow (Gallons per Person)	Duration of Flow (Hours)
Municipality	Residential	100	24
Subdivision	Residential	100	24
Trailer Park (Transient)	2½ Persons per Trailer	50	16
Mobile Home Park	3 Persons per Trailer	75	24
School with Cafeteria	With Showers	20	8 - 12
	Without Showers	15	8 - 12
Recreational Parks	Overnight User	30	16
	Day User	5	16
Office Building or Factory	—	20	Length of Shift NOTE: The Facility shall be Designed for largest shift.
Motel	—	50	12
Restaurant	Per Meal	5	12
Hospital	Per Bed	200	12-24
Nursing Home	Per Bed	100	12 - 24
Alternative Collection Systems (Subchapter D)	Per Capita	75	24

4.3 Separation and Spacing of Sewer Mains From Water Mains

- A. When water mains and sanitary sewers are installed, they shall be installed no closer to each other than nine feet in all directions and parallel lines must be installed in separate trenches. Where the nine-foot separation distance cannot be achieved, the guidelines in this section shall apply. The guidelines also are listed in tabular form in Table 4.2.
1. Where a sanitary sewer parallels a water line, the sewer shall be constructed of cast iron, ductile iron or PVC meeting ASTM specifications with a pressure rating for both the pipe and joints of 150 psi. The vertical separation shall be a minimum of two feet between outside diameters and the horizontal separation shall be a minimum of four feet between outside diameters. The sewer shall be located below the water line.
 2. Where a sanitary sewer crosses a water line and the sewer is constructed of cast iron, ductile iron or PVC with a minimum of pressure rating of 150 psi, an absolute minimum distance of six inches between outside diameters shall be maintained. In addition the sewer shall be located below the water line where possible and one length of the sewer pipe must be centered on the water line.
 3. Where a sewer crosses under a water line and the sewer is constructed of ABS truss pipe, similar semi-rigid plastic composite pipe, clay pipe or concrete pipe with gasketed joints, a minimum two foot separation distance shall be maintained. The initial backfill shall be cement stabilized (two or more bags of cement per cubic yard of sand) for all sections of sewer with nine feet of the water line. The initial backfill shall be from one-quarter diameter below the center line of the pipe to one pipe diameter (but not less than 12 inches) above the top of the pipe.
 4. The crossing and both ends sealed with cement grout or manufactured seal. Where a sewer crosses over a water line, all portions of the sewer within nine feet of the water line shall be constructed of cast iron, ductile iron or PVC pipe with a pressure rating of at least 150 psi using appropriate adapters. In lieu of this procedure, the new conveyance may be encased in a joint of 150 psi pressure class pipe at least 18 feet long and two nominal sizes larger than the new conveyance. The space around the carrier pipe shall be supported at five foot intervals with spacers or be filled to the spring line with washed sand. The encasement pipe should be centered on
 5. The sewer need not be disturbed where a new water line is to be installed parallel to an existing sewer that shows no evidence of leakage and the water line is installed above the sewer a minimum of two feet vertically and four feet horizontally. Should excavation for the sewer line produce evidence that the sewer is leaking, the sewer must be repaired or replaced as described in sub-paragraphs (a) or (d) above.
 6. The sewer need not be disturbed where a new water line is to cross over (by two feet or more) existing sewer showing no evidence of leakage. Should excavation for the sewer line produce evidence that the sewer is leaking, then the sewer must be repaired or replaced as described in subparagraphs (b) or (d) of the paragraph.
- B. Unless sanitary sewer manholes and the connecting sewer can be made watertight and be tested for no leakage, they must be installed so as to provide a minimum of nine feet of horizontal clearance from an existing or proposed water line. Where the nine-foot separation distance cannot be achieved, an encasement pipe as described in paragraph (1)(d) of this subsection may be used for the water line.
- C. Fire hydrants shall not be installed within nine feet vertically or horizontally of any sanitary sewer regardless of construction.
- D. No physical connection shall be made between a drinking water supply (public or private) and a sewer. Any appurtenances shall be designed and constructed so as to prevent any possibility of sewage entering the drinking water system.
- E. No sewer carrying domestic or industrial wastes shall cross section mains to pumping equipment. Water mains shall not be installed closer than ten feet to septic tank drain fields. No raw water lines shall be installed within five feet of any tile or concrete sanitary sewer.

4.4 Size and Slope of Sewer

After the designer has determined the wastewater flows per Section 4.2, the sewer size can be determined using the following criteria; however, no sewer other than service lateral and force mains shall be less than 8 inches in diameter. The size and grade of the proposed sewer shall be evaluated by the Manning's Equation.

$$V = \frac{1.49(R)^{0.67}(S)^{0.50}}{n}$$

Where, V = velocity (feet per second)

n = Manning's coefficient of roughness

R = hydraulic radius (feet)

S = slope of energy grade line (feet per foot)

Proposed sewers shall be designed with slopes sufficient to give a velocity of not less than 2.0 feet per second (fps). It is desirable to design for 3.0 fps velocity in the sewer. The minimum acceptable Manning's "n" factor for design shall be 0.013. This "n" value takes into consideration the slime, grit and grease layers that will affect hydraulics or hinder flow as the pipe matures. The sewer pipe grades shown below are based on an "n" value of 0.013 and are the minimum acceptable slope for sewer lines.

Size of Pipe in Inches I.D	Minimum Slope In Percent	Maximum Slope in Percent	Capacity Flowing Full at Min. Slope (MGD)
6	0.60	12.35	0.28
8	0.33	8.40	0.45
10	0.25	6.23	0.71
12	0.20	4.88	1.03
15	0.15	3.62	1.62
18	0.11	2.83	2.25
21	0.09	2.30	3.07
24	0.08	1.93	4.14
27	0.06	1.65	4.91
30	0.055	1.43	6.23
33	0.05	1.26	7.66
36	0.045	1.12	9.17

The capacity of the sewer pipe flowing full shall be computed by the following equation:

$$C = \frac{0.299(D)^{2.67}(S)^{0.50}}{n}$$

Where C = capacity (million gallons per day)

n = Manning's coefficient of roughness

D = inside diameter (feet)

S = slope of the energy grade line (feet per foot)

Table 4.2 - Separation of Water and Sewer Lines

New Water And Existing Sanitary Sewer						
New Water Parallel Existing Sewer	Water Above Sewer	Std	Clay, Conc, ABX CI DI PVC	2'	4'	If sewer shows no sign of leakage, then leave sewer alone. If sewer shows signs of leakage, then repair or replace.
New Water Crossing Existing Sewer	Water Above Sewer	Std	ABS, Clay, Conc Composite	2'	NA	If sewer shows no sign of leakage, then leave sewer alone. If sewer shows sign of leakage, then repair or replace.
New Water Crossing Existing Sewer	Sewer Above Water	Std	ABS, Clay, Conc, Composite	2'	NA	Replace existing sewer with one joint CI DI PVC-150 PSI, centering over water line.
New Water Parallel to Existing Sewer	Sewer Above Water	Std	ABS, Clay, Conc, Composite	2'	4'	Replace existing sewer with CI, DI, PVC-150 PSI or cement stabilized sand backfill in initial backfill zone of sewer where parallel closer than 9', or encase water in 150 PSI Pipe two nominal sizes larger.

4.4.1 High Velocity Protection

Where velocities greater than 10 fps will occur when 0.25 depth of the pipe is flowing full at slopes greater than those listed in Section 4.4 above, designer will make special provisions to protect the pipe due to displacement of the bedding by erosion and/or shock.

4.5 Sewer Main Depth

Minimum depth for the design of sewer mains shall be determined by providing a two percent grade for the lateral from the center of the house or building to the center of the proposed main and including an additional two foot drop. Therefore, for a house 100 feet from the proposed sewer main, the designed depth of the main shall be at least 4.0 feet below the finished floor elevation of the house since:

$$2 \text{ feet} + (2\% \text{ of } 100 \text{ feet}) = 4.0 \text{ feet}$$

The lateral also must have at least 2 feet of cover at its shallowest point. The designer is responsible for insuring that sufficient depth and grade is maintained to serve all building sites in the sewer shed.

4.6 Recommended Cover

Recommended cover for all sewer mains is 4 feet to 6 feet. Minimum cover shall be 3.5 feet. Any main with less than minimum cover shall be encased in Class "G" embedment.

When establishing depth for proposed wastewater mains, designers should be aware of proposed street grades in unimproved areas. This information can be obtained from the Public Works Department in City Hall.

Designers should also anticipate the size of proposed storm sewers that will be installed in unimproved streets. To do this, calculate the cross-sectional area of both drainage ditches and convert that area into a circular area of equivalent storm sewer pipe, thus determining the anticipated size of the future storm sewer. Future storm sewers should be at least 2.5 feet below the top of the curb. The proposed sewer main should be at least 2 feet below the bottom of the future storm sewer.

4.7 Sewer Alignment

The following guidelines should aid the designers with the alignment of wastewater lines:

- A. For new construction in areas not served, sewer mains shall be laid straight between manholes at the center of the pavement. No horizontal or vertical bends are allowed between manholes.
- B. Avoid shifting mains from one side of the R.O.W. to the other side of the R.O.W. between street intersections.
- C. When existing flow permits, it is recommended that 8 and 10 inch mains being replaced be constructed horizontally in the same ditch.

4.8 Sewer Laterals

The minimum size of a sanitary sewer lateral within a dedicated easement on R.O.W. shall be 6- inches in diameter. Clean-outs shall be provided on laterals.

Manholes shall be provided for lateral connections greater than 6-inch in diameter. Laterals shall be constructed up to the property line and shall be located at a point 5 feet downstream from the center of the lot on unimproved property. For improved property, designer should use discretion in lateral placement.

Preferred grade for lateral construction is 2%. It is recommended that laterals not be designed with less than 1% grade. Minimum size for laterals is as follows:

- A. 4" minimum for single family
- B. 6" minimum for local retail, light commercial and apartment
- C. 8" minimum for manufacturing and industrial

4.9 Gravity and Force Main Sewer Pipe Material

Gravity sewer pipe shall be PVC and meet the following criteria

Size	PVC Sewer Pipe
6" through 15"	SDR 35
18" through 24"	ASTM F 679

Design calculations and pipe selection for shall be submitted to the Public Works Department. For pipe sizes over 24" diameter, pipe material shall be approved on a project by project basis.

Force main sewer pipe shall be designed to meet the working and surge pressure requirements of the particular application. Design calculations and pipe selection shall be submitted to the Public Works Department. Different pipe materials shall not be mixed between manholes. If it is anticipated that a mixing of materials will occur, the designer shall design a manhole at the point of transition of pipe materials. For previously placed stub out of a material other than PVC pipe, designer shall add a note to the plans calling for removal of the stub out or change the material of the proposed pipe for that section of pipe between manholes.

4.10 Sewer Pipe Embedment

Embedment requirements shall be based on sewer mains under proposed pavement, unpaved areas and existing pavement. Embedment and backfill up to 6 inches above the top of the pipe will be based on materials as called for in North Central

Texas Council of Governments (NCTCOG) Standards 2.1.8 (a) crushed stone embedment - Aggregate Grade 4.

Standard crushed rock Aggregate Grade 4	Percent
Retained on 1 - 1/2 inch sieve	0 %
Retained on 1 inch sieve	0 - 5 %
Retained on 1/2 inch sieve	40 - 75 %
Retained on No. 4 sieve	90 - 100 %
Retained on No. 8 sieve	95 - 100 %

4.11 Manholes

Manholes to be constructed on existing or proposed sewer lines shall be sized as follows:

Pipe Diameter	Manhole Diameter
8" through 12"	4.0 ft
15" through 27"	5.0 ft
30" through 36"	6.0 ft

Special manholes shall be designed for mains larger than 36" diameter pipe and for mains greater than 12 feet deep.

The types of manholes currently used by the City are listed below:

- A. Pre-cast
- B. Pre-cast with pre-cast base
- C. Cast in place
- D. Drop connection

Generally, manholes shall be stationed on the main run, and where known, the stations of the side mains should be also indicated. When connecting a proposed main to an existing main at a manhole, the preferred connection should have the elevation of the outfall main level with the top inside elevation of the proposed main.

4.11.1 Manhole Locations

Manholes shall be provided at the following locations to facilitate maintenance, cleaning, and inspection:

- A. At the location of lateral connections that are 8" in diameter or larger
- B. At 500 feet intervals on sewer mains 15" diameter or smaller. At 800 feet intervals on mains 10" diameter through 30" diameter, and 1000 feet intervals on mains 36"-48" diameter and at 2000 feet for 54" and larger.
- C. At all locations where diameter of the pipe changes.
- D. At all locations where the horizontal or vertical alignment of the sewer main changes.
- E. At the ends of all mains.
- F. At the end of a sewer line projected for extension in the near future. A manhole and stub-out shall be provided at the end of the sewer line.

4.12 Highway Crossings

The designer shall, prior to the design of any highway crossing, contact the appropriate regulatory agency and determine if there are any special requirements.

4.13 Tunneling, Jacking, and Boring

Tunneling, jacking and boring are methods used for sewer line placement under restrictive conditions when open cut construction is not allowed. Only straight pipe alignments for both horizontal and vertical alignments are allowed. Designers should consider the location, size and depth of boring and receiving pits when choosing the beginning and ending stations for boring. A typical bore pit is over 20 feet in length to accommodate one joint of pipe. Width of the bore pit can vary depending on the depth and size of pipe, with the narrowest width about 5 feet. The preferred location for the bore pit is at the lower elevation end of the tunnel. This allows any groundwater and/or boring slurry to drain from the tunnel into the bore pit. The water can then be removed by pumping.

The casing pipe thickness design shall be based on the following criteria:

Pipe Diameter	Casing Pipe Thickness
< 16"	3/8"
≥ 16"	0.5"

All carrying pipe shall be ductile iron. Minimum depth of bore shall be 42".

4.14 Creek Crossings

When a sewer main crosses a creek or channel, the designer must evaluate the condition of the creek bed. The Director of Public Works shall have final decision in creek crossing designs.

4.15 Siphons

For creek or channel crossings and under special design conditions, design of inverted siphons should be undertaken only as a last resort, when all other alternatives have been evaluated and rejected. Inverted siphons shall not have less than 2 barrels, with a minimum pipe size of 8 inches, and shall be provided with necessary appurtenances for convenient flushing and maintenance. Manholes are required at each end of the siphon with adequate clearance for rodding.

4.16 Abandonment of Sewer Mains

When an existing sewer line is replaced with a new sewer line, often it is necessary to abandon the old line, especially if the replacement is not in the same ditch. The designer shall ensure that the laterals tying into the existing sewer line are transferred to the new main, so that a live sewer main is not abandoned. If a manhole on the sewer main being abandoned is to remain in service because other sewer mains are entering this manhole, then the sewer main to be abandoned shall be plugged inside the manhole. A note on the plans showing which sewer main is to be plugged inside the manhole is required. "Cut and plug" method resulting in excavation outside the manhole and a cut in the main with attendant excessive costs shall be avoided. Designer shall use the minimum guidelines shown in Appendix-A for abandonment of an existing sewer line.

4.17 Abandonment of Manholes

If a manhole as well as the sewer main is to be abandoned, the method described in Section 4.16 above shall be used.

4.18 Lift Stations

The need to construct a lift station should be determined only after a thorough analysis of the physical and economic factors involved. A preliminary engineering report is required which lists all factors and adheres to current state regulations. The City reserves the right to review each proposal and determine whether there is enough merit to justify a lift station.

4.18.1 Preliminary Design Submittal

A preliminary design submittal will be required for each lift station proposed. The submittal shall include a typed report and a map prepared by a registered professional engineer.

- A. The plan or plans submitted shall contain the following information:
1. Shall be to scale and the scale shall be indicated.
 2. Shall include a north arrow.
 3. Shall include a location map.
 4. Shall delineate the boundary of the proposed development.
 5. Shall delineate the boundary of the sewershed in which the development lies.
 6. Shall indicate the area in acres of the development.
 7. Shall indicate the area in acres of the sewershed contributing to the Lift Station.
 8. Shall indicate the proposed use or uses for the development.
 9. Shall indicate the proposed use or uses for the sewershed.
 10. The proposed lift station site.
 11. The proposed force main routing.
 12. Delineation of the one hundred year flood plain.
 13. The location and size of the existing collection system at the tie-in point.
 14. Contour lines (4-foot intervals).
 15. Shall include property lines.
- B. The typed report shall include the following information.
1. The general narrative about the proposed development and the circumstances that warrant a lift station.
 2. Influent hydraulic calculations showing:
 - a. Area in acres of the sewer basin and the development.
 - b. The area of each proposed use for the development and the projected use for the basin.
 - c. The design flow for the basin and the development.
 - d. The maximum flow for the basin and the development.

- e. Elevation of the proposed lift station site.
- f. The elevation of the proposed discharge point of the force main.
- 3. Preliminary wet well volume calculations.
- 4. Preliminary force main size.
- 5. Cost estimates for lift stations and the force main, and cost estimates for a gravity line in lieu of the lift station if possible.
- 6. Ground water levels in proposed site areas.

4.18.2 Site Layout

A. Station Siting. The following are the minimum criteria that shall be met for station site.

- 1. The station shall be protected from the 100-year flood and shall be accessible during a 25-year flood.
- 2. The station should be located as remotely as possible from populated areas. The station shall be a minimum of 100 feet from a potential residential use.
- 3. The station site and its access shall be dedicated to the City.
- 4. The station site shall be located so it may serve as much of the entire sewer drainage basin as possible. This may require that the station be located off-site of the development. When it is required that the station serve a larger area than the proposed development, the developer may enter into a pro-rata contract with the City to be reimbursed the cost of excess capacity as other developments tie-on to the system.

B. Wet Well/ Dry Well Arrangement

- 1. Orientation shall consider the routing of incoming sewer and force main.
- 2. Orientation shall allow a two-ton vehicle to pull in forwards or backwards directly to the wet well or the dry well.
- 3. Wet wells or dry wells shall be separated by at least a water and gas tight wall with separate entrances.
- 4. Wet wells shall have sloped bottoms to avoid excess sludge deposits.
- 5. The wet well shall have a lockable aluminum door with an aluminum frame. The minimum opening size shall be 4' x 6' with two doors large enough to adequately maintain the wet well. Door and frame shall be Bilco Type K, KD or an approved equal.
- 6. The dry well or valve vault shall have a lockable aluminum door with an aluminum frame. The minimum opening size shall be 2' x 3' or large enough to adequately maintain the dry well or meter vault. Door and frame shall be Bilco Type K, KD or an approved equal.
- 7. The wet well, dry well, valve vault and meter vault shall be cast in place concrete or pre-cast with watertight joint meeting ASTM C478-90. Steel, fiberglass, HDPE and RCP are not acceptable materials. The tops may be pre-cast with the doors built in. The coating for the wet well interior shall be as shown in 4.19.2.C and D below.
- 8. Wet well shall be hydrostatically tested to the top of the wet well for 48-hours prior to putting the lift station into service. Only losses due to evaporation will be tolerated.
- 9. Provisions shall be made to remove water from the dry well, valve vault or meter vault without allowing gas or water from the wet well into the above listed structures.

C. Exterior Walls (below grade, to be backfilled)

Surface Preparation	Coating System
Clean and Dry	Primer Polyamide Epoxy - Coal Tar 8 to 10 mils for two coats for a total of 16.0 to 20.0 dry mils 4.0 ft Tnemec Series 46H-413

D. Interior Walls

1. Thick Film System

	Coating System	
Surface Preparation	Primer	Finish
Brush-off Blast Cleaning	Tnemec Series 66-1255 H.B. Epoxoline 4.0- 6.0 dry mils	Tnemec Series 262 Elasto-Shield 50.0-75.0 dry mils

E. Site Access

1. Access will be provided by an all-weather surface of the flex base or better from a public street to the station site.
2. Access shall be functional during a 25-year flood. The road surface shall be above the water level caused by a 25-year return period storm.
3. If the station is greater than 100 feet from a public street, a turn around shall be provided.

F. Fencing

1. Fence shall be 7 feet above grade, using 6 feet high chain link fabric surmounted by three strands of barbed wire.

G. Electrical and Instrumentation Panels

1. Panel shall generally be located where they do not obstruct vehicle access to the wet well or the dry well. The panels shall be placed at an elevation so that they are easily accessible.

H. Site inside the fence shall be an all weather surface such as ¾" crushed rock or flex base.

1. Passive ventilation shall be screened to prevent insects to the wet well. Minimum air vent shall be 4-inch diameter. Vent outlet shall be at least 1 foot above the 100-year flood elevation.

4.18.3 Hydraulic Design

A. Influent Flow

1. The preliminary design report shall include the design flow and the maximum flow for the development and the drainage basin. The design flow shall be calculated in accordance with the TNRCC guidelines. Refer to Section 4.2: Estimated Wastewater flows for maximum flow calculation.

B. Pump Capacity

1. Definitions

- a. Firm pumping capacity is the pumping capacity of the station with the largest pump out of service.
2. The firm pumping capacity shall be greater than the maximum flow for the entire drainage basin. If the drainage basin is significantly larger than the proposed development and it is not feasible to design for this flow, the firm capacity may be designed to handle a portion of the basin with approval from the Engineering Administrator.
3. The pump curves shall be selected so that during normal operating conditions the pumps will run near the best efficiency point. The curves shall also be such that when the pumps are running together they do not approach shut off head.
4. System head curves, pump curves and head calculations shall be submitted. Calculations and pump curves at both minimum (all pumps off) and maximum (last normal operating pump on) static heads, and for a C value of both 100 and 140 must be provided for each pump and for the combination of pumps with modified pump curves.

A. Wet Well Volume

1. Definitions

- a. Wet well volume for a submersible pump station is the volume contained above the top of the motor, or as specified by the pump manufacturer.
- b. Wet well volume for all other non-submersible pump stations is defined as the volume contained in an area from a minimum of two feet above or depth above which vortexing does not occur above the top of the intake of the pump.
- c. High level alarm elevation shall be a minimum of 48 inches below the top of the wet well or 48 inches below the flow line elevation of the lowest service tap whichever elevation is lower. Wet well volume shall be calculated by the following method:

$$t = \frac{V + V_1}{D - Q} \frac{1}{Q}$$

Where t = Total time between successive pump starts in minutes (operating cycle)

D = Rated pump capacity in GPM

V = Storage volume between lead pump on and pump off elevations in gallons

Q = Inflow to wet well in GPM

The operation cycle 't' shall not be less than 10 minutes for Average Flow and not more than 60 minutes for Minimum Flow conditions.

2. Force main capacity shall be sized to meet the capacity of the entire basin. The force main may be designed to handle a portion of the basin with approval from the Engineering Administrator. The minimum force main size shall be four inches in diameter except for Grinder Pump lift stations. The minimum recommended velocity is 3 feet per second, and the velocity shall not be less than 2 feet per second when only the smallest pump is in operation.

4.18.4 Pumps

Pump criteria is included in the City of Azle specifications.

4.18.5 Mechanical

A. Force main

1. Force main 6-inch through 12-inch shall be polyvinyl chloride (PVC) meeting AWWA C-900 with a minimum working pressure of 150 psi and a minimum thickness of DR 18. Pipe larger than 12-inch diameter shall meet AWWA C-905 and minimum thickness of DR 18, 235 psi pressure class.
2. All fitting shall be ductile iron meeting AWWA C-110 or C-153. Interior of the fittings shall be lined with American Polybond Plus which consist of a primer layer of 5 mils thick fushion bonded epoxy and 55 mils thick of modified DuPont Fusabond Polyehylene or approved equal.
3. Force main shall be laid to Azle standard specifications for potable waterline.
4. Plans shall include plan and profile for the force main.
5. All force main contractors shall furnish and install non-metallic pipe detection tape. The pipe tape shall be green, 6-inch wide, 4 mils thick with 1-inch black continuous lettering " Caution Sewer line Buried Below". The pipe tape shall be terra tape, extra stretch or approved equivalent and shall be installed on top of the sewer pipe embedment along the centerline of the pipe line.

B. Lift station Interior Piping

1. Piping inside the lift station shall be ductile iron meeting AWWA C-150 and C-151. All fitting shall be ductile iron meeting AWWA C-110 or C-150. Interior of the pipe and fittings shall be lined with American Polybond Plus which consist of a primer layer of 5 mils thick fushion bonded epoxy and 55 mils thick of modified DuPont Fusabond Polyehylene or approved equal
2. All nut and bolt assemblies inside the wet well shall be ASTM 316 stainless steel unless otherwise specified.

C. Isolation Valves

1. Each pump shall have one isolation valve downstream of the pump.
2. Isolation valves shall be resilient seat gate valves or plug valves meeting the City of Azle standard specification.
3. Isolation valves shall not be located inside the wet well. They will be located in the building for self-priming stations and shall be in a separate vault for submersible stations.

D. Check Valve

1. Check valve shall be a controlled closing swing check valve with a lever arm or a ball check.
2. The check valve shall be located upstream of the isolation valve.
3. If the station is submersible then the check valve shall be located with the isolation valve in a separate vault. For self-priming stations, the check valve shall be located in the building. Under no circumstance shall the check valve be allowed in the wet well.
4. There must be at least 15 feet of vertical head downstream in order to use a ball check valve.

5. All external nuts and bolts shall be stainless steel.

E. Air Release/Vacuum Valves

1. Air release valves of a type suitable for wastewater service shall be installed along the force main where the force main would be prone to trapped air.
2. The type of valve shall be air release or a combination of air release and vacuum breaker. The design engineer shall determine the type and location.
3. Calculations for valve type and valve sizing shall be provided to the City.
4. Locations of the air release/vacuum valves shall be shown on the plan and profile sheets for the force main.
5. Isolation valves for 3 inches and smaller air release valves shall be all bronze or brass. Isolation valves 4 inches and larger shall meet Azle standard specification for resilient seat gate valve.
6. Valve shall be fitted with blow off valves, quick disconnect coupling and hose to permit back flushing after installation without dismantling the valve.
7. Valve must be located in a vault as shown in the City of Azle standard details.

4.19.6 Electrical Requirements for New Lift Stations

1. Electrical services to be 240 volt 3 phase or 480 volt 3 phase.
2. Allow a minimum of 3 feet in front of all enclosures to wet well openings for workmen standing space. Observe NEC Article 110 rules for working clearances around the electrical panels.
3. Install a manual transfer switch between electrical service and electrical equipment along with an emergency generator receptacle (Appleton# ADJA 1033-150).
4. Install a weatherproof 20 amp rated 120-volt convenience receptacle outside of the electrical control panel wired to a 20-amp circuit breaker.
5. Where a single-phase power transformer is required, install a minimum 3 KVA transformer, fused on both the primary and secondary side.
6. Install a power phase monitor capable of protecting against phase loss, phase reversal, low voltage, and high voltage.
7. Power phase monitor shall have two sets of control or alarm contacts. One set used to disable the pump control circuit, the second set used to alarm the RTU of a power failure.
8. Install current transformer between the service discount and the rest of the electrical equipment to provide a means to monitor the complete station load. Terminate secondary leads on a terminal strip for connection to a future power usage monitor.
9. Install potential transformer to provide a 120-volt secondary voltage on all three phases. Terminate the secondary leads on a terminal strip for connection to a future power usage monitor.
10. A spare conduit shall be installed between the pump control panel and the RTU enclosure for power usage monitor wiring (1" minimum).

11. All electrical power circuits to be protected by circuit breakers (versus fuses) where applicable. Use the following as a guide for single-phase circuits; RTU-15 amp, Flow meter/record-15 amp, pump control circuit-15 amp, convenience outlet/flood light-20 amp.
12. Thermal protection and moisture sensing devices in submersible pumps are to be wired to disable pumps and/or control circuits.
13. Hand position on H-O-A switch is to be capable of operating pump in the event of a complete failure of the Miltronics level controller.
14. The required remote start/stop capability is to be provided by using RTU control module. Install interface relay between RTU contacts pump control circuit. RTU contact operating may be momentary action only.
15. Motor starters shall have a normally open auxiliary contact to be used for a pump run contact connected to the RTU.
16. All control relays are to be octal 8 pin or 11 pin plug-in type where feasible.
17. Three laminated control drawings are to be provided.
18. Mercury float switch is to be installed and wired as a low level emergency shut off in the event of a continuous pump run due to a level controller failure, pump control switch left in Hand position, etc.
19. Where submersible pump cords are to be installed in conduits, the conduits should be sized and installed to facilitate removal and re-installation of the pump cords.
20. A switch-operated floodlight shall be installed to illuminate control panel area at night.

4.19.7 Electronic Requirements for New Lift Stations

- A. Flow and Flow Recording
 1. Flow recorder – Chessell 392, 10" circular recorder, 4-20mA input, single channel (pen), no totalizer, 7 day charts. No other options
 2. Flow meter
 - a. Polysonics DCT 1088 with 4-20mA output, optional display, 120VAC power
 - b. Flow meter transducer vault
 - i May be standard manhole (24" access)
 - ii Force main material through vault must be PVC, Cast Iron, or ductile iron. No Concrete.
 - iii Force main shall have ten (10) straight pipe diameters
 - iv Upstream and ten (10) straight pipe diameters downstream of transducer location.
 - v. There shall be a minimum clearance of 12" between the vault floor and the bottom on the force main.
 3. DCT 1088 analog output shall go to recorder and RTU, AI #2
 4. A 120 Volt, 15 A convenience outlet should be provided in Flowmeter / Recorder Cabinet
- C. Level I analog inputs

1. Level meter – Milltronics Hydroranger, 115 VAC. Unit comes with Isolated 4-20mA output, built in temperature compensator and 5 relays.
 - a. Relays #1 and #2 to be used for pumps control and alternation
 - b. Relays #3, #4, and #5 shall go to terminal strip for use as RTU discrete inputs: #3 – wet well low level; #4 – Wet well high level; #5 – Loss of echo.
2. Transducer (level meter) shall be XPS – 15 with submergence shield.
 - a. Transducer beam shall have clear path to wet well bottom, and it shall be accessible from outside the wet well access hatch.
3. The hydroranger analog output shall go to a RTU analog input, AI#1.
4. Do not purchase hydroranger programmer.

D. General

1. All leads shall be landed on terminal blocks:
2. No wire nuts or butt splices blocks:
3. Separate Voltages in conduits; 120 VAC SHALL NOT be run with 4-20 mA DC Signal Loops.
4. RTU shall be in dedicated enclosure.
5. Flowmeter Recorder shall be in dedicated enclosure.

E. General

1. All leads shall be landed on terminal blocks:
2. No wire nuts or butt splices blocks:
3. Separate Voltages in conduits; 120 VAC SHALL NOT be run with 4-20 mA DC Signal Loops.
4. RTU shall be in dedicated enclosure.
5. Flowmeter Recorder shall be in dedicated enclosure.

Section 5 – Right of Way

5.1 Right of Way Approvals and Requests prior to Contract/Work Order

Prior to release of any project for contract or work order, R.O.W. must be cleared. This means all highway, highway, Park Department approvals, easements, releases, agreements, covenants, etc., required for the project must be properly executed and/or notarized, and recorded with the County Clerk's office.

5.2 Within Existing Public R.O.W.

If the project falls entirely within an existing public R.O.W., the designer must request R.O.W. approval from the R.O.W. Division. This request should be made on the proper R.O.W. request form (see figure 5.1).

5.3 Easement and R.O.W. Acquisition

If there are easements, highway approvals, etc., that must be acquired, the designer must submit a written request. Many of these acquisitions can be time consuming, requiring anywhere from 6-12 months. The designer should recognize this and make the request to R.O.W. as early as possible.

The procedures for easement acquisition for city contracts or work orders are as follows:

- A. The designer shall request the Right of Way Division to obtain a sample form for preparation of the easement document applicable to the Project at hand.
- B. Upon receipt of the sample form from R.O.W. Division, the designer prepares an easement for permanent and temporary construction easements. The easement document shall include in the approved form by right of way division:
 1. A legal description of the proposed easement by using solely a perimeter description.
 2. The square footage and acreage of the proposed easement, both temporary and permanent.
 3. A survey plat prepared by a licensed land surveyor fully describing the proposed easement and its relationship to the parent tract.
- C. Designer submits unsigned easement document package to Right Of Way Division for review and approval.
- D. Upon approval, documents will be released for execution by affected parties. The designer shall be responsible for obtaining the required signatures.
- E. Upon execution, the designer shall return the original easement document to the R.O.W. Division to the designer.
- F. Upon recording at the County Clerk's office and return from the courthouse, a file-stamped copy of the easement document will be relayed to the designer along with their receipt for filing.

Section 6 – Addenda, Plan Revision and Change Orders

6.1 General

After a designer has submitted the plans to the Purchasing department and either advertising, or work order has been initiated, occasionally, despite the best efforts of the designers, the design must be altered. This section is devoted to the procedures the designer must undertake to see that modifications are properly incorporated into the project. The importance of the time factor for performing any modification cannot be overemphasized. The designer must make the modifications quickly and coordinate those changes with the Public Works Department.

The designer is not to attempt to contact contractors at any time concerning addenda, plan revisions or change orders. All contact must be through the Public Works Department for addenda or through Water and Sewer Construction Inspection for plan revisions and change orders.

6.2 Addenda

An addendum is briefly defined as a change in plans or specifications during advertisement, but prior to the reception of bids. The change specifications may be initiated from within Engineering Division or may be initiated from the "outside." After the designer has been notified which designs must be modified, he is responsible for immediately notifying the Public Works Department. After consultation with the Purchasing Department and, if the advertising schedule permits an addendum, the required changes in plans and specifications must be made quickly by the designer. All revisions by addendum must be submitted to the Public Works Department no later than 10 calendar days prior to the bid opening.

date. This will allow the Purchasing Department time to notify all plan holders by certified mail of any contract modifications.

6.3 Plan Revisions

A plan revision is a modification in design after award of the contract. This type of modification is usually a minor change in alignment horizontally or vertically where little or no quantity change or additional bid item is involved. This type of modification may also be initiated from inside Engineering or outside, during actual construction of the project. Here, too, timely modifications must be made so as to assure that the construction is not delayed.

6.4 Change Orders

A change order is a modification in the plans or specifications that involves a quantity change or an additional bid item not previously bid by the contractor. Change Orders that involve less than \$15,000.00 may be approved by "Administrative Action" and do not require City Council approval. Conversely, any change orders \$15,000 over the original contract dollar amount require City Council approval. In all cases, a change order cannot exceed 25% of the award amount of the contract. Additionally, the designer is responsible for providing written justification and notification to the Engineering/Transportation Department on all ongoing change orders.

6.5 Method of Plan Modification

The designer is responsible for making all required modifications to the plans. Several changes may be made under a single addendum, plan revision, or change order. No matter which process is being undertaken, each modification(s) made as a "group" under these processes is to be designated with a number within a triangle, and this designation is to be placed by each note, tie, or other item being changed. Subsequent modifications to the design should be designated sequentially, e.g. 1, 2, 3, etc. The original design is not to be erased; it must be crossed out or otherwise indicated as void.

The designer is to furnish Contracts Section with at least six (6) sets of prints of the modified plans. More prints may be required if an addendum is being processed; Public Works Department can provide the exact number of prints required of the designer.

6.6 Distribution of Modified Plans or Specifications

Public Works Department is responsible for distributing the modified plans or specifications to all involved parties and establishing City Council hearing dates if required.

Section 7 – Submittals

7.1 General

If a specialized project requires unique construction methods or materials, control of the quality of those methods or materials must be assured. A contractor has a multitude of options that can be employed on any project and still fall within the Guidelines outlined in the specifications of that project, yet the end result may not be exactly what the designer wanted. Some control of the quality methods or materials can be obtained by requiring the contractor to furnish submittals prior to construction.

7.2 Submission of Submittals

A submittal is a proposal by a manufacturer through the contractor to City of Azle Public Works Department for an item or an approved equal to the item that a designer has specified. A submittal may also be required of a contractor when specific construction phases, methods or procedures require analysis to determine their conformance to approved performance, quality or safety.

Submittals on specific items usually consist of the manufacturer's technical specifications which state materials, components, performance tests as noted by an approved laboratory, dimensions, finishes, and limitations or operational ranges of items.

Submittals on specialized construction methods should state steps, procedures and construction sequences that the contractor proposed to follow. These items can be submitted as "catalog cuts", letters of certification by the manufacturer or notarized letters by the contractor. These items can be submitted for review either as a package or separately.

At least five sets of submittals are required of the contractor. All submittals are to go through Public Works Department Construction Inspection prior to review by the designer. Two submittals, accompanied by a transmittal letter written by the Public Works Department, should be returned through Public Works Construction Inspection Division.

7.3 Standards for Pipe

Pipe and related fittings should conform to or have a designation of certification by the American Water Works Association (AWWA) or the American National Standards Institute (ANSI). Other materials should conform to American Society for Testing and Materials (ASTM).

7.4 Submittal Review

The designer should review the submittals for conformance to the item specified, including kind, type, size, operational limits, component materials, etc. The Public Works Department should also review the submittals and carefully check for conformance to the North Central Texas Council of Governments Standard Specifications for Public Works Construction, City of Azle addendum to that specification and the contract specifications.

7.5 Nonconformance of Submittal

After review, if the submittal does not conform, the Public Works Department stamps the submittal accordingly and returns them. A letter stating which item (s) did not conform shall accompany the submittal.

7.6 Submittal Acceptable with Minor Exceptions

If the submittal is acceptable with minor exceptions, the plans are to be stamped accordingly and the minor exceptions noted in the submittal. A letter stating the minor exceptions shall accompany the return of the submittal.

7.7 Acceptable Submittal

If the submittal is acceptable without exception, the plans are to be stamped accordingly and a letter stating the acceptance shall be returned with the submittal.

7.8 Submittal Records

The designer is to keep a copy of all submittals whether approved or disapproved in the project file.

Section 8 – Addenda, Plan Revision and Change Orders

8.1 General

After a designer has submitted the plans to the Contracts Section and either advertising, award or work order has been initiated, occasionally, despite the best efforts of the designers, the design must be altered. Even after they have been reviewed by other D.W.U. operating divisions, other utilities, section managers and division managers, design modifications may be required due to unforeseen problems. This section is devoted to the procedures the designer must undertake to see that modifications are properly incorporated into the project.

The importance of the time factor for performing any modification cannot be over emphasized. The designer must make the modifications quickly and coordinate those changes with the Public Works Department at all times.

The designer is not to attempt to contact contractors at any time concerning addenda, plan revisions or change orders. All contact must be through the Public Works Department for addenda or through Water and Sewer Construction Inspection for plan revisions and change orders.

8.2 Addenda

An addendum is briefly defined as a change in plans or specifications during advertisement, but prior to the reception of bids. The change specifications may be initiated from within Public Works Department or may be initiated from the "outside." After the designer has been notified which designs must be modified, he is responsible for immediately notifying the Public Works Department. After consultation with the Purchasing Department and, if the advertising schedule permits an addendum, the required changes in plans and specifications must be made quickly by the designer. All revisions by addendum must be submitted to the Public Works Department no later than 10 calendar days prior to the bid opening date. This will allow the Purchasing Department time to notify all plan holders by certified mail of any contract modifications.

8.3 Plan Revisions

A plan revision is a modification in design after award of the contract. This type of modification is usually a minor change in alignment horizontally or vertically where little or no quantity change or additional bid item is involved. This type of modification may also be initiated from inside Engineering or outside, during actual construction of the project. Here, too, timely modifications must be made so as to assure that the construction is not delayed.

8.4 Change Orders

A change order is a modification in the plans or specifications that involves a quantity change or an additional bid item not previously bid by the contractor. All change order negotiations are made through Public Works Department orders that involve less than \$15,000.00 may be approved by "Administrative Action" and do not require City Council approval. Conversely, any change orders \$15,000 over or under the original contract dollar amount require City Council approval. In all cases, a change order cannot exceed 25% of the award amount of the contract. Additionally, the designer is responsible for providing written justification and notification to the Engineering/Transportation Department on all ongoing change orders.

8.5 Method of Plan Modification

The designer is responsible for making all required modifications to the plans. Several changes may be made under a single addendum, plan revision, or change order. No matter which process is being undertaken, each modification(s) made as a "group" under these processes is to be designated with a number within a triangle, e.g., 1, and this designation is to be placed by each note, tie, or other item being changed.

Subsequent modifications to the design should be designated sequentially, e.g. 1, 2, 3, etc. The original design is not to be erased; it must be crossed out or otherwise indicated as void.

The designer is to furnish Contracts Section with at least six (6) sets of prints of the modified plans. More prints may be required if an addendum is being processed; Public Works Department can provide the exact number of prints required of the designer.

8.6 Distribution of Modified Plans or Specifications

Public Works Department is responsible for distributing the modified plans or specifications to all involved parties and establishing City Council hearing dates if required.

Section 9 – On-Site Sewage Facilities

9.1 General

The City of Azle criteria for planning, design and operation of the on-site sewage facilities complies with the most recent on-site sewage facility construction standards and administrative rules adopted by the Texas Natural Resource Conservation Commission or any other successor agency, and as amended by the City of Azle. The property owner proposing to use an on-site sewage facility shall comply with the criteria listed in this Section.

9.2 Permits Required

Any owner of a residential, commercial or institutional building that utilizes an on-site sewage facility is required to secure a permit from the City of Azle to construct, alter, repair or extend an on-site sewage facility regardless of the size of the legal tract. Contact the Public Works Director for details on permit fees, and maintenance requirements.

9.3 Site Evaluations

A professional engineer must perform site evaluations.

9.4 Planning Requirements

A professional engineer must prepare on-site sewage facility plans.

9.5 On-Site Sewage Facility Land Use Requirements

Lots or tracts of land where an on-site sewage facility is proposed will have the following area size:

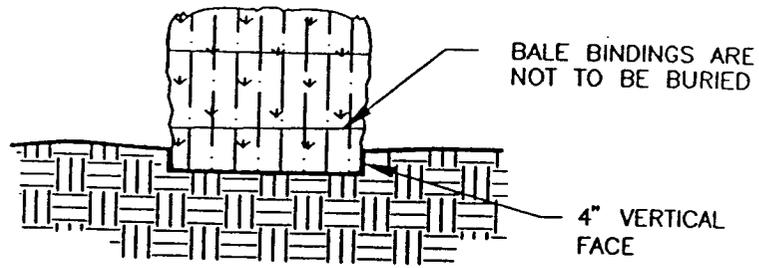
- A minimum of 1 acre when a private water well is located on the tract or lot.
- A minimum of 1 acre when a public water system serves the tract or lot.

Detail No.	Category	Description
	Storm Water	
1020A	Quality	Silt Fence
1020B		Silt Fence General Notes
1030A		Interceptor Swale
1030B		Interceptor Swale General Notes
1040A		Diversion Dike
1040B		Diversion Dike General Notes
1050A		Triangular Sediment Filter Dike
1050B		Triangular Sediment Filter Dike General Notes
1060A		Rock Berm
1060B		Rock Berm General Notes
1070A		Stabilized Construction Entrance
1070B		Stabilized Construction Entrance General Notes
1080A		Sand Bag Berm
1080B		Sand Bag Berm General Notes
1090		Stone Outlet Sediment Trap
1100		Sediment Basin
1110		Pipe Slope Drain
1120		Inlet Protection Filter Barrier
1130		Inlet Protection Block And Gravel
1140		Inlet Protection Wire Mesh And Gravel
1150		Inlet Protection Excavated Impoundment
1160A		Erosion Control Mattings
1160B		Erosion Control Mattings General Notes
2010	Paving	Reinforced Concrete Pavement - Six-Lane Divided Thoroughfare
2020		Reinforced Concrete Pavement - Four-Lane Divided Thoroughfare
2030		Reinforced Concrete Pavement - 2 & 4 Lane Undivided Thoroughfare
2040		Reinforced Concrete Pavement - Alleys
2050		Reinforced Concrete Pavement - Joints
2060		Reinforced Concrete Pavement - Transverse Joint Spacing
2070		Reinforced Concrete Pavement - Street Headers
2080		Reinforced Concrete Pavement - Bridge Approach Slab
2090		Hot Mix Asphalt Pavement - Six Lane Divided Thoroughfare
2100		Hot Mix Asphalt Pavement - Four Lane Divided Thoroughfare
2110		Hot Mix Asphalt Pavement - 2 & 4 Lane Undivided Thoroughfare
2120		Concrete Curb & Gutter Integral, Separate & Doweled
2130		Median Island Pavement Nose & Left Turn Lane
2140		Median Island Pavement Monolithic Concrete Nose
2150A		Driveway Approach Flared Return Type
2150B		Driveway Approach Flared Return Type
2160		Alley Approach Radius Return Type
2170		Reinforced Concrete Sidewalks Joints and Spacing
2180		Reinforced Concrete Retaining Wall Integral with Sidewalk
2190		Pavement Systems General Notes
2200		Subdrains Pavement Subgrade
2210		Alley Geometrics - Type "A" & "B"
2220		Alley Geometrics - Type "C" & "D"
2230		Alley Geometrics - Type "E" & "F"

2240		Alley Geometrics - Type "G" & "H"
2250		Alley Geometrics - Type "J"
2260		Alley Intersection Proposed to Existing
2270A		Metal Beam Guardrail Roadside Placement & Beam Elements
2270B		Metal Beam Guardrail Line Post & Connections
2270C		Metal Beam Guardrail End Section & Angle Anchor Post
2270D		Metal Beam Guardrail Special End Shoe & Anchor Post
2270E		Metal Beam Guardrail General Notes
2280A		Metal Beam Guardrail Two-Way Traffic Bridge End
2280B		Metal Beam Guardrail Two-Way Bridge End
2290		Metal Beam Barricade End of Road
3010	Embedment	Class "A" & A-1"
3020		Class "B", "B+", & "B-1"
3030		Class "B-2", "B-3", & B-4"
3040		Class "C", C+", & "C-1"
3050		Class "C-2" & "D+"
3060		Class "G" & "G-1"
3070		Pavement Cuts Removal and Replacement
3080		Infiltration Protection Conduit Under Channel
4010A	Water	Horizontal Thrust Block at Pipe End
4010B		Horizontal Thrust Block at Pipe End General Notes
4010C		Horizontal Thrust Block at Pipe End General Notes
4020		Horizontal Thrust Block At Tees and Plugs
4030		Vertical Thrust Block At Pipe End
4040		General Notes for All Thrust Blocks
4050		Gate Valve 4" to 12" Box & Extension Stem
4060A		Vault Construction Horizontal Gate Valve $\leq 16"$
4060B		Vault Construction Horizontal Gate Valve $\geq 16"$
4070A		Vault Construction Vertical Gate Valve $\leq 16"$
4070B		Vault Construction Vertical Gate Valve $\geq 16"$
4080A		Vault Construction Butterfly Valve $\geq 48"$
4080B		Vault Construction Butterfly Valve $\geq 48"$
4090		Air Release Valve Type "1"
4100A		Air Release Valve Type "2"
4100B		Air Release Valve Type "2"
4110		Flush Point Type "1"
4120		Fire Hydrant Installation
4130		Water Service Installation 3/4" or 1" Line
4140		Water Service 1 1/2" or 2" Line
4150		4" Combined Service With 4" Meter
4160		8" Detector Check Service With 8" Meter
4170		8" Fire Line Standard Service With 8" Meter
4180		4" Domestic Service With 3" Meter
4190A		Large Service Meter Vault Installation
4190B		Large Service Meter Precast Vault
4200		Water Main Lowering Below Wastewater Main
5010	Wastewater	Wastewater Main Tie-In At Cleanout or M.H. Stubout
5020		Wastewater Manhole Precast
5030		Wastewater Manhole Cast - in- Place
5040		Wastewater Manhole Fiberglass
5050		Wastewater Manhole Pressure-Type
5060		Wastewater Manhole Vented
5070		Wastewater Manhole Outside Drop Connections

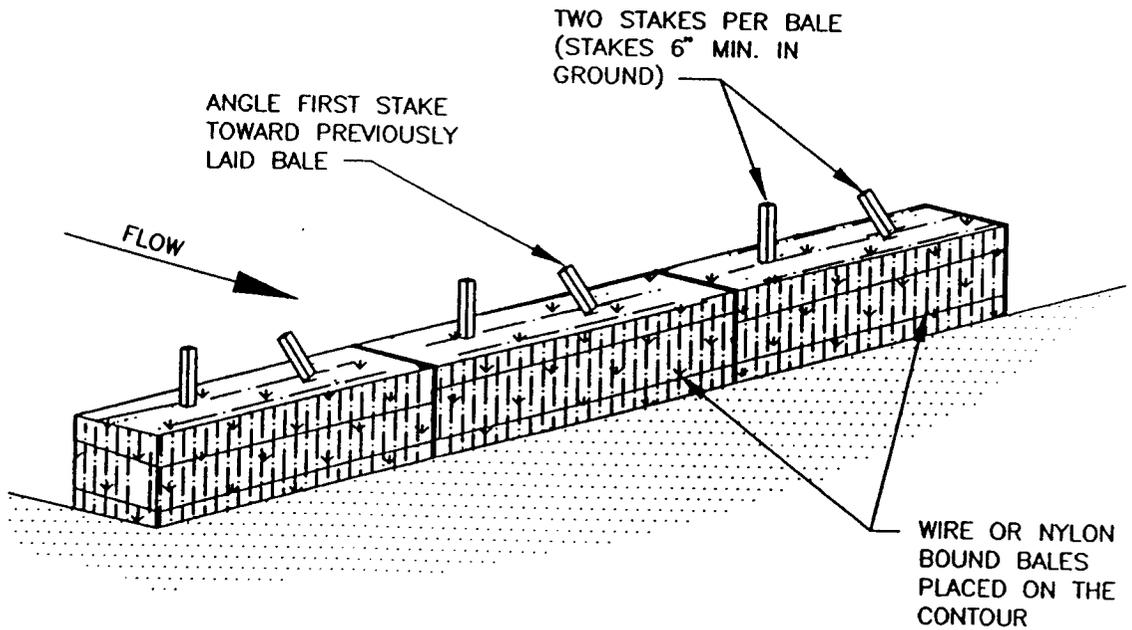
5080		Wastewater Manhole Inside Drop Connection
5090		Wastewater Manhole Line Intersection
5100		Wastewater Manhole False Bottom
5110		Wastewater Main Clean out
5120		Wastewater Laterals With & Without A Cleanout
5130		Wastewater Lateral Connections In Earth & Rock
5140		Wastewater Lateral Clean Out Frame & Cover
5150		Wastewater Lateral Stub out In Advance of Paving
5160		Wastewater Lateral Replacement In Advance of Paving
5170		Abandonment of Manhole In or Out of Pavement
6010A	Drainage	Stormwater Manhole 4',5', or 6'
6010B		Stormwater Manhole 4',5', or 6'
6020A		Curb Inlet 5', 10', 15', or 20' Opening
6020B		Curb Inlet Cross Section & Inlet Throat
6020C		Curb Inlet Rebar & M.H. Frame & Cover
6020D		Curb Inlet Bill Of Reinforcing Steel
6020E		Curb Inlet Summary of Quantities
6030A		Curb Inlet Recessed 5', 10', 15', or 20' Opening
6030B		Curb Inlet Recessed Cross Section & Center Beam
6030C		Curb Inlet Recessed Inlet Throat & M.H. Frame & Cover
6030D		Curb Inlet Recessed General Notes
6040		Drop Inlet 2', 4', 5', or 6' Square
6050		Full Channel Lining Concrete Reinforced
6060		Concrete Apron Vertical Headwall
6070		Concrete Apron Sloping Headwall

FLOW →



EMBEDDING DETAIL

N.T.S.



ANCHORING DETAIL

N.T.S.

STRAW BALE DIKE
CITY OF AZLE



STANDARD SPECIFICATION REFERENCE

DATE
JAN. '98

STANDARD DRAWING NO.
1010A

STRAW BALE DIKE GENERAL NOTES:

1. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF FOUR INCHES.
2. BALES SHALL BE SECURELY ANCHORED IN PLACE BY 2" X 2" WOOD STAKES DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER.
3. INSPECTION SHALL BE MADE EVERY TWO WEEKS AND AFTER EACH 1/2" RAINFALL EVENT. REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED BY THE CONTRACTOR.
4. WHEN SILT REACHES A DEPTH OF 6 INCHES, IT SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED MANNER.
5. AFTER THE DISTURBED AREAS OF THE SITE ARE COMPLETELY STABILIZED, THE BALES SHALL BE REMOVED AND DISPOSED OF AT AN APPROVED SPOIL DISPOSAL SITE.

STRAW BALE DIKE

CITY OF AZLE



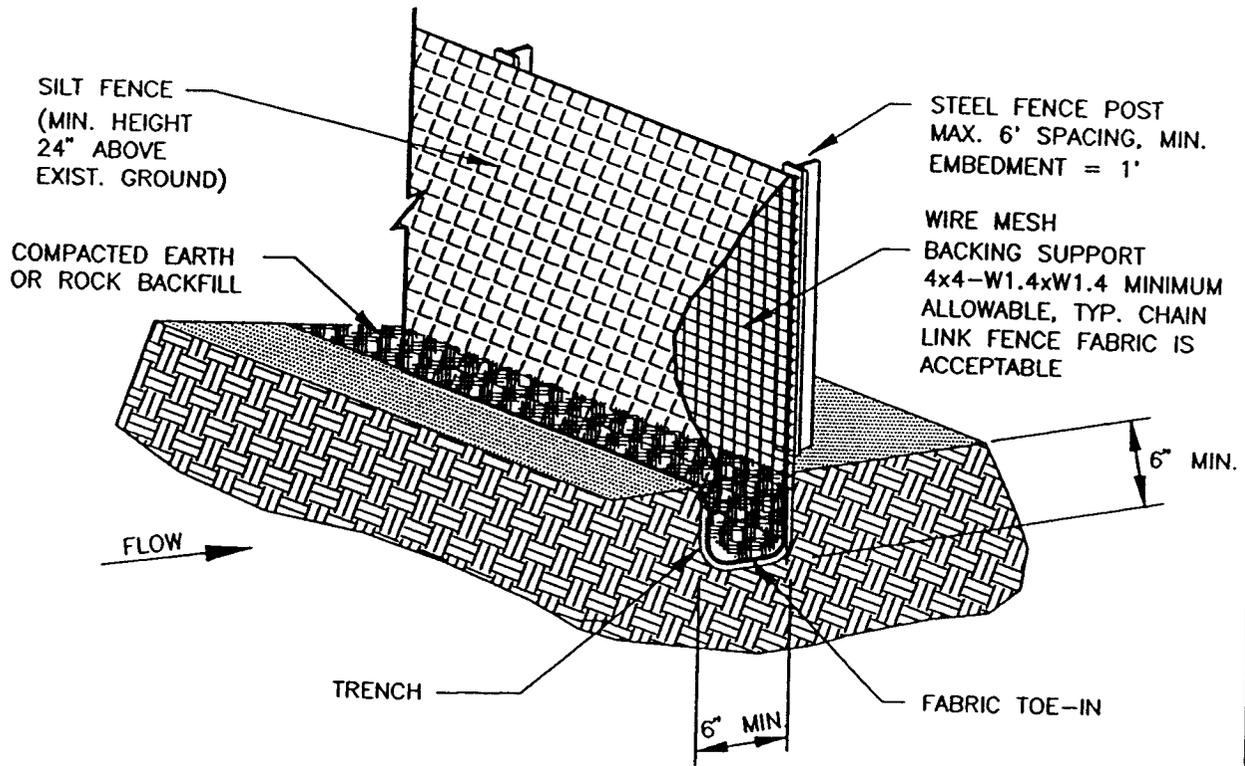
STANDARD SPECIFICATION REFERENCE

DATE

JAN. '98

STANDARD DRAWING NO.

1010B



SILT FENCE
(MIN. HEIGHT
24" ABOVE
EXIST. GROUND)

COMPACTED EARTH
OR ROCK BACKFILL

STEEL FENCE POST
MAX. 6' SPACING, MIN.
EMBEDMENT = 1'

WIRE MESH
BACKING SUPPORT
4x4-W1.4xW1.4 MINIMUM
ALLOWABLE, TYP. CHAIN
LINK FENCE FABRIC IS
ACCEPTABLE

6" MIN.

FLOW →

TRENCH

6" MIN.

FABRIC TOE-IN

ISOMETRIC PLAN VIEW
N.T.S.

SILT FENCE
CITY OF AZLE



STANDARD SPECIFICATION REFERENCE

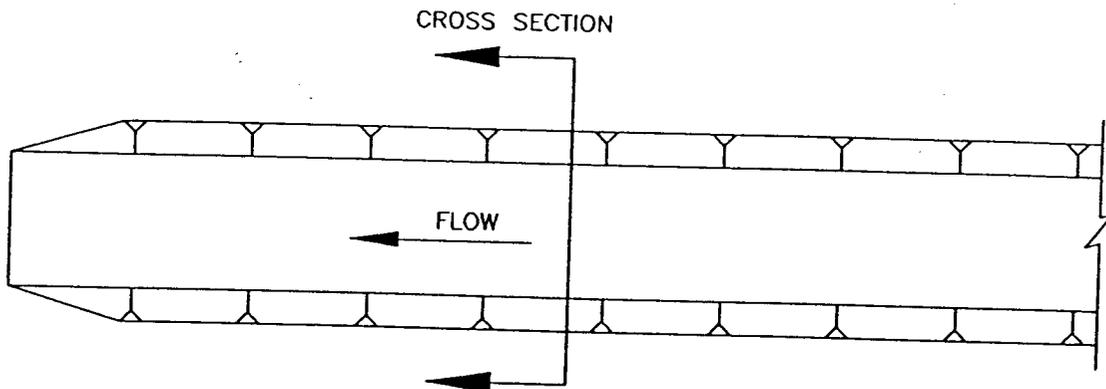
DATE
JAN. '98

STANDARD DRAWING NO.
1020A

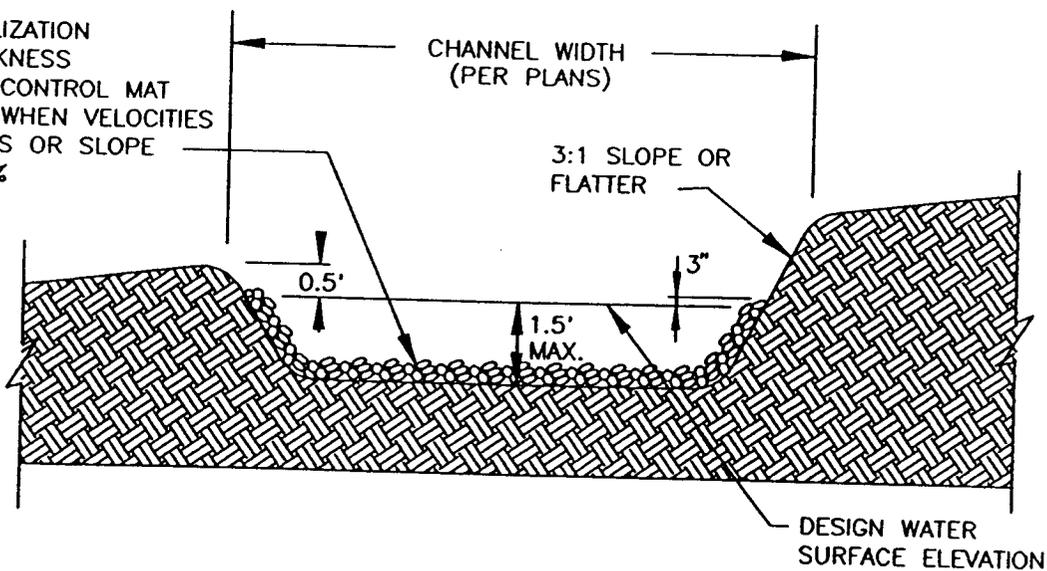
SILT FENCE GENERAL NOTES:

1. STEEL POSTS WHICH SUPPORT THE SILT FENCE SHALL BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POST MUST BE EMBEDDED A MINIMUM OF ONE FOOT.
2. THE TOE OF THE SILT FENCE SHALL BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. WHERE FENCE CANNOT BE TRENCHED IN (e.g. PAVEMENT), WEIGHT FABRIC FLAP WITH ROCK ON UPHILL SIDE TO PREVENT FLOW FROM SEEPING UNDER FENCE.
3. THE TRENCH MUST BE A MINIMUM OF 6 INCHES DEEP AND 6 INCHES WIDE TO ALLOW FOR THE SILT FENCE FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIAL.
4. SILT FENCE SHOULD BE SECURELY FASTENED TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE, WHICH IN TURN IS ATTACHED TO THE STEEL FENCE POST. THERE SHALL BE A 3 FOOT OVERLAP, SECURELY FASTENED WHERE ENDS OF FABRIC MEET.
5. INSPECTION SHALL BE MADE EVERY TWO WEEKS AND AFTER EACH 1/2" RAINFALL. REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
6. SILT FENCE SHALL BE REMOVED WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF HALF THE HEIGHT OF THE FENCE. THE SILT SHALL BE DISPOSED OF AT AN APPROVED SITE AND IN SUCH A MANNER AS TO NOT CONTRIBUTE TO ADDITIONAL SILTATION.

SILT FENCE		STANDARD SPECIFICATION REFERENCE	
CITY OF AZLE		DATE JAN. '98	STANDARD DRAWING NO. 1020B



STONE STABILIZATION
MIN. 3" THICKNESS
OR EROSION CONTROL MAT
IS REQUIRED WHEN VELOCITIES
EXCEED 6 FPS OR SLOPE
EXCEEDS 2.0%



INTERCEPTOR SWALE

CITY OF AZLE



STANDARD SPECIFICATION REFERENCE

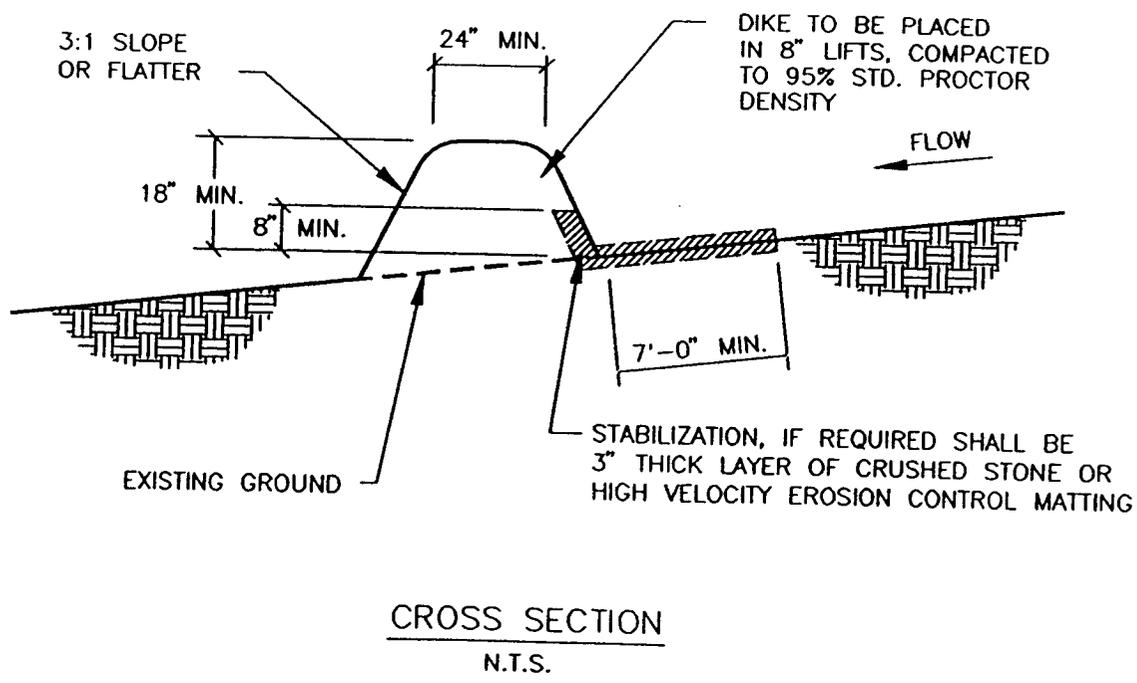
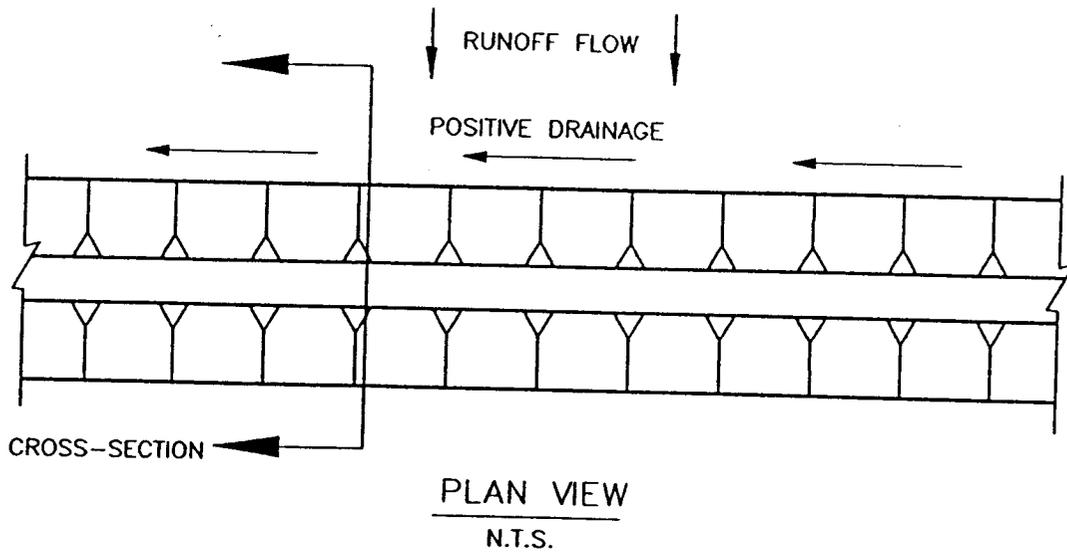
DATE
JAN. '98

STANDARD DRAWING NO.
1030A

INTERCEPTOR SWALE GENERAL NOTES:

1. ALL TREES, BRUSH, STUMPS, OBSTUCTIONS AND OTHER MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE SWALE.
2. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE AND CROSS-SECTION AS REQUIRED TO MEET CRITERIA SPECIFIED HEREIN AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
3. ALL EARTH REMOVED AND NOT NEEDED IN CONSTRUCTION SHALL BE DISPOSED OF IN AN APPROVED SPOILS SITE SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE SWALE.
4. DIVERTED RUNOFF FROM A DISTURBED OR EXPOSED UPLAND AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
5. THE ON-SITE LOCATION MAY NEED TO BE ADJUSTED TO MEET FIELD CONDITIONS IN ORDER TO UTILIZE THE MOST SUITABLE OUTLET.
6. STABILIZATION IS REQUIRED WHEN VELOCITIES EXCEED 6 FEET PER SECOND OR WHEN GRADES EXCEED 2.0%. STABILIZATION SHALL BE CRUSHED STONE PLACED IN A LAYER OF AT LEAST 3 INCHES THICKNESS OR HIGH VELOCITY EROSION CONTROL MATTING. VEGETATION MAY BE USED FOR VELOCITIES LESS THAN 6 FEET PER SECOND.
7. MINIMUM COMPACTION FOR THE SWALE SHALL BE 90 PERCENT STANDARD PROCTOR.

INTERCEPTOR SWALE		STANDARD SPECIFICATION REFERENCE	
CITY OF AZLE		DATE JAN. '98	STANDARD DRAWING NO. 1030B



DIVERSION DIKE
CITY OF AZLE

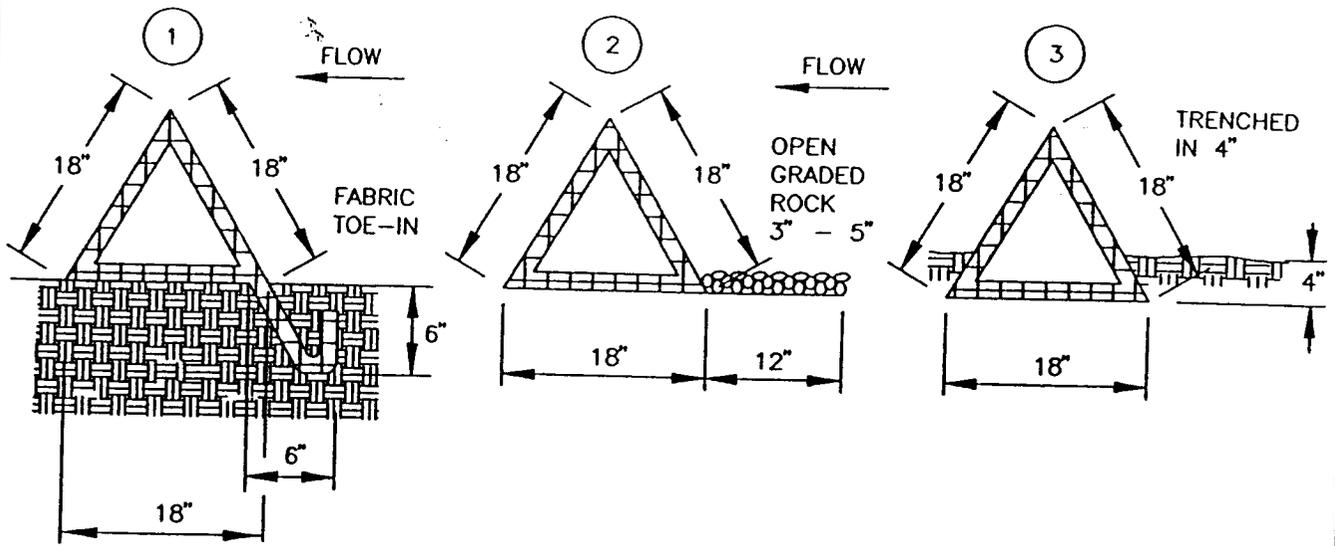


STANDARD SPECIFICATION REFERENCE	
DATE	STANDARD DRAWING NO.
JAN. '98	1040A

DIVERSION DIKE GENERAL NOTES:

1. ALL DIKES SHALL BE PLACED IN 8" LIFTS OR LESS AND COMPACTED TO 95% STANDARD PROCTOR DENSITY.
2. ALL DIVERSION DIKES SHALL HAVE POSITIVE DRAINAGE TO A CONTROLLED OUTLET.
3. DIVERTED RUNOFF FROM A PROTECTED OR STABILIZED AREA SHALL ITS OUTLET FLOW DIRECTED TO AN UNDISTURBED STABILIZED AREA OR INTO A LEVEL SPREADER OR GRADE STABILIZATION STRUCTURE.
4. DIVERTED RUNOFF FROM A DISTURBED OR EXPOSED AREA SHALL BE CONVEYED TO SEDIMENT TRAP SUCH AS A ROCK BERM, TEMPORARY SEDIMENT TRAP OR SEDIMENT BASIN OR TO AN AREA PROTECTED BY ANY OF THESE MEASURES.
5. STABILIZATION IS REQUIRED WHEN VELOCITIES EXCEED 6 FEET PER SECOND OR WHEN GRADES EXCEED 2.0%. STABILIZATION SHALL BE CRUSHED STONE PLACED IN A LAYER OF AT LEAST 3 INCHES THICKNESS OR HIGH VELOCITY EROSION CONTROL MATTING. VEGETATION MAY BE USED FOR VELOCITIES LESS THAN 6 FEET PER SECOND.
6. INSPECTION SHALL BE CONDUCTED EVERY TWO WEEKS OR AFTER EACH 1/2" RAINFALL EVENT.

DIVERSION DIKE CITY OF AZLE		STANDARD SPECIFICATION REFERENCE	
		DATE JAN. '98	STANDARD DRAWING NO. 1040B

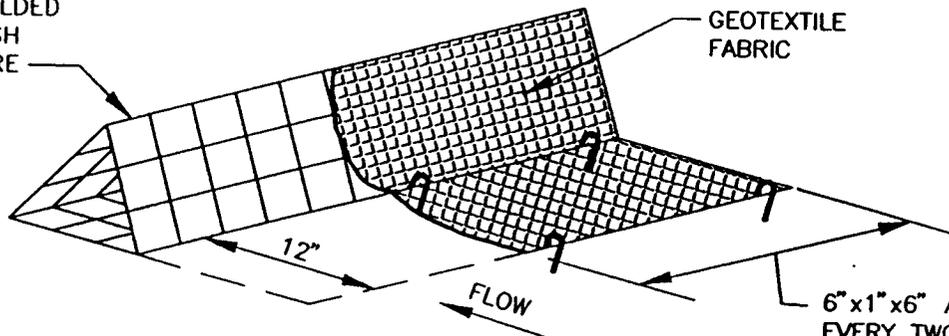


CROSS SECTION OF INSTALLATION OPTIONS

N.T.S.

- 1. TOE-IN 6" MIN.
- 2. WEIGHTED W/ 3" - 5" OPEN GRADED ROCK
- 3. TRENCHED IN 4"

6" x 6" WELDED WIRE MESH STRUCTURE



GEOTEXTILE FABRIC

6" x 1" x 6" ANCHORS EVERY TWO FEET (WHEN INSTALLED USING OPEN GRADED ROCK ONLY)

ISOMETRIC PLAN VIEW

N.T.S.

TRIANGULAR SEDIMENT FILTER DIKE

CITY OF AZLE



STANDARD SPECIFICATION REFERENCE

DATE
JAN. '98

STANDARD DRAWING NO.
1050A

TRIANGULAR SEDIMENT FILTER DIKE GENERAL NOTES:

1. DIKES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT DIKE.
2. THE FABRIC COVER AND SKIRT SHALL BE A CONTINUOUS EXTENSION OF THE FABRIC ON THE UPSTREAM FACE, AND FABRIC SHALL BE OVERLAPPED A MINIMUM OF 12".
3. THE SKIRT SHALL BE WEIGHTED WITH A CONTINUOUS LAYER OF TYPE 'A' RIP RAP, OR TOED-IN 6" WITH MECHANICALLY COMPACTED MATERIAL. OTHERWISE, THE ENTIRE STRUCTURE SHALL BE TRENCHED TO A DEPTH OF 4 INCHES.
4. DIKES AND SKIRT SHALL BE SECURELY ANCHORED IN PLACE USING 6-INCH WIRE STAPLES ON 2-FOOT CENTERS ON BOTH EDGES AND SKIRTS.
5. FILTER MATERIAL SHALL BE LAPPED OVER ENDS 6" TO COVER DIKE TO DIKE JOINTS. JOINTS SHALL BE FASTENED WITH GALVANIZED SHOAT RINGS.
6. THE DIKE STRUCTURE SHALL BE 6 GA. 6" X 6" WIRE MESH, 18" ON A SIDE.
7. INSPECTION SHALL BE MADE EVERY TWO WEEKS OR AFTER EACH 1/2" RAINFALL EVENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED BY THE CONTRACTOR.
8. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES APPROXIMATELY ONE-HALF THE HEIGHT OF THE DIKE, AND DISPOSED OF IN A MANNER WHICH WILL NOT CAUSE ADDITIONAL SILTATION.
9. AFTER THE DISTURBED AREAS OF THE SITE ARE COMPLETELY STABILIZED, THE DIKES AND ANY REMAINING SILT SHALL BE REMOVED. SILT SHALL BE DISPOSED OF AS INDICATED IN NO. 8 ABOVE.

TRIANGULAR SEDIMENT FILTER DIKE

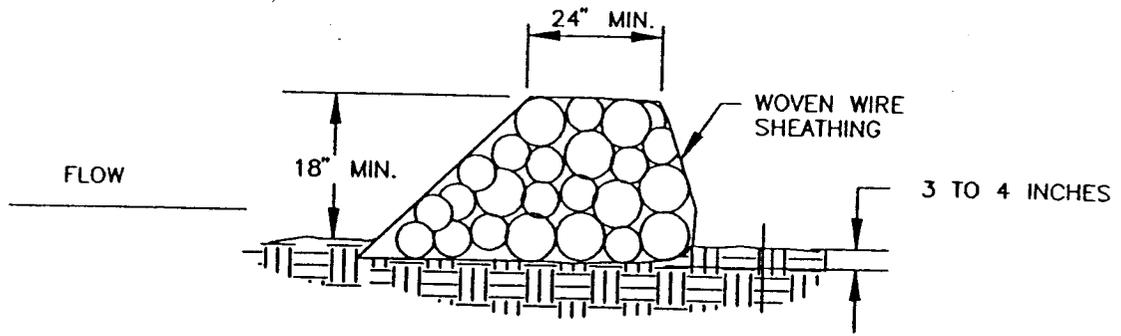
CITY OF AZLE



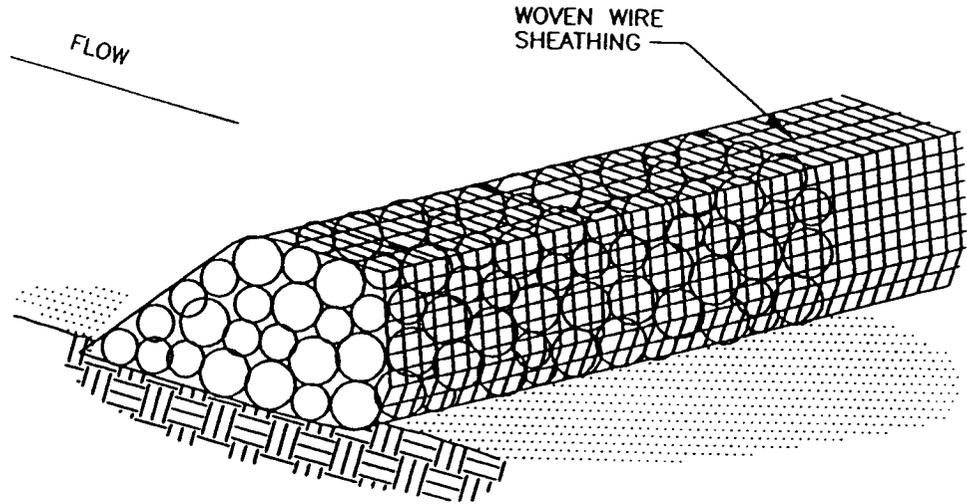
STANDARD SPECIFICATION REFERENCE

DATE
JAN. '98

STANDARD DRAWING NO.
1050B



CROSS SECTION
N.T.S.



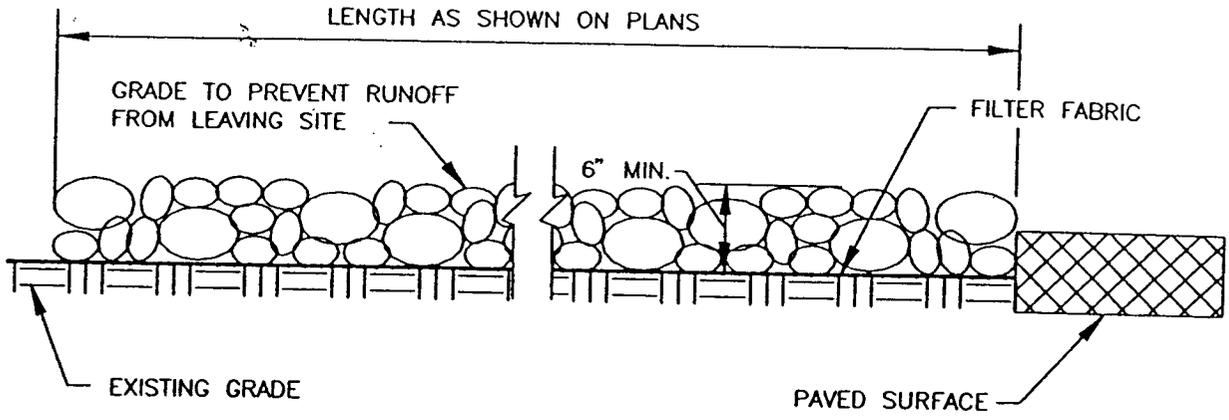
ISOMETRIC PLAN VIEW
N.T.S.

<p>ROCK BERM CITY OF AZLE</p>		STANDARD SPECIFICATION REFERENCE	
		DATE JAN. '98	STANDARD DRAWING NO. 1060A

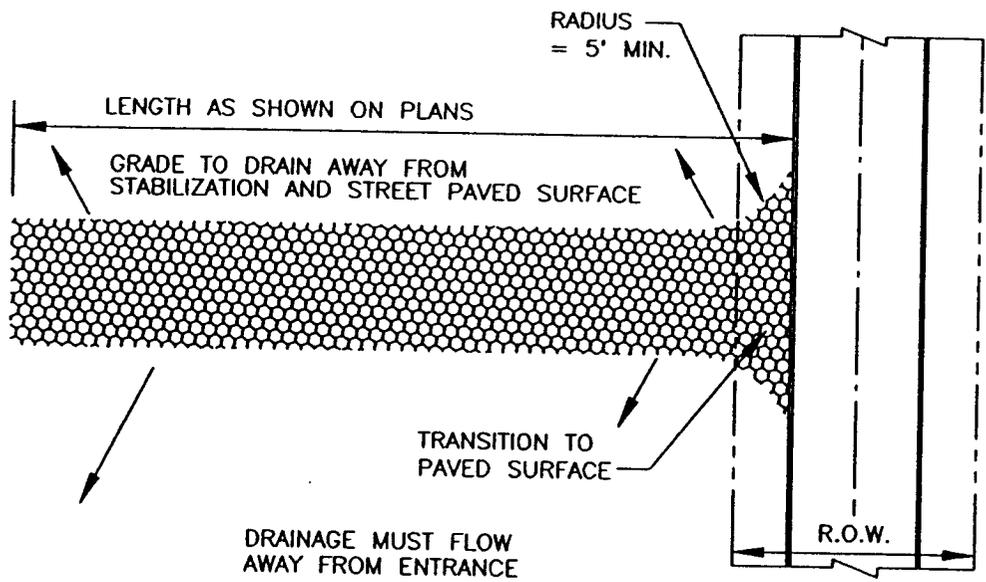
ROCK BERM GENERAL NOTES:

1. USE ONLY OPEN GRADED ROCK 4-8 INCHES IN DIAMETER FOR STREAM FLOW CONDITION. USE OPEN GRADED ROCK 3-5 INCHES IN DIAMETER FOR OTHER CONDITIONS.
2. THE ROCK BERM SHALL BE SECURED WITH A WOVEN WIRE SHEATHING HAVING A MAXIMUM OPENING OF 1 INCH AND A MINIMUM WIRE SIZE OF 20 GAUGE AND SHALL BE BURIED IN A TRENCH APPROXIMATELY 3 TO 4 INCHES DEEP.
3. THE ROCK BERM SHALL BE INSPECTED EVERY TWO WEEKS OR AFTER EACH 1/2" RAIN EVENT AND SHALL BE REPLACED WHEN THE STRUCTURE CEASES TO FUNCTION AS INTENDED DUE TO SILT ACCUMULATION AMONG THE ROCKS, WASHOUT, CONSTRUCTION TRAFFIC DAMAGE, ETC.
4. WHEN SILT REACHES A DEPTH EQUAL TO ONE-THIRD OF THE HEIGHT OF THE BERM OR ONE FOOT, WHICHEVER IS LESS, THE SILT SHALL BE REMOVED AND DISPOSED OF PROPERLY.
5. WHEN THE SITE IS COMPLETELY STABILIZED, THE BERM AND ACCUMULATED SILT SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED MANNER.
6. ROCK BERM SHOULD BE USED AS CHECK DAMS FOR CONCENTRATED FLOW AND ARE NOT INTENDED FOR USE IN PERIMETER PROTECTION.

ROCK BERM		STANDARD SPECIFICATION REFERENCE	
CITY OF AZLE		DATE JAN. '98	STANDARD DRAWING NO. 1060B



PROFILE VIEW
N.T.S.



PLAN VIEW
N.T.S.

STABILIZED ENTRANCE
CITY OF AZLE



STANDARD SPECIFICATION REFERENCE	
DATE	STANDARD DRAWING NO.
JAN. '98	1070A

STABILIZED CONSTRUCTION ENTRANCE GENERAL NOTES:

1. STONE SHALL BE 3 TO 5 INCH DIAMETER CRUSHED ROCK OR ACCEPTABLE CRUSHED PORTLAND CEMENT CONCRETE.
2. LENGTH SHALL BE SHOWN ON PLANS, WITH A MINIMUM LENGTH OF 30 FEET FOR LOTS WHICH ARE LESS THAN 150 FEET FROM EDGE OF PAVEMENT. THE MINIMUM DEPTH IN ALL OTHER CASES SHALL BE 50 FEET.
3. THE THICKNESS SHALL NOT BE LESS THAN 6 INCHES.
4. THE WIDTH SHALL BE NO LESS THAN THE FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS.
5. WHEN NECESSARY, VEHICLES SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO A PUBLIC ROADWAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WITH DRAINAGE FLOWING AWAY FROM BOTH THE STREET AND THE STABILIZED ENTRANCE. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH OR WATERCOURSE USING APPROVED METHODS.
6. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PAVED SURFACES. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO PAVED SURFACES MUST BE REMOVED IMMEDIATELY.
7. THE ENTRANCE MUST BE PROPERLY GRADED OR INCORPORATE A DRAINAGE SWALE TO PREVENT RUNOFF FROM LEAVING THE CONSTRUCTION SITE.

STABILIZED ENTRANCE

CITY OF AZLE



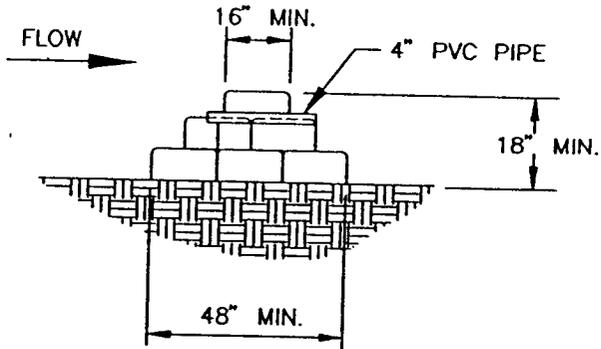
STANDARD SPECIFICATION REFERENCE

DATE

JAN. '98

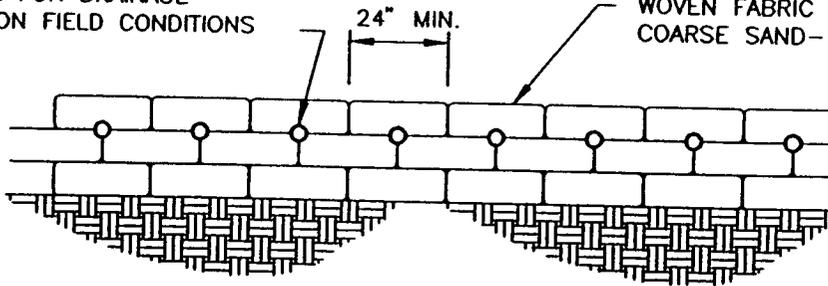
STANDARD DRAWING NO.

1070B



CROSS SECTION
N.T.S.

4" PVC PIPE FOR DRAINAGE
DEPENDING ON FIELD CONDITIONS



WOVEN FABRIC SANDBAG FILLED W/
COARSE SAND- MIN. WEIGHT 40 LBS.

PROFILE VIEW
N.T.S.

SAND BAG BERM
CITY OF AZLE



STANDARD SPECIFICATION REFERENCE

DATE
JAN. '98

STANDARD DRAWING NO.
1080A

SAND BAG BERM GENERAL NOTES:

1. WHEN A SANDBAG IS FILLED WITH MATERIAL, THE OPEN END OF THE SANDBAG SHOULD BE STAPLED OR TIED WITH NYLON OR POLY CORD.
2. SANDBAGS SHOULD BE STACKED IN AT LEAST THREE ROWS ABUTTING EACH OTHER, AND IN STAGGERED ARRANGEMENT.
3. THE BASE OF THE BERM SHOULD HAVE AT LEAST 3 SANDBAGS. THESE CAN BE REDUCED TO 2 AND 1 BAG IN THE SECOND AND THIRD ROWS RESPECTIVELY.
4. FOR EACH ADDITIONAL 6" OF HEIGHT, AN ADDITIONAL SANDBAG MUST BE ADDED TO EACH ROW WIDTH.
5. THE SANDBAG BERM SHALL BE INSPECTED AFTER EACH 1/2" RAIN EVENT AND SHALL BE RESHAPED OR REPLACED AS NEEDED DURING INSPECTION. REPAIRS SHALL BE MADE FOR WASHOUT, CONSTRUCTION TRAFFIC DAMAGE, ETC.
6. WHEN SILT REACHES A DEPTH EQUAL TO 6 INCHES (THE HEIGHT OF ONE SANDBAG), THE SILT SHALL BE REMOVED AND DISPOSED OF AT AN APPROVED SITE AND IN SUCH A MANNER AS TO NOT CREATE A SILTATION PROBLEM.
7. WHEN THE SITE IS COMPLETELY STABILIZED, THE BERM AND ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED MANNER.

SAND BAG BERM

CITY OF AZLE



STANDARD SPECIFICATION REFERENCE

DATE
JAN. '98

STANDARD DRAWING NO.
1080B

AREA TO BE EXCAVATED, IF NECESSARY, FOR STORAGE

EARTH EMBANKMENT

FILTER STONE EMBANKMENT

DIRECTION OF FLOW

CUTAWAY TO SHOW GEOTEXTILE COVERED FILTER STONE CORE

3'-0" MIN.
TOP WIDTH

PLAN VIEW

N.T.S.

LENGTH (FT.) =
6 x DRAINAGE AREA (AC.)

GEOTEXTILE COVERED FILTER STONE CORE

PROFILE VIEW

N.T.S.

6" MIN.

GEOTEXTILE COVERED FILTER STONE CORE

TYPE 'A' RIP RAP

EXCAVATION, IF NECESSARY FOR STORAGE, 1800 CF/AC., MINIMUM

EXISTING GROUND

FLOW

SECTION A - A

N.T.S.

STONE OUTLET SEDIMENT TRAP

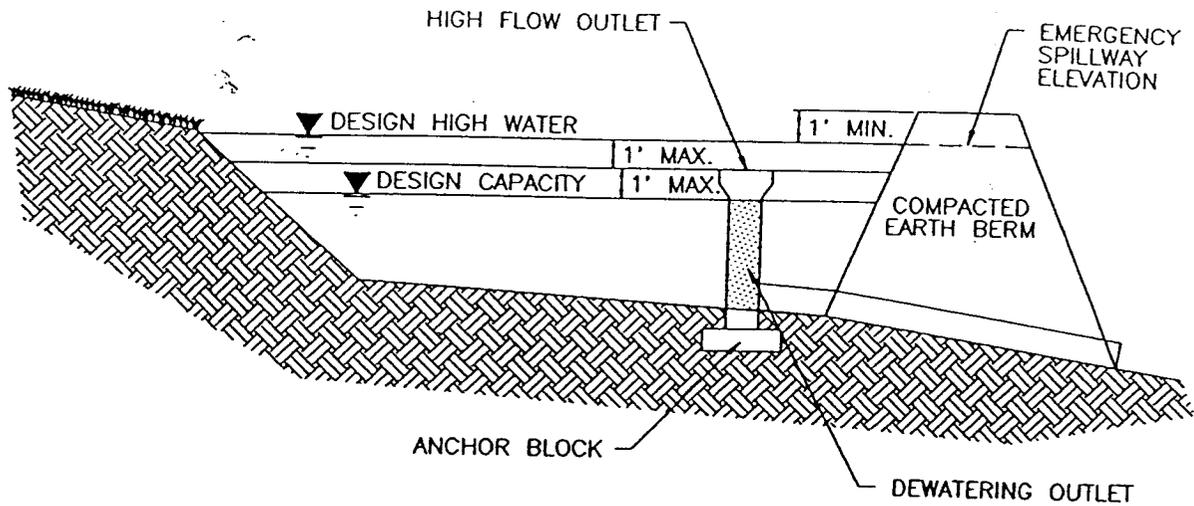
CITY OF AZLE



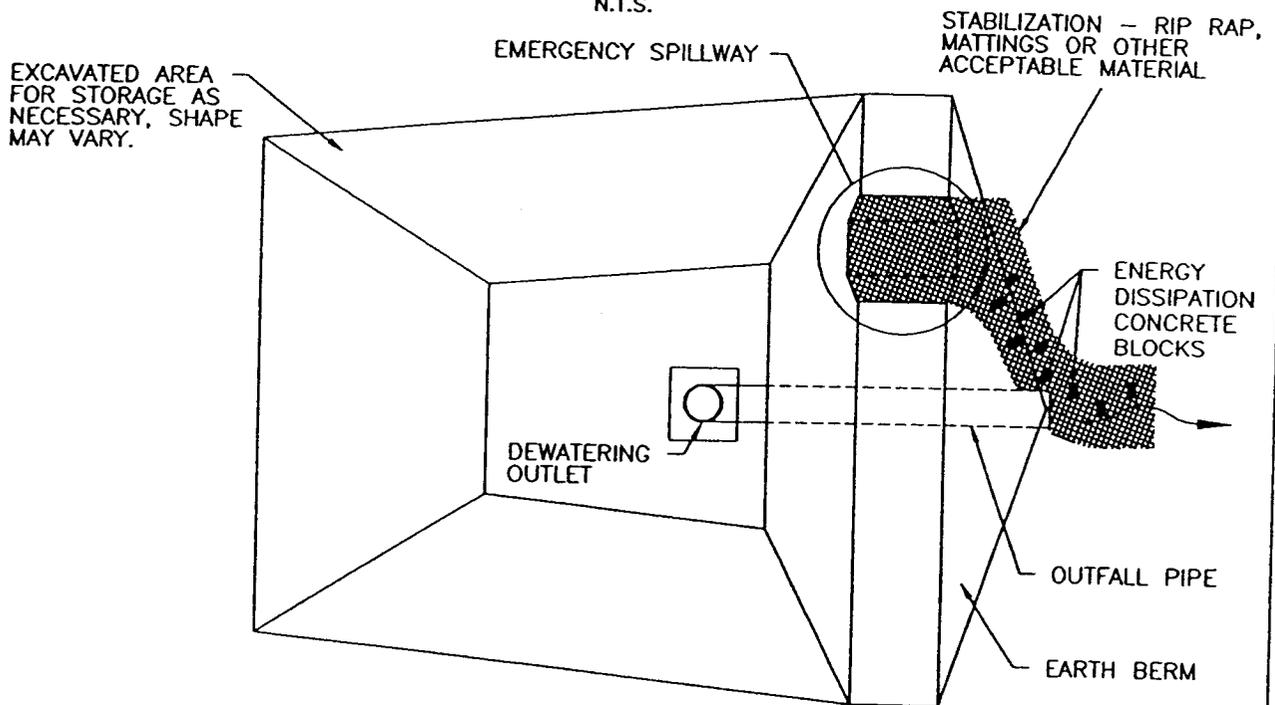
STANDARD SPECIFICATION REFERENCE

DATE
JAN. '98

STANDARD DRAWING NO.
1090



CROSS SECTION
N.T.S.



PLAN VIEW
N.T.S.

- * Maximum drainage area contributing to the basin shall be 10 acres.
- * Minimum capacity of the basin shall provide storage for the calculated volume of runoff from a 2-year, 24-hour storm per disturbed acre of drainage area. Where no such calculation has been performed, the minimum capacity of the basin shall be 3600 cubic feet per disturbed acre of contributing drainage area.

SEDIMENT BASIN

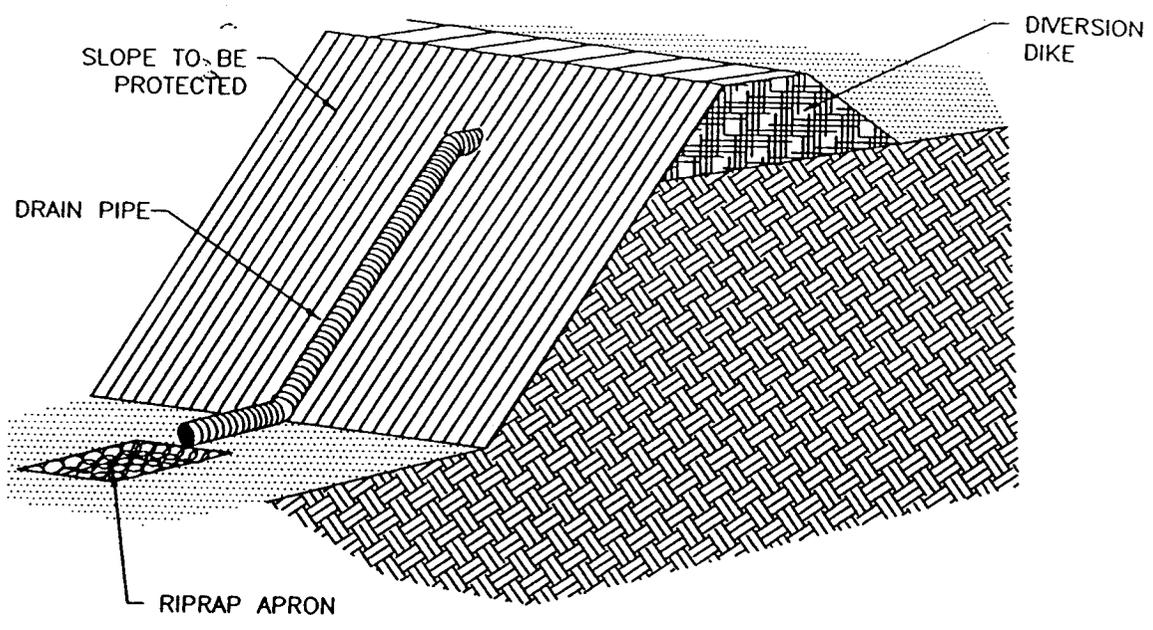
CITY OF AZLE



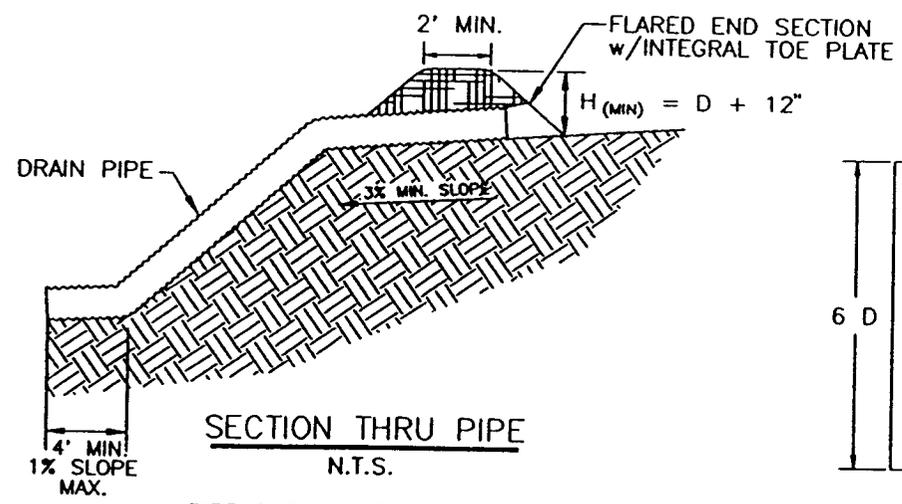
STANDARD SPECIFICATION REFERENCE

DATE
JAN. '98

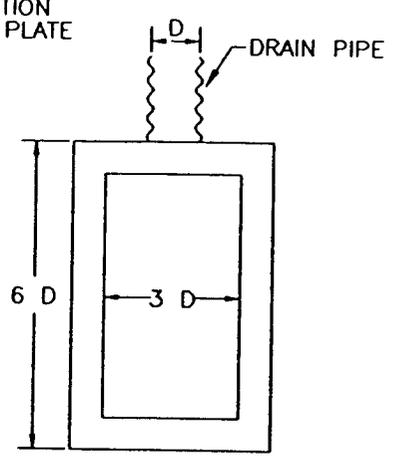
STANDARD DRAWING NO.
1100



ISOMETRIC PLAN VIEW
N.T.S.



SECTION THRU PIPE
N.T.S.



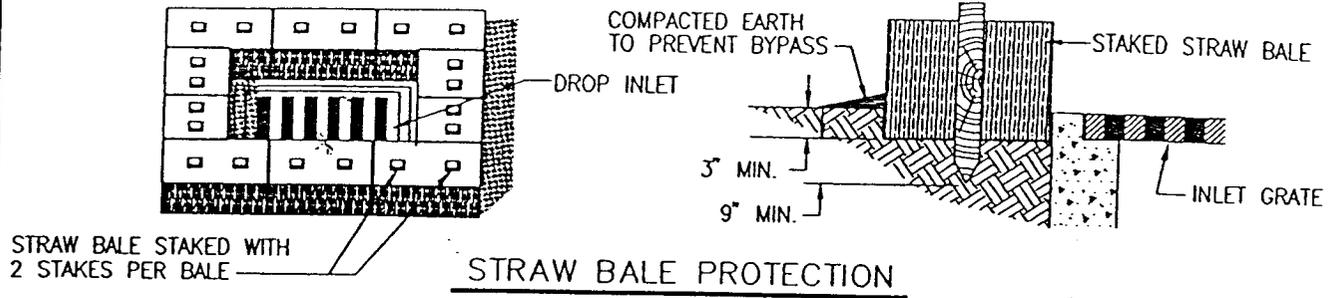
RIPRAP APRON PLAN VIEW
N.T.S.

RIPRAP SHALL CONSIST OF 50 TO 150 POUND STONES PLACED IN A LAYER OF NOT LESS THAN 12 INCHES. THE DEPTH OF THE APRON SHALL EQUAL THE PIPE DIAMETER BUT IN NO CASE SHALL IT BE LESS THAN 12 INCHES.

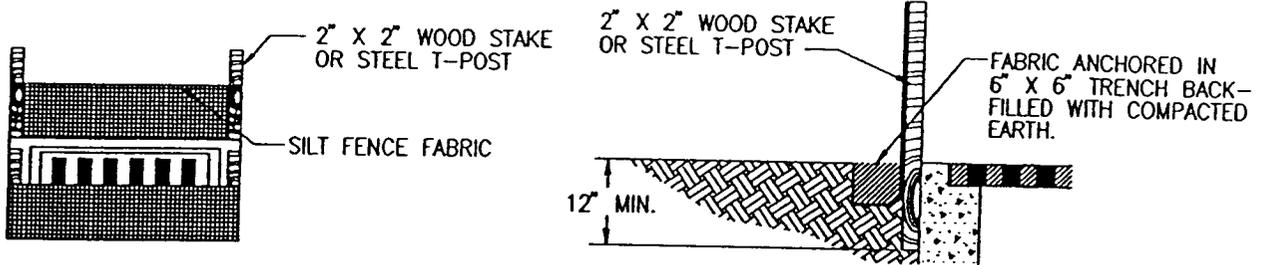
PIPE SLOPE DRAIN
CITY OF AZLE



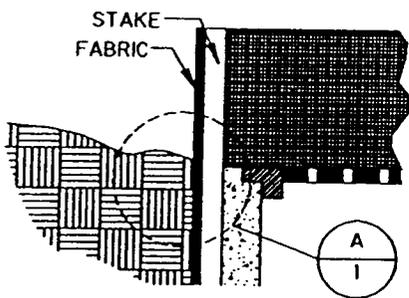
STANDARD SPECIFICATION REFERENCE	
DATE JAN. '98	STANDARD DRAWING NO. 1110



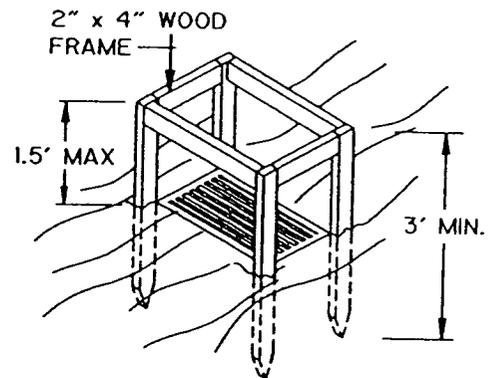
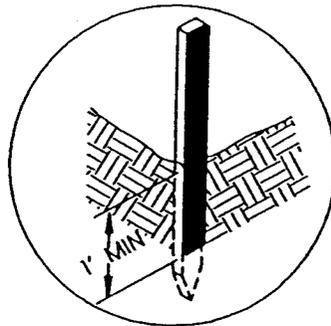
N.T.S.



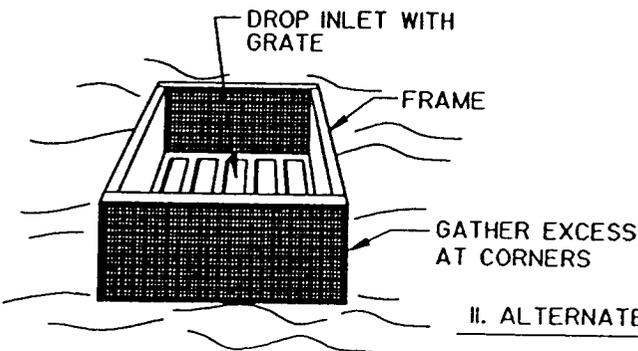
I. STANDARD INSTALLATION



ELEVATION OF STAKE AND FABRIC ORIENTATION



PERSPECTIVE VIEW



PERSPECTIVE VIEW

II. ALTERNATE INSTALLATION

FILTER FABRIC PROTECTION

N.T.S.

SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE INLET DRAINS A RELATIVELY FLAT AREA (SLOPE NO GREATER THAN 5%) WHERE THE INLET SHEET OR OVERLAND FLOWS (NOT TO EXCEED 1 C.F.S.) ARE TYPICAL. THE METHOD SHALL NOT APPLY TO INLETS RECEIVING CONCENTRATED FLOWS, SUCH AS IN STREETS OR HIGHWAY MEDIANS.

INLET PROTECTION FILTER BARRIER

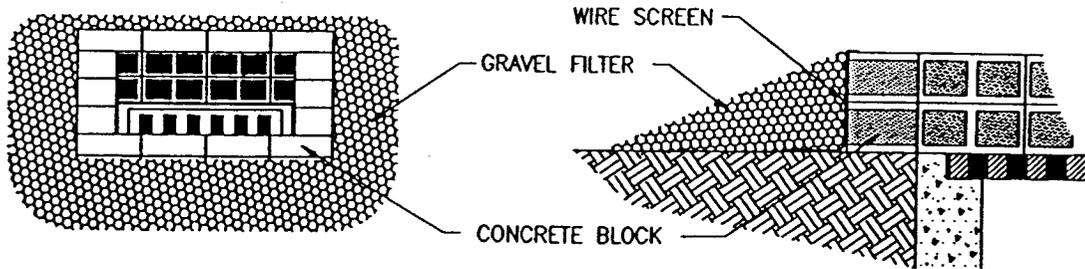
CITY OF AZLE



STANDARD SPECIFICATION REFERENCE

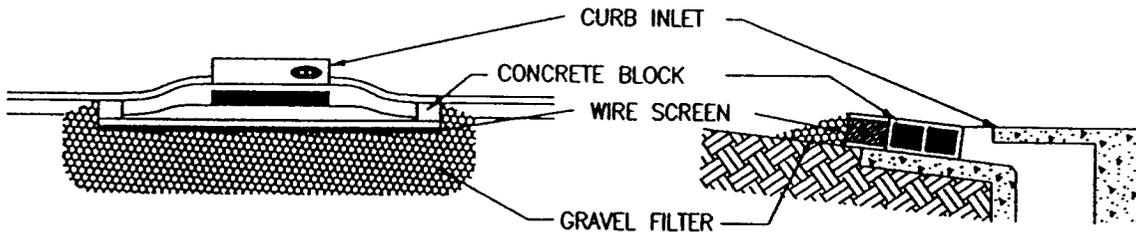
DATE
JAN. '98

STANDARD DRAWING NO.
1120



DROP INLET PROTECTION

N.T.S.



CURB INLET PROTECTION

N.T.S.

INLET PROTECTION BLOCK & GRAVEL

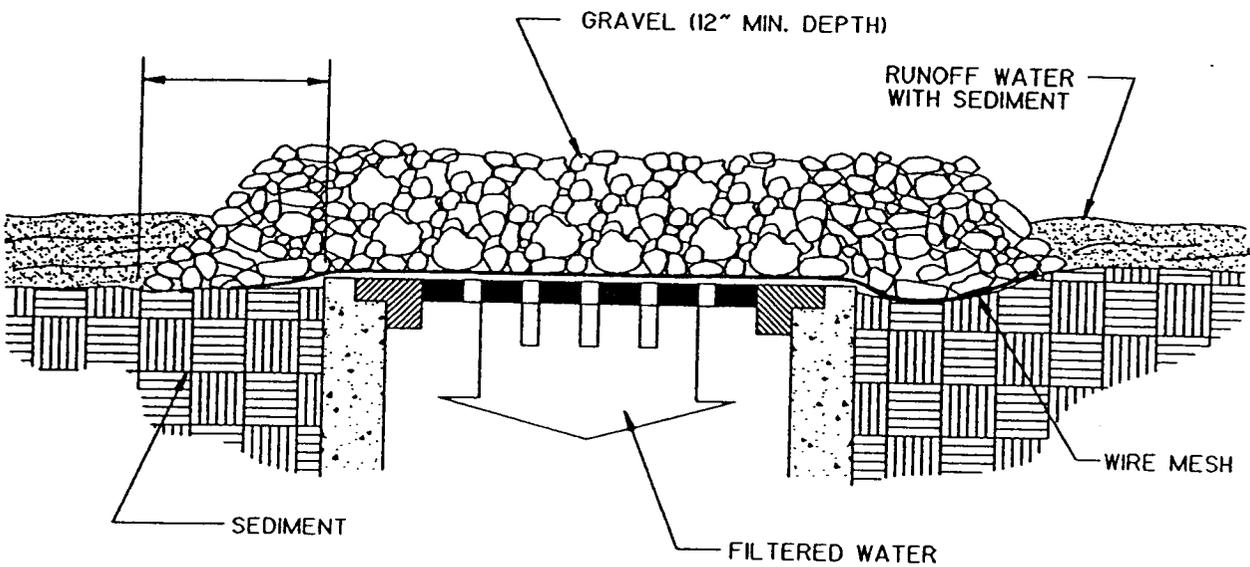
CITY OF AZLE



STANDARD SPECIFICATION REFERENCE

DATE
JAN. '98

STANDARD DRAWING NO.
1130

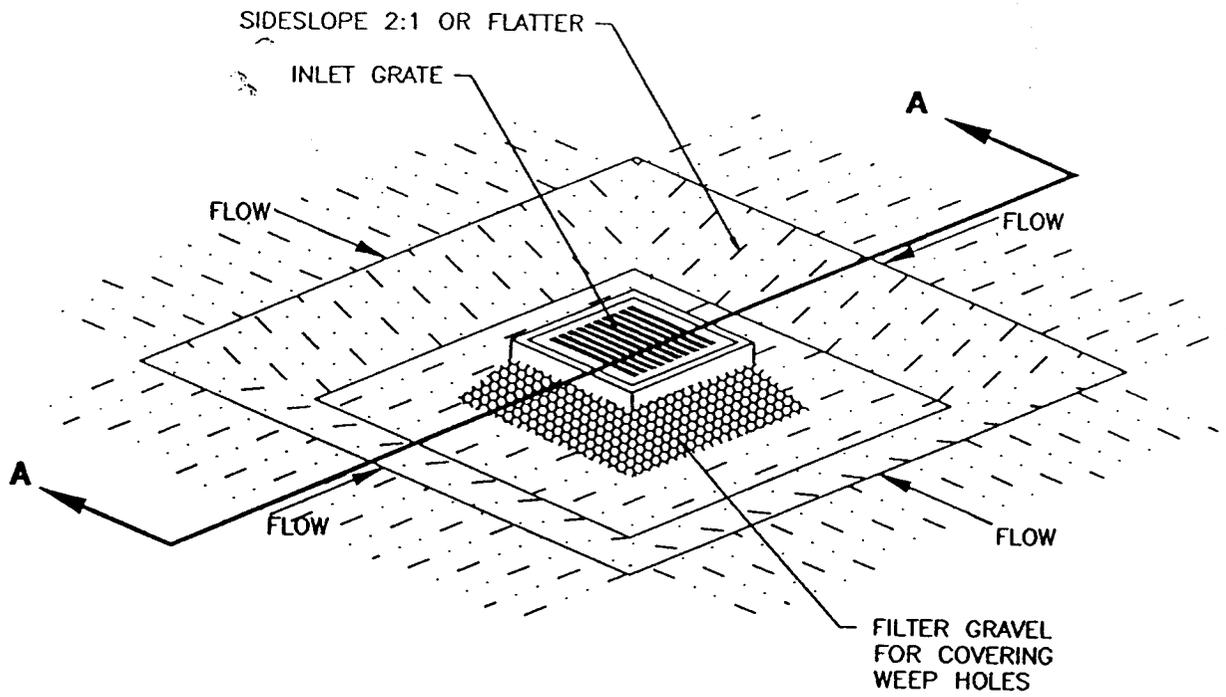


CROSS SECTION
N.T.S.

SPECIFIC APPLICATION

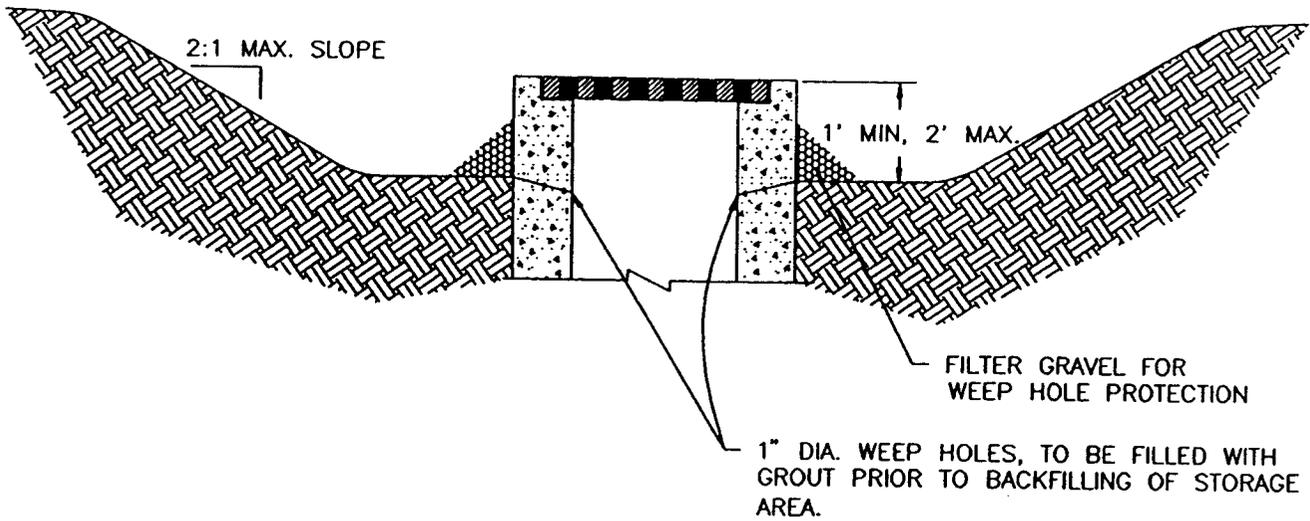
THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY CONCENTRATION FLOWS ARE EXPECTED, BUT NOT WHERE PONDING AROUND THE STRUCTURE MIGHT CAUSE EXCESSIVE AND UNPROTECTED AREAS.

INLET PROTECTION WIRE MESH & GRAVEL		STANDARD SPECIFICATION REFERENCE	
CITY OF AZLE		DATE JAN. '98	STANDARD DRAWING NO. 1140



ISOMETRIC PLAN VIEW

N.T.S.



SECTION A-A

N.T.S.

INLET PROTECTION EXCAVATED IMPOUNDMENT

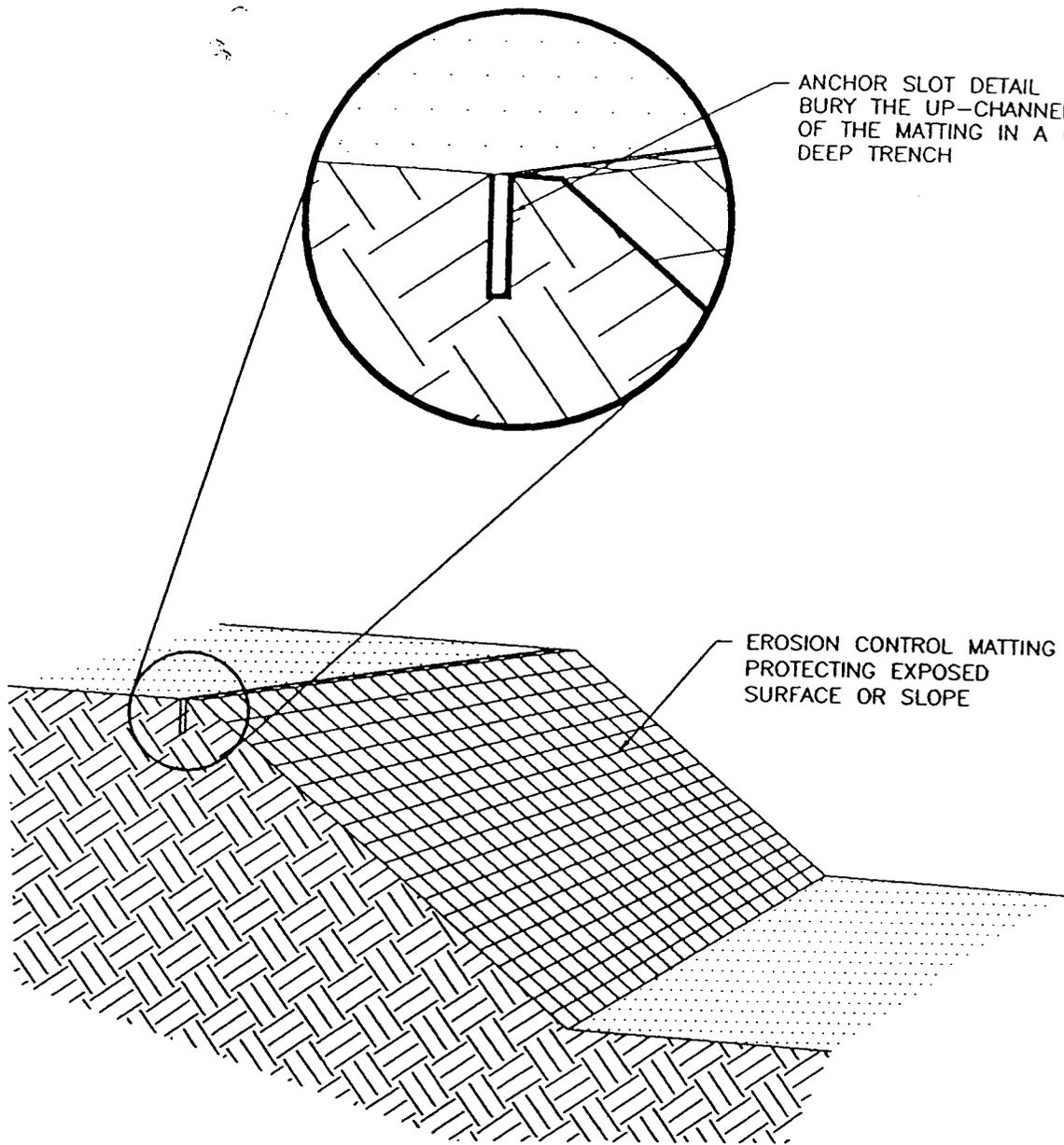
CITY OF AZLE



STANDARD SPECIFICATION REFERENCE

DATE
JAN. '98

STANDARD DRAWING NO.
1150



ANCHOR SLOT DETAIL
 BURY THE UP-CHANNEL END
 OF THE MATTING IN A 6"
 DEEP TRENCH

EROSION CONTROL MATTING
 PROTECTING EXPOSED
 SURFACE OR SLOPE

<p>EROSION CONTROL MATTINGS</p>		<p>STANDARD SPECIFICATION REFERENCE</p>	
<p>CITY OF AZLE</p>		<p>DATE JAN. '98</p>	<p>STANDARD DRAWING NO. 1160A</p>

EROSION CONTROL MATTING GENERAL NOTES:

1. STRIPS OF MATTING SHALL BE INSTALLED PARALLEL TO THE DIRECTION OF FLOW OVER THE SURFACE WHICH IS TO BE PROTECTED.
2. THE UP-CHANNEL END OF THE MATTING SHALL BE BURIED IN A TRENCH MEASURING 6 INCHES DEEP AND 6 INCHES WIDE FOR THE ENTIRE WIDTH OF THE END. THE SOIL SHALL BE BACKFILLED INTO THE TRENCH AND TAMPED FIRMLY. STAPLES SHALL BE PLACED EVERY 12 INCHES ALONG THE END OF THE MATTING.
3. EDGES OF ADJACENT STRIPS OF MATTING SHALL BE OVERLAPPED A MINIMUM OF 4 INCHES AND SHALL BE STAPLED EVERY 3 FEET ALONG THE OVERLAP.
4. WHEN JOINING STRIPS OF MATTING END TO END, A TRENCH SIMILAR TO THE ONE DUG AT THE BEGINNING OF THE ORIGINAL STRIP SHALL BE DUG WITH THE UP-CHANNEL END OF THE NEW STRIP BEING PLACED IN A LIKE MANNER IN THE TRENCH AS THE BEGINNING END OF THE ORIGINAL STRIP. THE END OF THE STRIP BEING FOLDED UNDER AT LEAST 12 INCHES. STAPLES SHALL BE INSTALLED AT 12 INCH INTERVALS ALONG THE WIDTH OF THE STRIP NOT MORE THAN 6 INCHES FROM THE TRENCH.
5. IN SITUATIONS WHERE ERODIBLE SOILS, STEEP SLOPES OR HIGH VELOCITY FLOWS ARE ENCOUNTERED, A FOLD OF THE MATTING SHALL BE INSERTED INTO A 6 INCH TRENCH AND TAMPED FIRMLY. STAPLES SHALL BE INSTALLED AT 12 INCH INTERVALS ALONG THE TRENCH.
6. STAPLES FOR ANCHORING SOIL STABILIZING MATERIALS SHALL BE MADE OF 10 GAUGE WIRE OR HEAVIER. THEY SHALL BE 6 TO 10 INCHES IN LENGTH, WITH THE LONGER STAPLES BEING USED IN LOOSE OR UNSTABLE SOILS. THERE SHALL BE ONE STAPLE FOR EACH FOUR (4) SQUARE FEET OF MATTING TO ASSURE PROPER BONDING BETWEEN THE SOIL AND THE MAT MATERIAL.

EROSION CONTROL MATTINGS

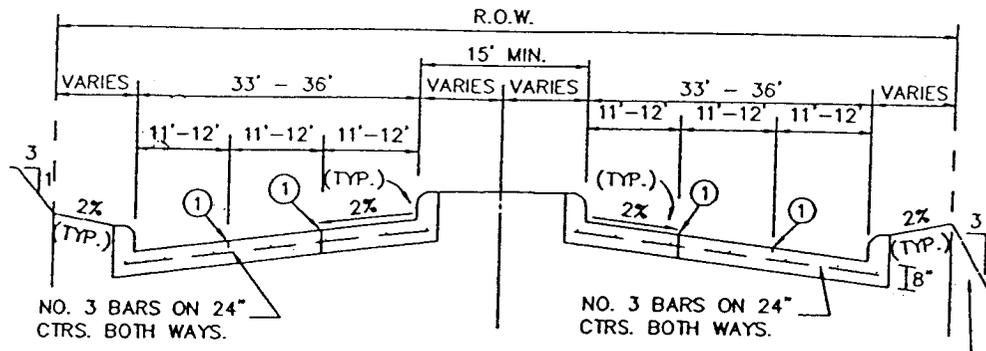
CITY OF AZLE



STANDARD SPECIFICATION REFERENCE

DATE
JAN. '98

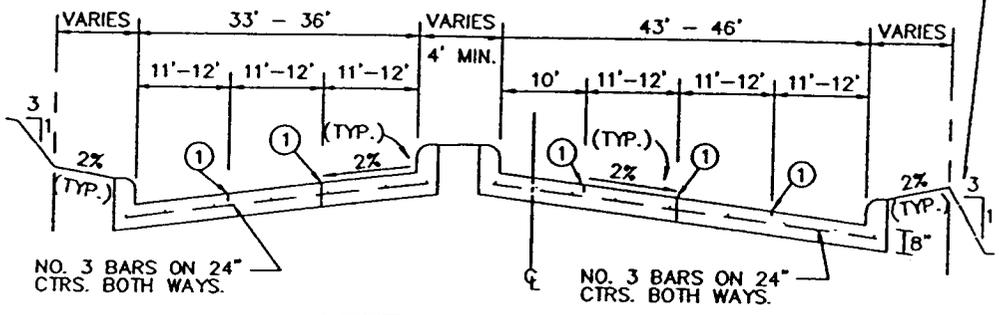
STANDARD DRAWING NO.
1160B



REGULAR SECTION

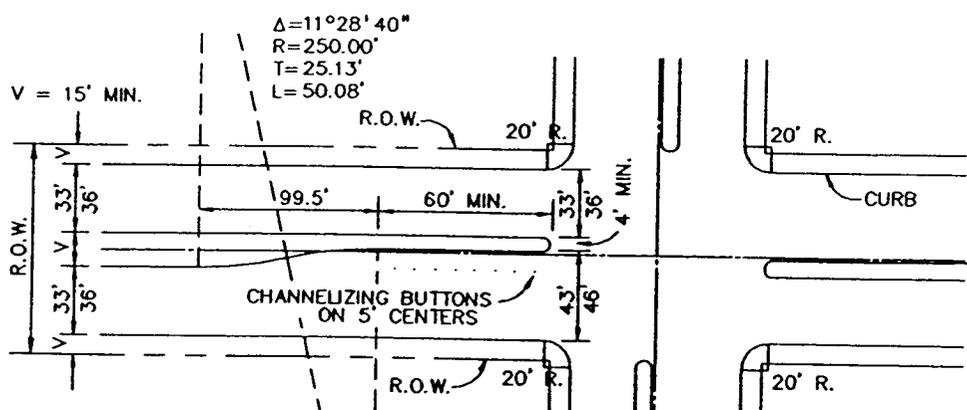
N.T.S.

(FILL SECTIONS ONLY. ALTERNATE REVERSE SLOPE ACCEPTABLE. NOT TO EXCEED 3:1)



LEFT TURN SECTION

N.T.S.



PLAN

N.T.S.

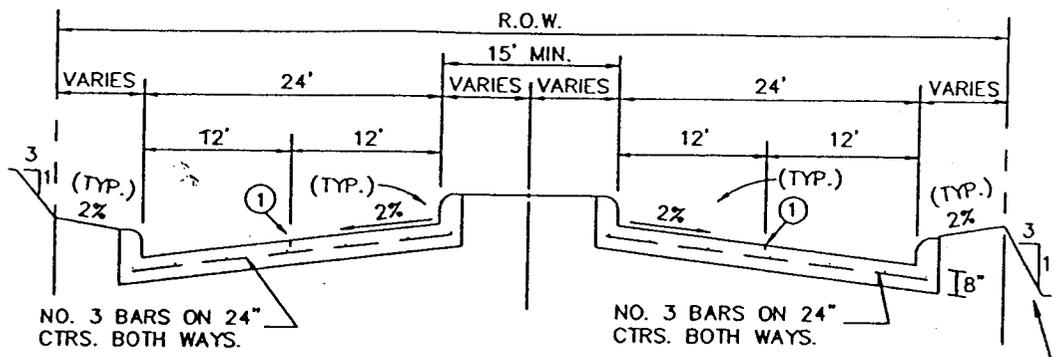
NOTES:

1. MIN. PAVEMENT DEPTH AND STRENGTH SHALL BE 8" - CLASS "C", OR AS SPECIFIED BY OWNER.
2. MIN. CURB HEIGHT AND WIDTH SHALL BE 6", OR AS SPECIFIED BY OWNER.
3. ALTERNATE REINFORCEMENT SHALL BE #4 BARS ON 30" CENTERS BOTH WAYS.

① SAWED LONGITUDINAL CONTRACTION JOINT OR CONSTRUCTION JOINT.

REINFORCED CONCRETE PAVEMENT
SIX-LANE DIVIDED THOROUGHFARE

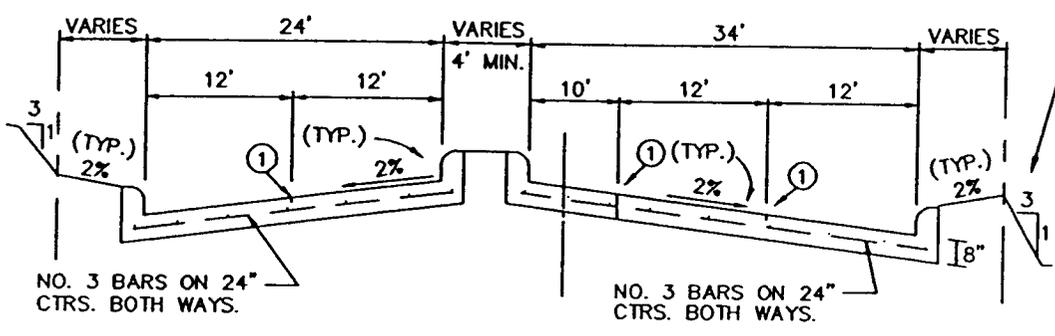
STANDARD SPECIFICATION REFERENCE	
5.8.	
DATE	STANDARD DRAWING NO.
NOV. '96	2010



REGULAR SECTION

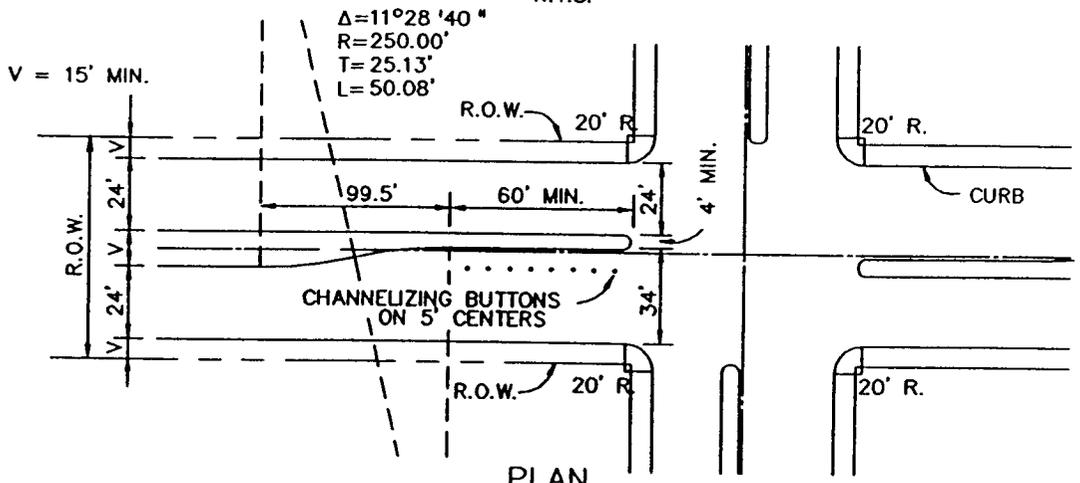
N.T.S.

(FILL SECTIONS ONLY. ALTERNATE REVERSE SLOPE ACCEPTABLE. NOT TO EXCEED 3:1.)



LEFT TURN SECTION

N.T.S.



PLAN

N.T.S.

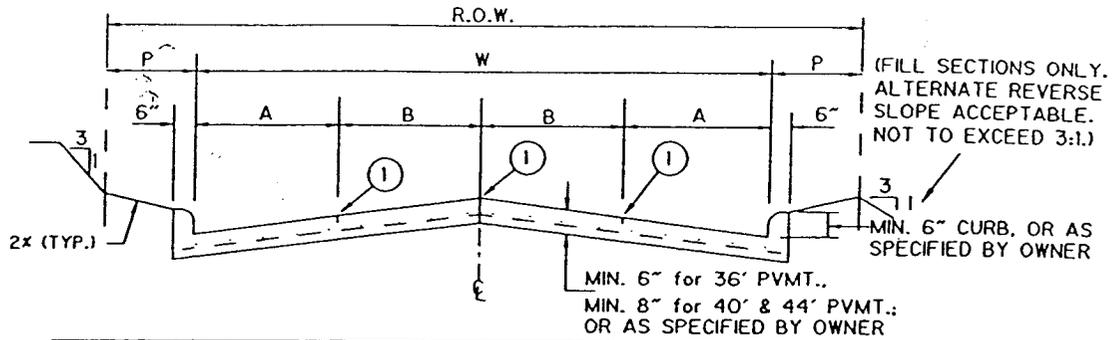
NOTES:

1. MIN. PAVEMENT DEPTH AND STRENGTH SHALL BE 8" - CLASS "C", OR AS SPECIFIED BY OWNER.
2. MIN. CURB HEIGHT AND WIDTH SHALL BE 6", OR AS SPECIFIED BY OWNER.
3. ALTERNATE REINFORCEMENT SHALL BE #4 BARS ON 30" CENTERS BOTH WAYS.

① SAWED LONGITUDINAL CONTRACTION JOINT OR CONSTRUCTION JOINT.

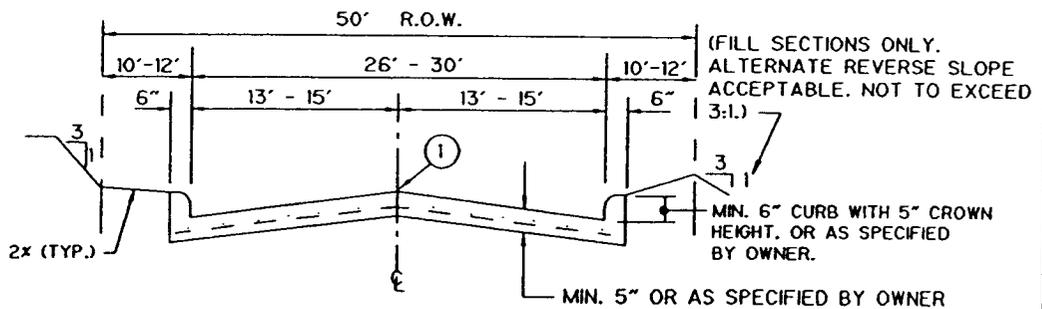
REINFORCED CONCRETE PAVEMENT
FOUR-LANE DIVIDED THOROUGHFARE

STANDARD SPECIFICATION REFERENCE	
5.8.	
DATE	STANDARD DRAWING NO.
NOV. '96	2020



STREET WIDTH(W)	A	B	R.O.W. WIDTH	P	CROWN HEIGHT
36'	8'	10'	VARIES	VARIES	6"
40'	8' OR 10'	10' OR 12'	VARIES	VARIES	6"
44'	11'	11'	VARIES	VARIES	8"

**FOUR TRAVEL LANES OR
TWO TRAVEL LANES & TWO PARKING LANES**
N.T.S.



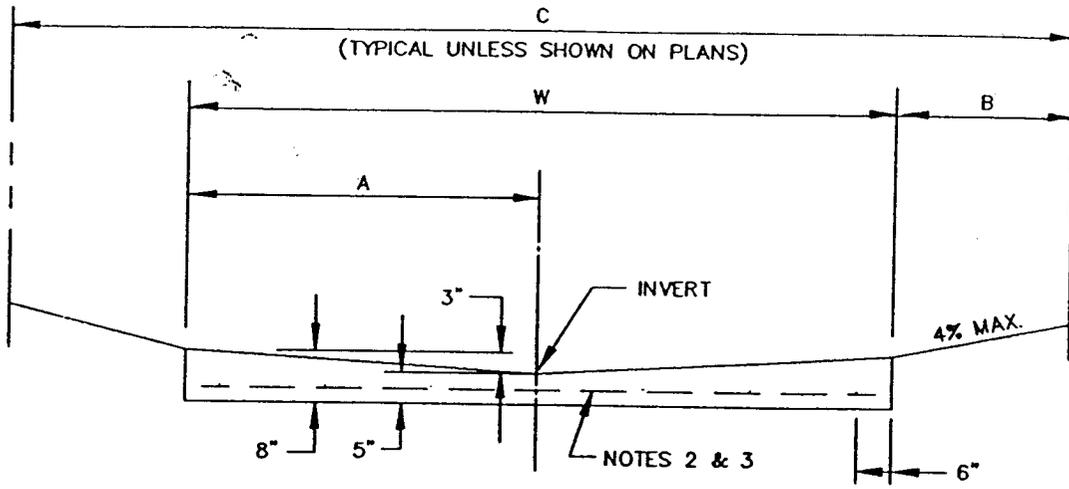
ONE TRAVEL LANE & TWO PARKING LANES
N.T.S.

① INDICATES SAWED LONGITUDINAL CONTRACTION OR CONSTRUCTION JOINT.

NOTES :

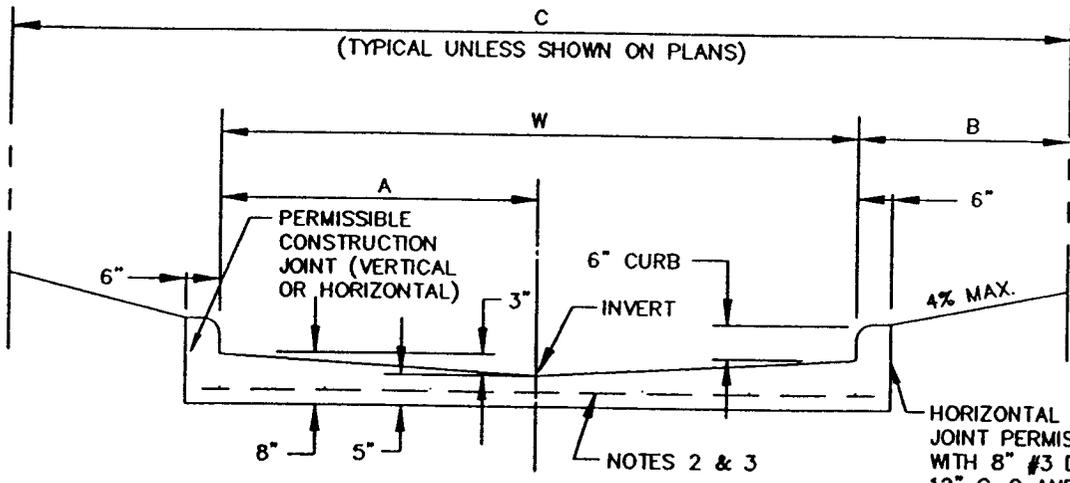
1. ALL REINFORCEMENT SHALL BE #3 BARS ON 24" CENTERS BOTH WAYS, EXCEPT WHERE NOTED.
2. ALTERNATE REINFORCEMENT SHALL BE #4 BARS ON 30" CENTERS BOTH WAYS.
3. PAVEMENT STRENGTH SHALL CONFORM TO CLASS "C" CONCRETE, OR AS SPECIFIED BY THE OWNER.

REINFORCED CONCRETE PAVEMENT	STANDARD SPECIFICATION REFERENCE	
	5.8.	
2- & 4-LANE UNDIVIDED THOROUGHFARE	DATE	STANDARD DRAWING NO.
	NOV. '96	2030



ALLEY SECTION WITHOUT CURB

N.T.S.



ALLEY SECTION WITH CURB

N.T.S.

HORIZONTAL CONSTRUCTION JOINT PERMISSIBLE WITH 8" #3 DOWELS 12" C-C AND LONGITUDINAL #3 BAR IN CURB.

NOTES:

1. PROVIDE SAWED TRANSVERSE CONTRACTION JOINTS NOT MORE THAN 20' C-C.
2. REINFORCED WITH NO. 3 BARS AT 24" C-C BOTH WAYS.
3. ALTERNATE REINFORCEMENT - NO. 4 BARS AT 30" C-C BOTH WAYS.
4. EXPANSION JOINTS TO BE PLACED AT ALL INTERSECTIONS AND NOT TO EXCEED 600' BETWEEN JOINTS.
5. CONCRETE SHALL BE CLASS "C".

ALLEY WIDTH (W)	A	B	R.O.W. WIDTH (C)
10'	5'	2'-6"	15'
12'	6'	2'-6"	17'
16'	8'	2'-6"	21'
20'	10'	2'-6"	25'

REINFORCED CONCRETE PAVEMENT

ALLEYS

STANDARD SPECIFICATION REFERENCE

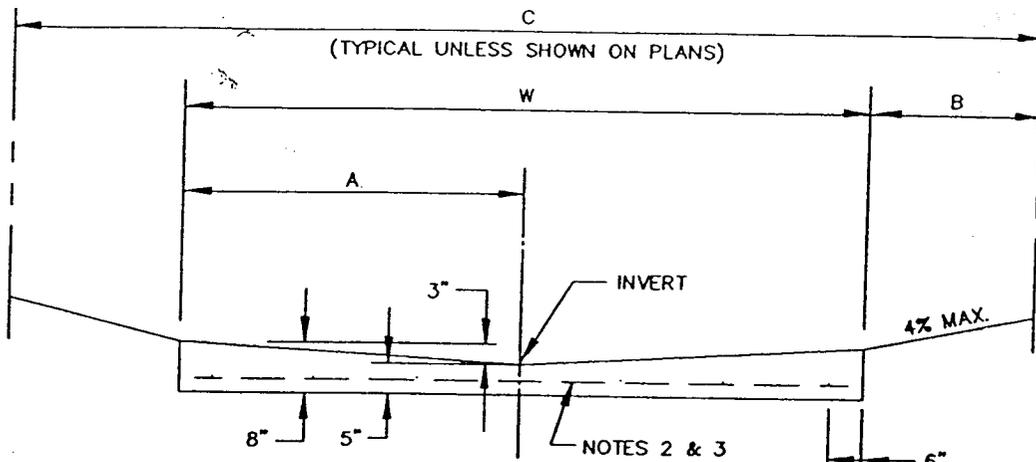
5.8.

DATE

NOV. '96

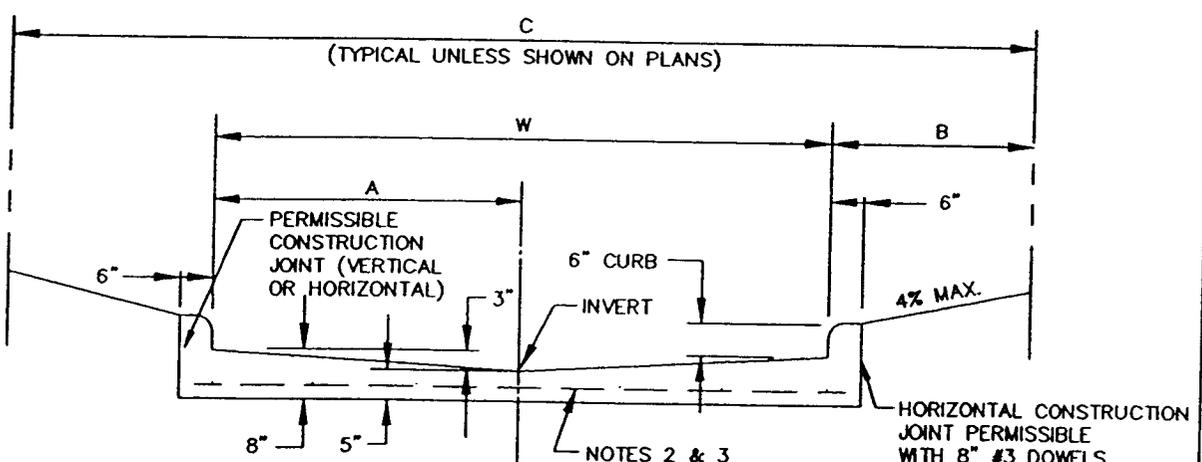
STANDARD DRAWING NO.

2040



ALLEY SECTION WITHOUT CURB

N.T.S.



ALLEY SECTION WITH CURB

N.T.S.

HORIZONTAL CONSTRUCTION JOINT PERMISSIBLE WITH 8" #3 DOWELS 12" C-C AND LONGITUDINAL #3 BAR IN CURB.

NOTES:

1. PROVIDE SAWED TRANSVERSE CONTRACTION JOINTS NOT MORE THAN 20' C-C.
2. REINFORCED WITH NO. 3 BARS AT 24" C-C BOTH WAYS.
3. ALTERNATE REINFORCEMENT - NO. 4 BARS AT 30" C-C BOTH WAYS.
4. EXPANSION JOINTS TO BE PLACED AT ALL INTERSECTIONS AND NOT TO EXCEED 600' BETWEEN JOINTS.
5. CONCRETE SHALL BE CLASS "C".

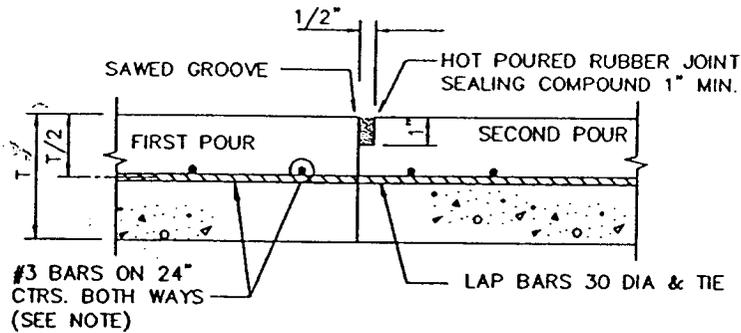
ALLEY WIDTH (W)	A	B	R.O.W. WIDTH (C)
10'	5'	2'-6"	15'
12'	6'	2'-6"	17'
16'	8'	2'-6"	21'
20'	10'	2'-6"	25'

REINFORCED CONCRETE PAVEMENT

ALLEYS

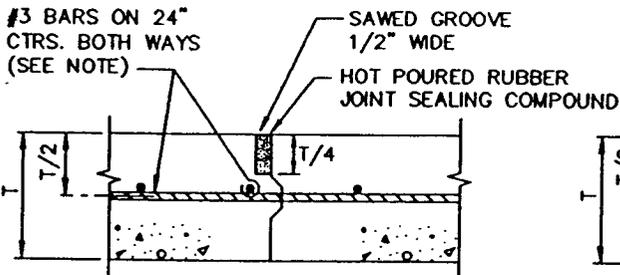
STANDARD SPECIFICATION REFERENCE
5.8.

DATE NOV. '96 STANDARD DRAWING NO. 2040



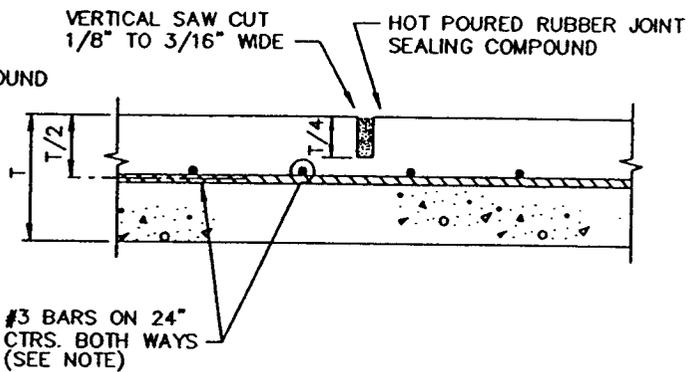
CONSTRUCTION JOINT

N.T.S.



KEYWAY JOINT

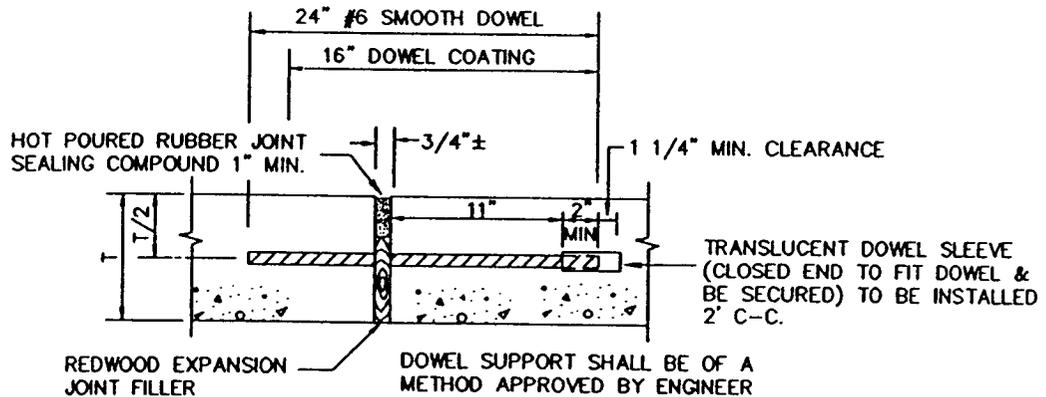
(FOR PAVEMENT THICKNESS > 6")
N.T.S.



SAWED CONTRACTION JOINT

N.T.S.

NOTE:
ALTERNATE REINFORCEMENT
#4 BARS ON 30" CTRS.
BOTH WAYS.



EXPANSION JOINT

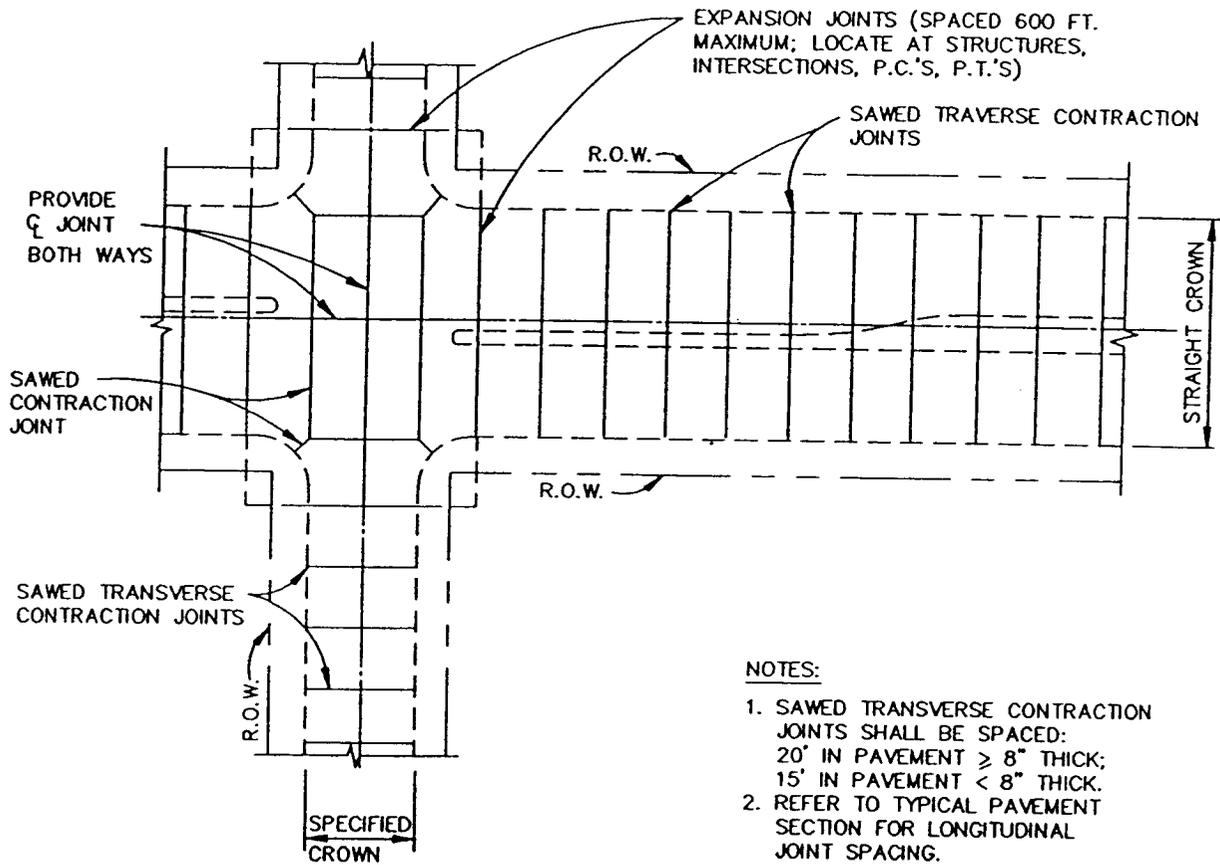
(SPACED 600 FT. MAXIMUM; LOCATE AT
STRUCTURES AND AT INTERSECTION P.C.'S & P.T.'S)
N.T.S.

REINFORCED CONCRETE PAVEMENT

JOINTS

STANDARD SPECIFICATION REFERENCE
5.8.

DATE NOV. '96 STANDARD DRAWING NO. .2050



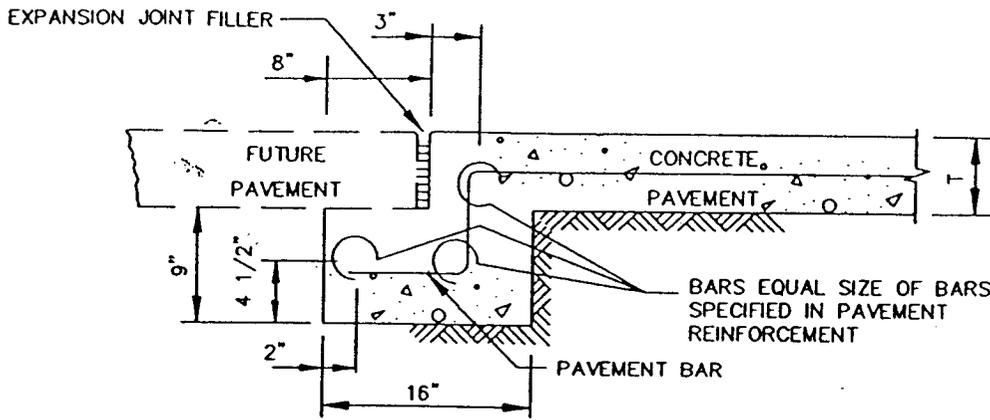
NOTES:

1. SAWED TRANSVERSE CONTRACTION JOINTS SHALL BE SPACED:
 20' IN PAVEMENT \geq 8" THICK;
 15' IN PAVEMENT < 8" THICK.
2. REFER TO TYPICAL PAVEMENT SECTION FOR LONGITUDINAL JOINT SPACING.

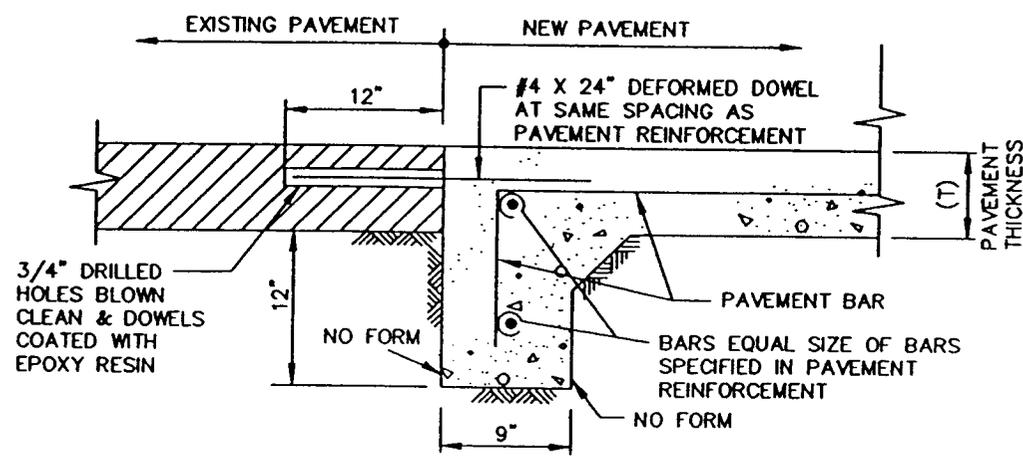
SPACING DIAGRAM FOR TRANSVERSE JOINTS

N.T.S.

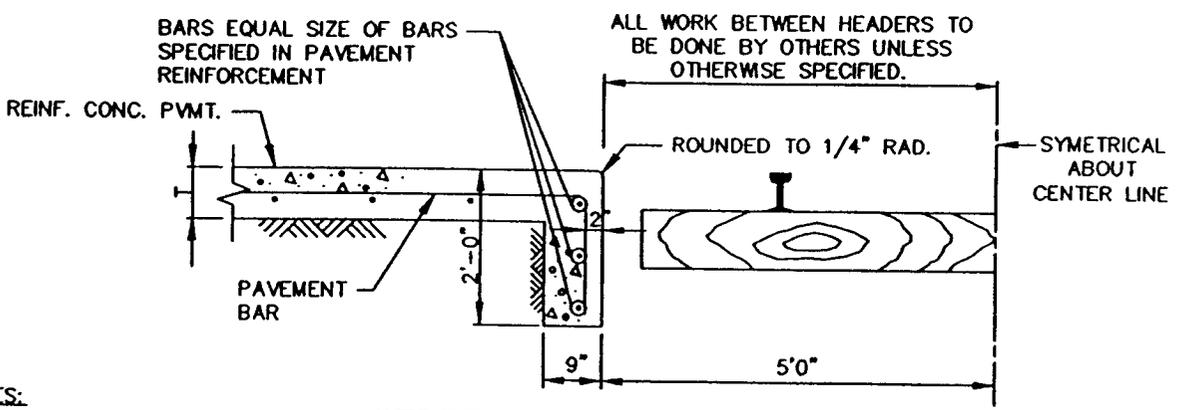
REINFORCED CONCRETE PAVEMENT TRANSVERSE JOINT SPACING	STANDARD SPECIFICATION REFERENCE 5.8.	
	DATE NOV. '96	STANDARD DRAWING NO. 2060



STREET HEADER FOR FUTURE PAVEMENT
N.T.S.



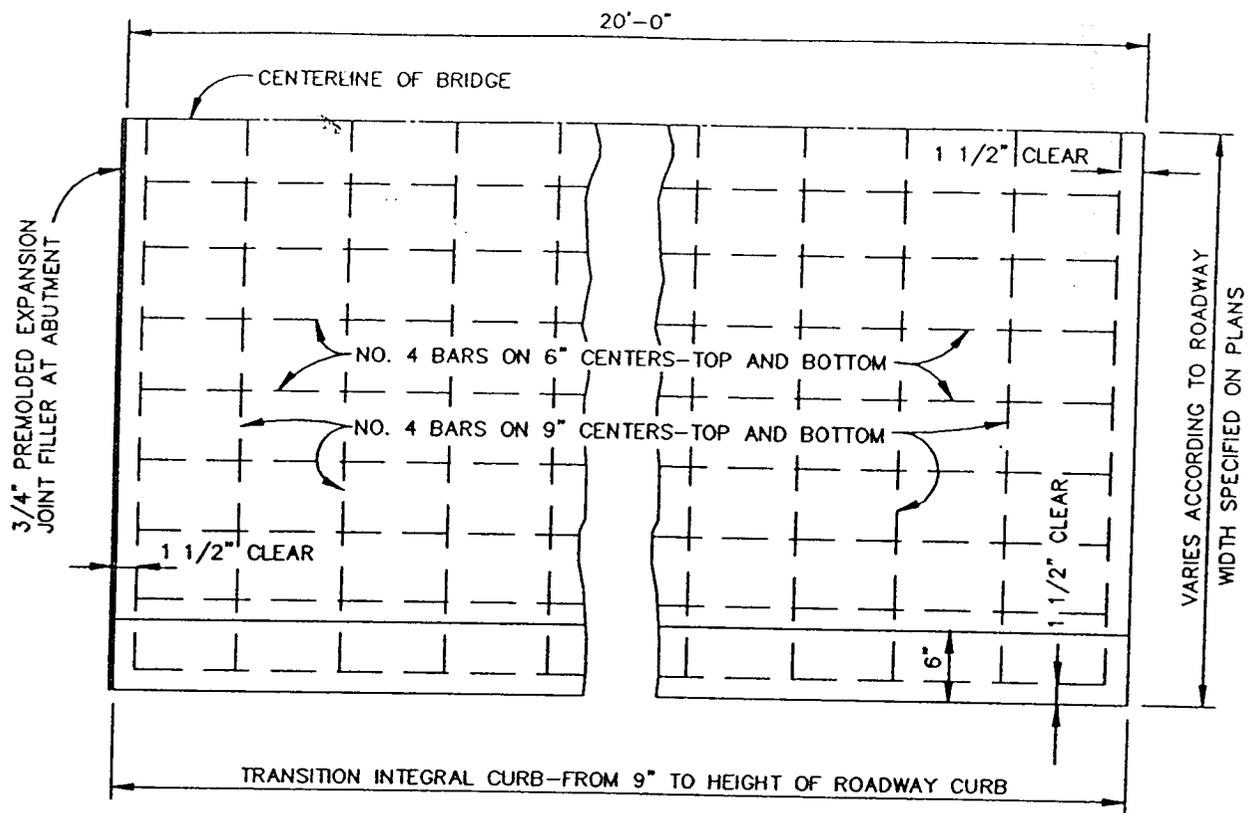
STREET HEADER AT EXISTING PAVEMENT
N.T.S.



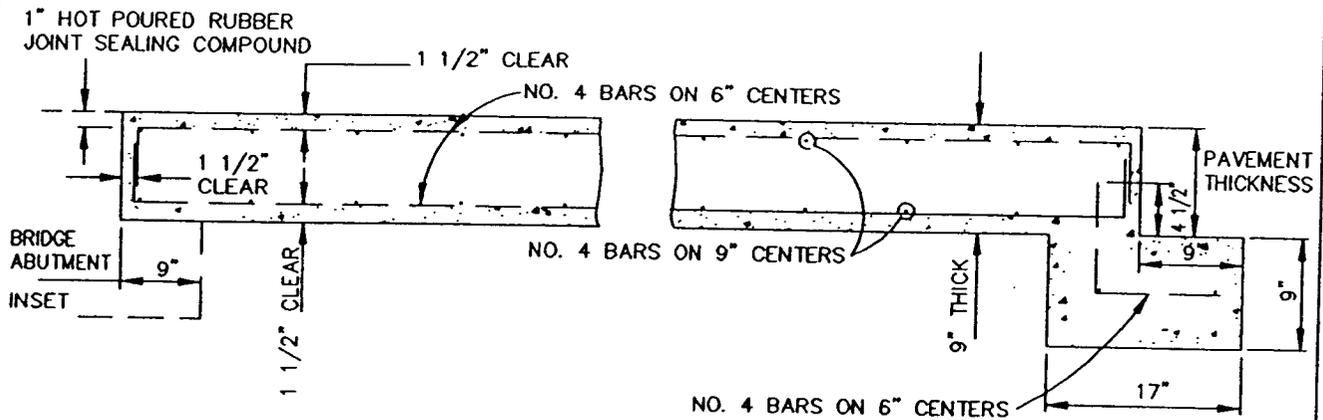
- NOTES:**
1. PAVEMENT BARS TO BE BENT DOWN INTO HEADER.
 2. HEADER AND PAVEMENT TO BE MONOLITHIC.

STREET HEADER AT RAILROAD
N.T.S.

REINFORCED CONCRETE PAVEMENT	STREET HEADERS	STANDARD SPECIFICATION REFERENCE	
		8.5.	
		DATE	STANDARD DRAWING NO.
		NOV. '96	2070



PLAN
N.T.S.



SECTION
N.T.S.

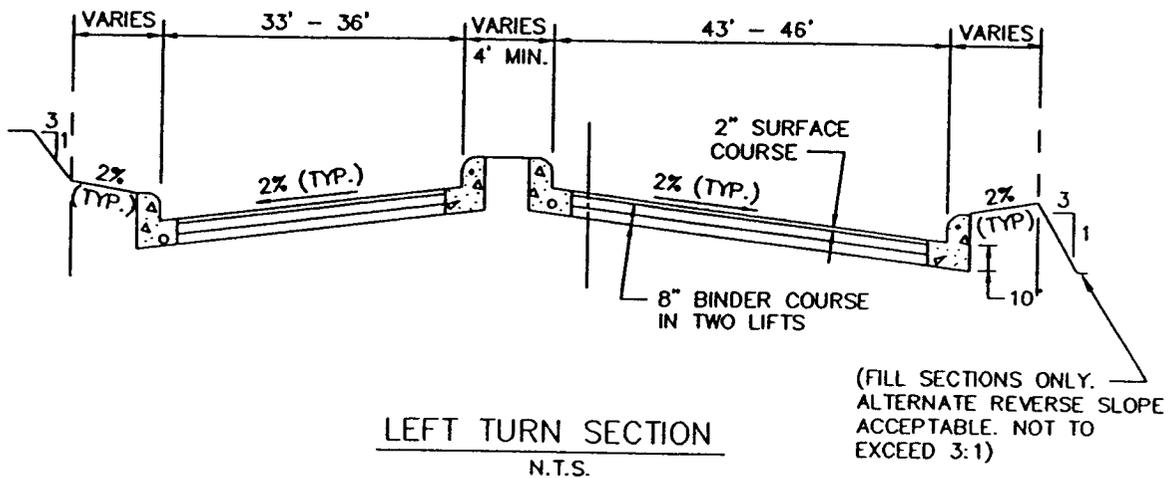
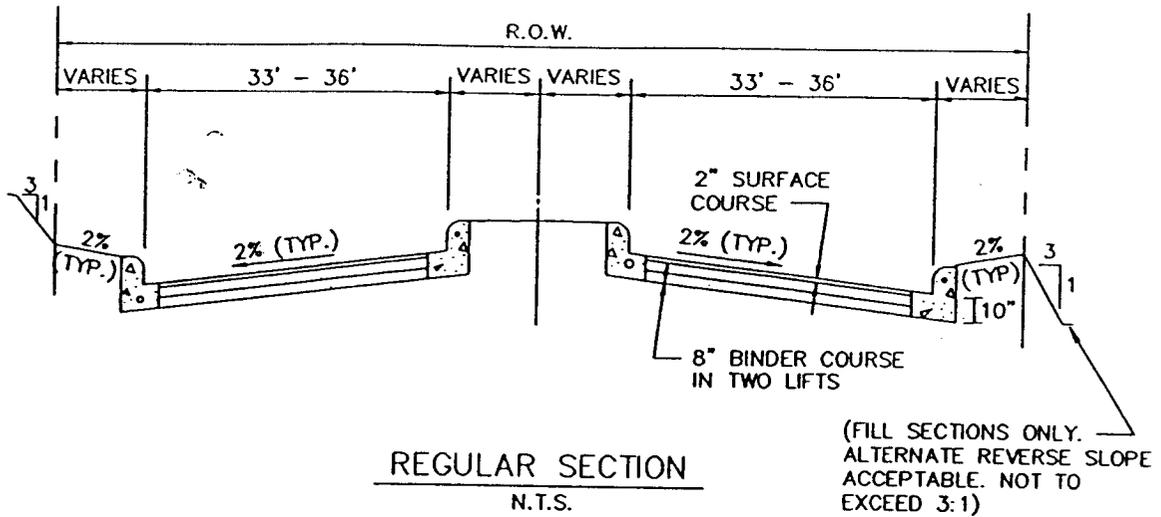
REINFORCED CONCRETE PAVEMENT

BRIDGE APPROACH SLAB

STANDARD SPECIFICATION REFERENCE

DATE
NOV. '96

STANDARD DRAWING NO.
2080



MIN. PAVEMENT DEPTH = 10" $\left\{ \begin{array}{l} 2" \text{ HMAC SURFACE COURSE} \\ 8" \text{ HMAC BINDER COURSE} \end{array} \right.$

(SEE STANDARD DRAWING NO. 2010 FOR PLAN VIEW)

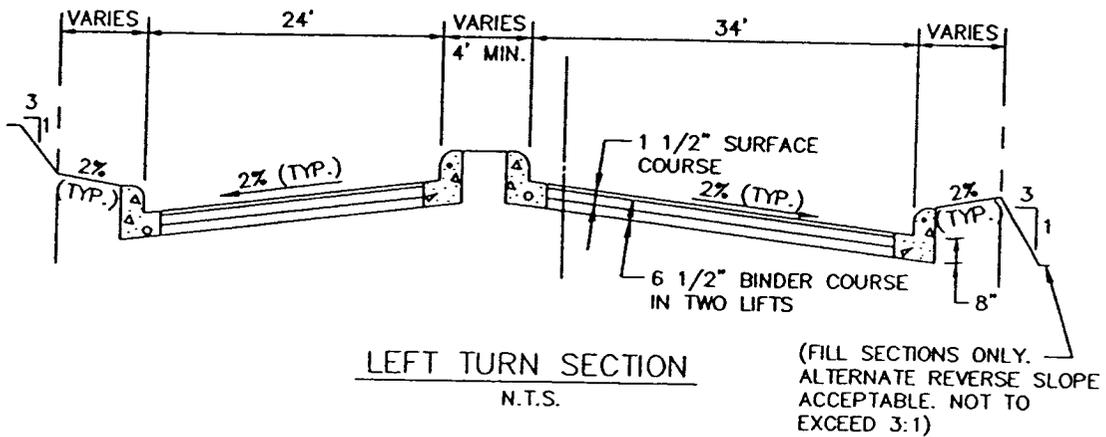
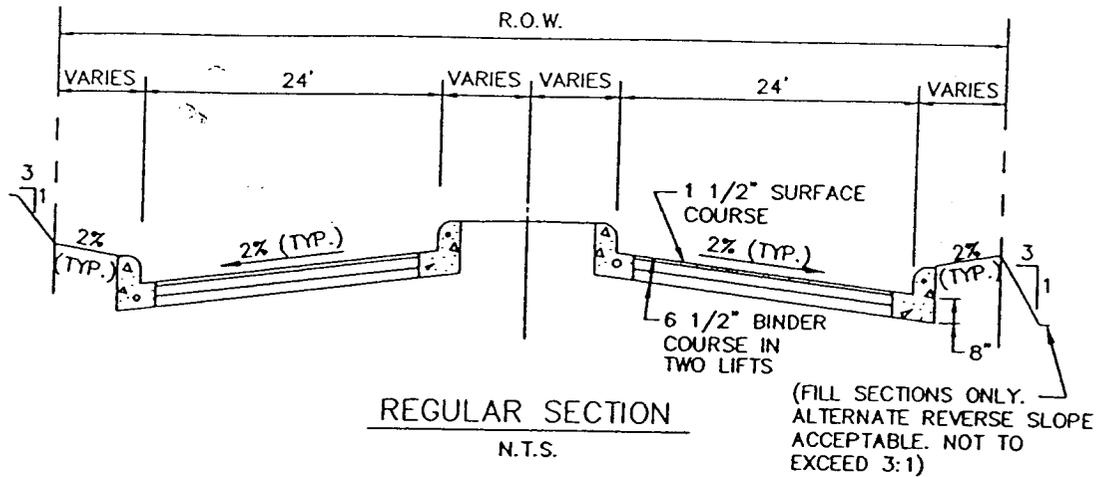
NOTES:

1. A SOIL INVESTIGATION FOR SUBGRADE DESIGN SHALL BE CONDUCTED BY THE ENGINEER AND THIS DESIGN SHALL BE APPROVED BY THE OWNER PRIOR TO CONSTRUCTION.
2. WHERE FULL-DEPTH ASPHALTIC CONCRETE PAVEMENTS ARE BEING CONSIDERED FOR USE, THE ASPHALT CONCRETE THICKNESS SHALL BE BASED UPON NECESSARY SUBGRADE ANALYSES AND PAVEMENT THICKNESS DESIGN DETERMINATIONS AS APPROVED BY THE OWNER.
3. MIN. CURB HEIGHT AND WIDTH SHALL BE 6", OR AS SPECIFIED BY OWNER.
4. TACK COAT BETWEEN COURSES AS REQUIRED.

HOT MIX ASPHALTIC CONCRETE PAVEMENT
SIX-LANE DIVIDED THOROUGHFARE

STANDARD SPECIFICATION REFERENCE
5.7.

DATE NOV. '96 STANDARD DRAWING NO. 2090



MIN. PAVEMENT DEPTH = 8" $\left\{ \begin{array}{l} 1 \frac{1}{2}'' \text{ HMAC SURFACE COURSE} \\ 2-3 \frac{1}{4}'' \text{ HMAC BINDER COURSES} \end{array} \right.$

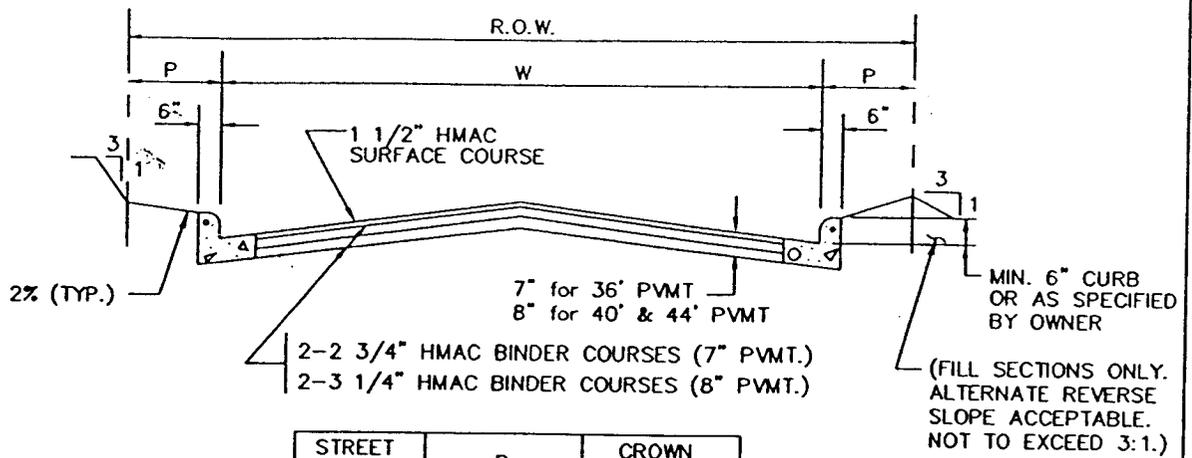
(SEE STANDARD DRAWING NO. 2020 FOR PLAN VIEW)

NOTES:

1. A SOIL INVESTIGATION FOR SUBGRADE DESIGN SHALL BE CONDUCTED BY THE ENGINEER AND THIS DESIGN SHALL BE APPROVED BY THE OWNER PRIOR TO CONSTRUCTION.
2. WHERE FULL-DEPTH ASPHALTIC CONCRETE PAVEMENTS ARE BEING CONSIDERED FOR USE, THE ASPHALT CONCRETE THICKNESS SHALL BE BASED UPON NECESSARY SUBGRADE ANALYSES AND PAVEMENT THICKNESS DESIGN DETERMINATIONS AS APPROVED BY THE OWNER.
3. MIN. CURB HEIGHT AND WIDTH SHALL BE 6", OR AS SPECIFIED BY OWNER.
4. TACK COAT BETWEEN COURSES AS REQUIRED.

HOT MIX ASPHALTIC CONCRETE PAVEMENT
FOUR-LANE DIVIDED THOROUGHFARE

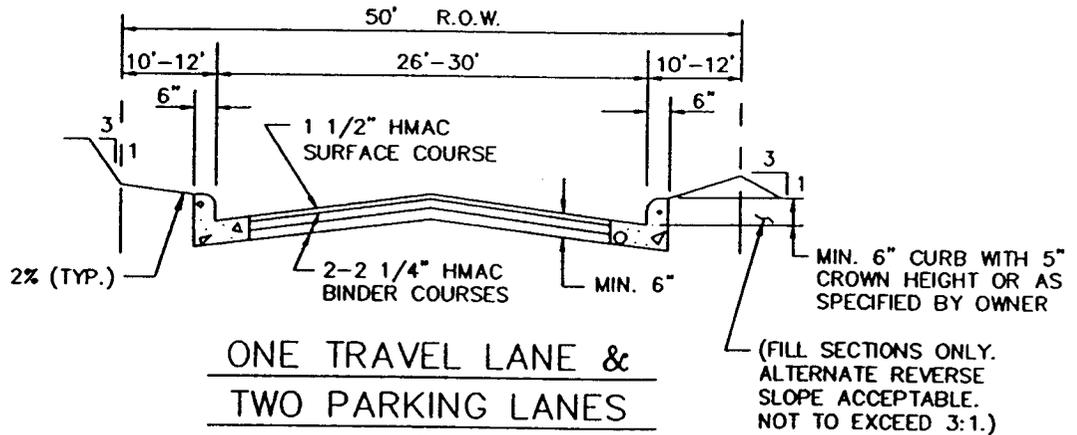
STANDARD SPECIFICATION REFERENCE	
5.7.	
DATE	STANDARD DRAWING NO.
NOV. '96	2100



STREET WIDTH(W)	P	CROWN HEIGHT
36'	VARIABLES	6"
40'	VARIABLES	6"
44'	VARIABLES	8"

FOUR TRAVEL LANES OR
TWO TRAVEL LANES &
TWO PARKING LANES

N.T.S.



ONE TRAVEL LANE &
TWO PARKING LANES

N.T.S.

NOTES:

1. A SOIL INVESTIGATION FOR SUBGRADE DESIGN SHALL BE CONDUCTED BY THE ENGINEER THIS DESIGN SHALL BE APPROVED BY THE OWNER PRIOR TO CONSTRUCTION.
2. WHERE FULL-DEPTH ASPHALTIC CONCRETE PAVEMENTS ARE BEING CONSIDERED FOR USE, THE ASPHALT CONCRETE THICKNESS SHALL BE BASED UPON NECESSARY SUBGRADE ANALYSES AND PAVEMENT THICKNESS DESIGN DETERMINATIONS AS APPROVED BY THE OWNER. THICKNESSES SHOWN ARE TYPICAL.
3. TACK COAT BETWEEN COURSES AS REQUIRED.

HOT MIX ASPHALTIC CONCRETE PAVEMENT

2- & 4-LANE UNDIVIDED THOROUGHFARE

STANDARD SPECIFICATION REFERENCE

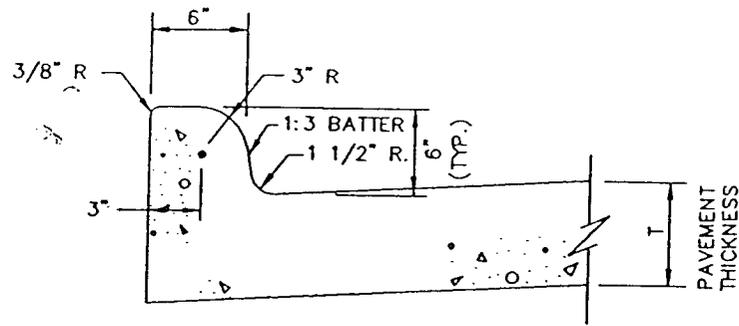
5.7.

DATE

NOV. '96

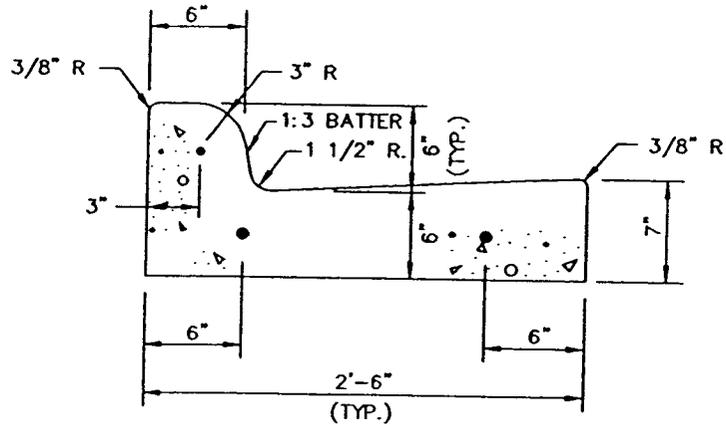
STANDARD DRAWING NO.

2110



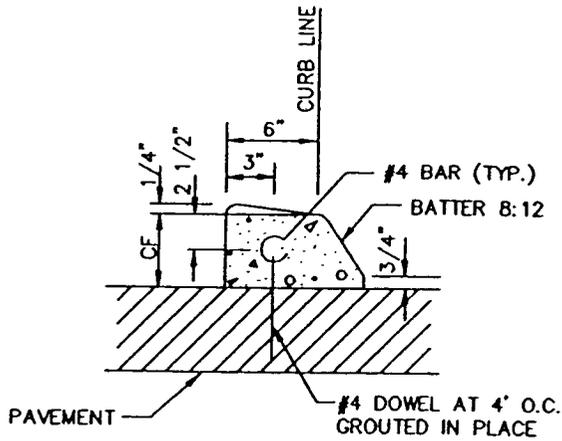
INTEGRAL CURB & GUTTER

N.T.S.



SEPARATE CURB & GUTTER

N.T.S.



DOWELED CURB

N.T.S.

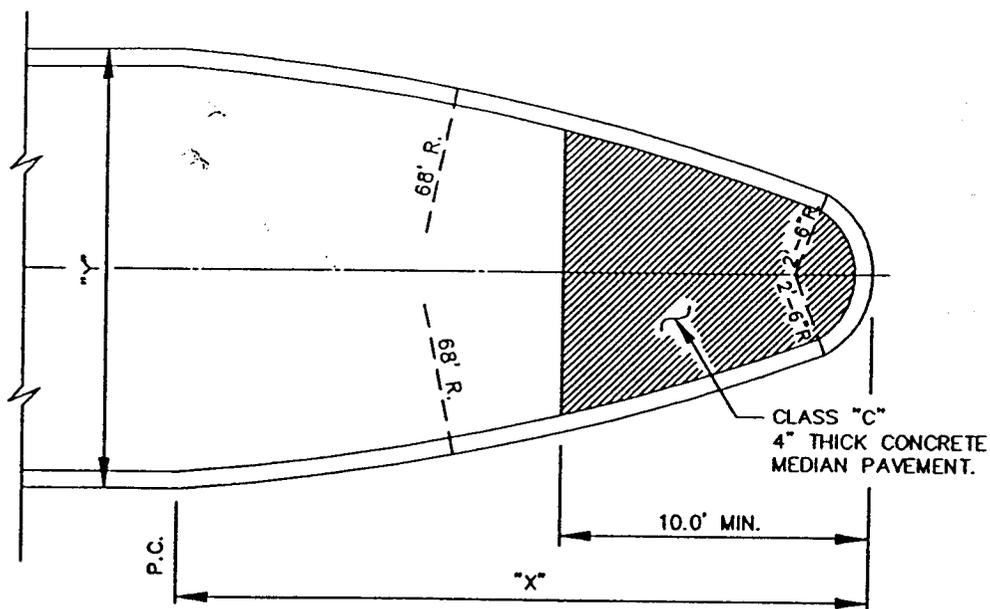
NOTES:

1. REINFORCEMENT SHALL BE NO. 4 BARS.
2. CONCRETE SHALL BE CLASS "C".
3. "CF" IS 6" UNLESS OTHERWISE SPECIFIED.
4. ALL CURBS ARE CONSTRUCTED OF PORTLAND CEMENT CONCRETE UNLESS OTHERWISE SHOWN.
5. GRADE SHALL BE MEASURED AT BACK OF CURB.

CONCRETE CURB & GUTTER
INTEGRAL, SEPARATE, & DOWELED

STANDARD SPECIFICATION REFERENCE
8.2.

DATE NOV. '96 STANDARD DRAWING NO. 2120



DIMENSIONS OF MEDIAN NOSE

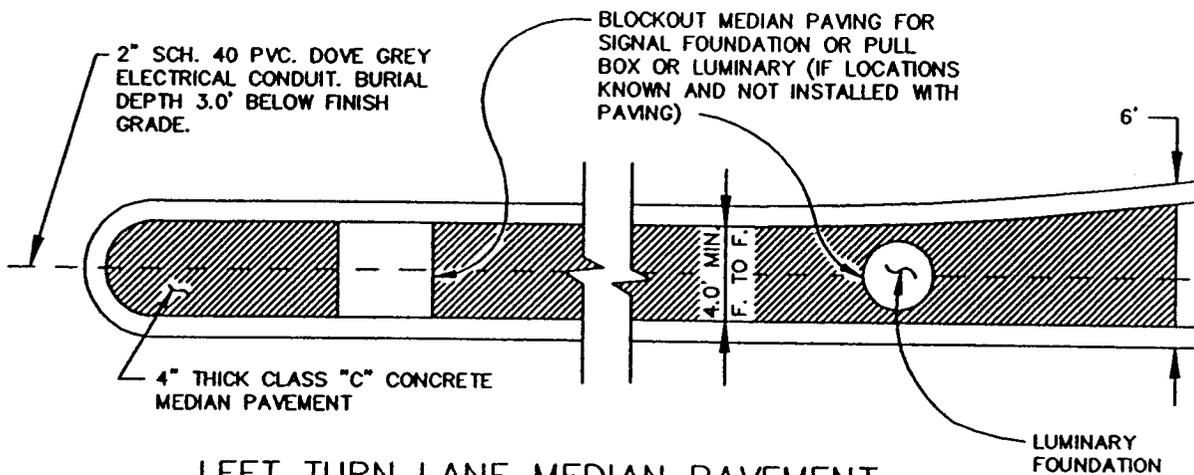
Y = 15'	X = 27.6'
Y = 16'	X = 28.8'
Y = 17'	X = 29.9'
Y = 18'	X = 30.9'

CONCRETE NOSE FOR MEDIAN ISLAND

N.T.S.

NOTE:

MEDIAN PAVING SHALL EXTEND TO POINT WHERE MEDIAN IS 6' WIDE. IF MEDIAN IS 6' WIDE, PAVING SHALL EXTEND 15' FROM NOSE. FOR MEDIANS WIDER THAN 6' PAVING SHALL EXTEND 10' FROM NOSE. ALL DISTANCES ARE MINIMUM.



LEFT TURN LANE MEDIAN PAVEMENT

N.T.S.

MEDIAN ISLAND PAVEMENT

NOSE & LEFT TURN LANE

North Central Texas Council of Governments



STANDARD SPECIFICATION REFERENCE

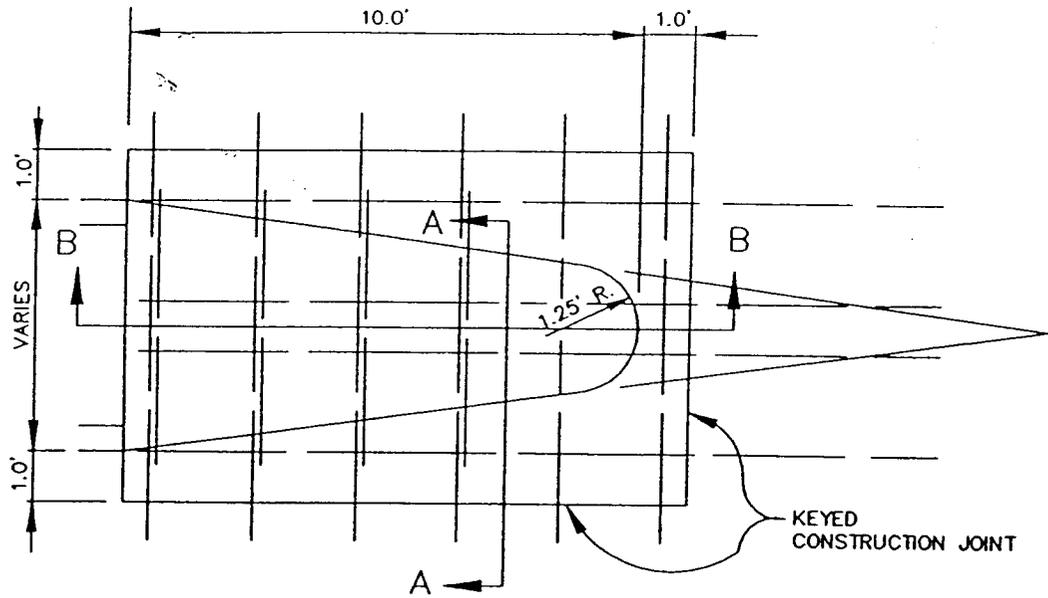
8.4.

DATE

NOV. '96

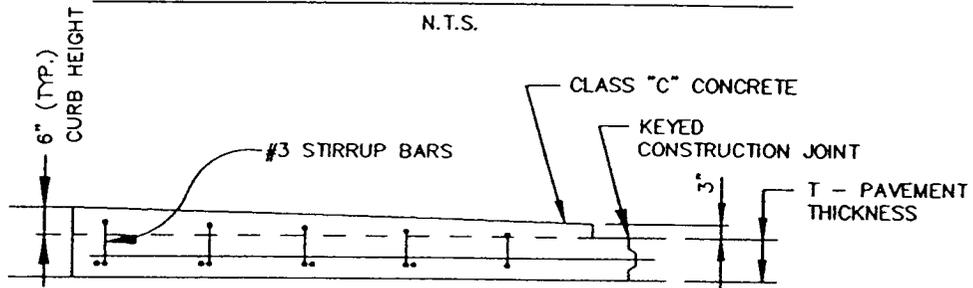
STANDARD DRAWING NO.

2130



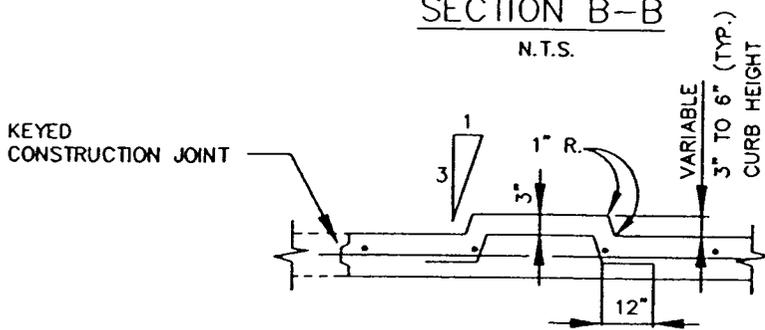
MONOLITHIC CONCRETE MEDIAN NOSE

N.T.S.



SECTION B-B

N.T.S.



SECTION A-A

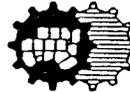
N.T.S.

NOTE:

REINFORCEMENT BARS SHALL MATCH THOSE IN PAVEMENT.

MEDIAN ISLAND PAVEMENT
MONOLITHIC CONCRETE NOSE

North Central Texas Council of Governments



STANDARD SPECIFICATION REFERENCE

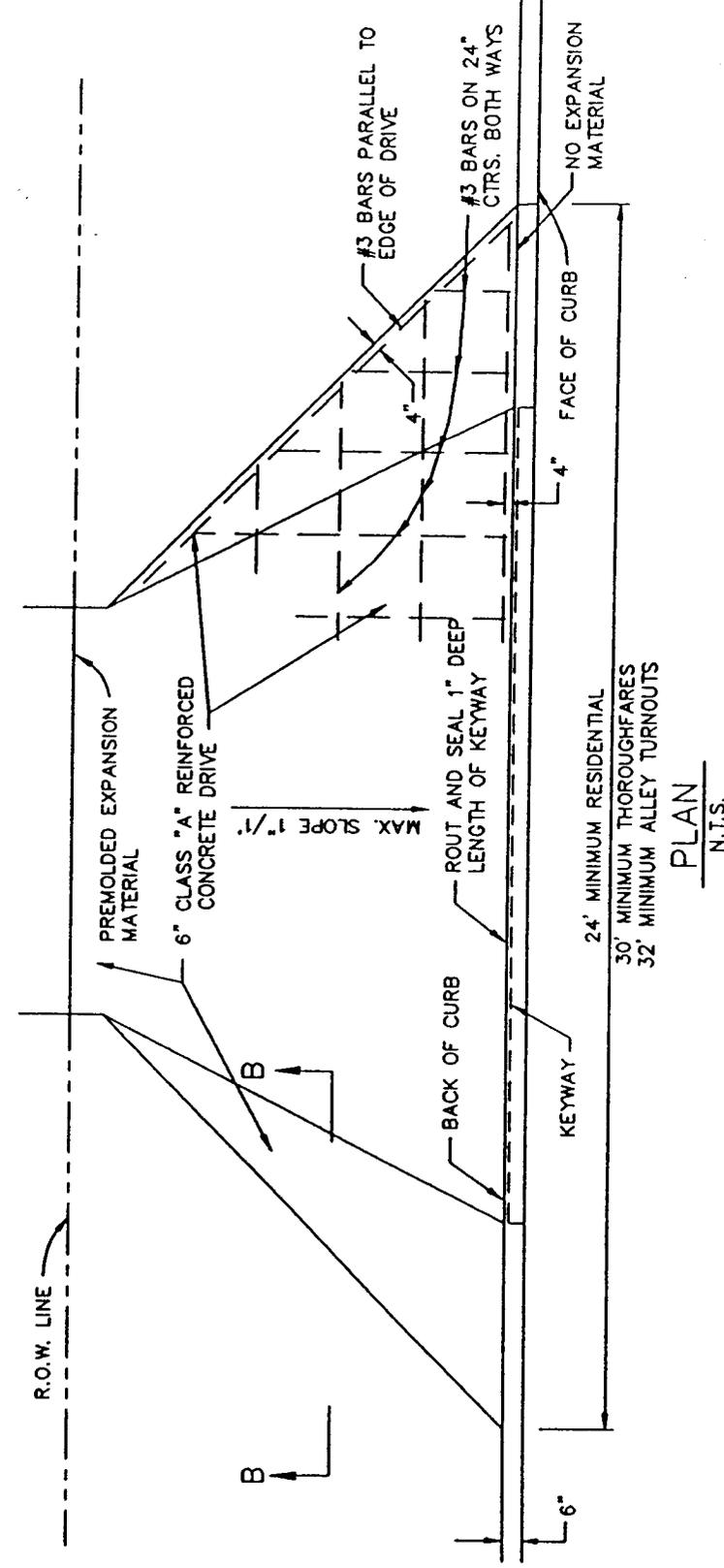
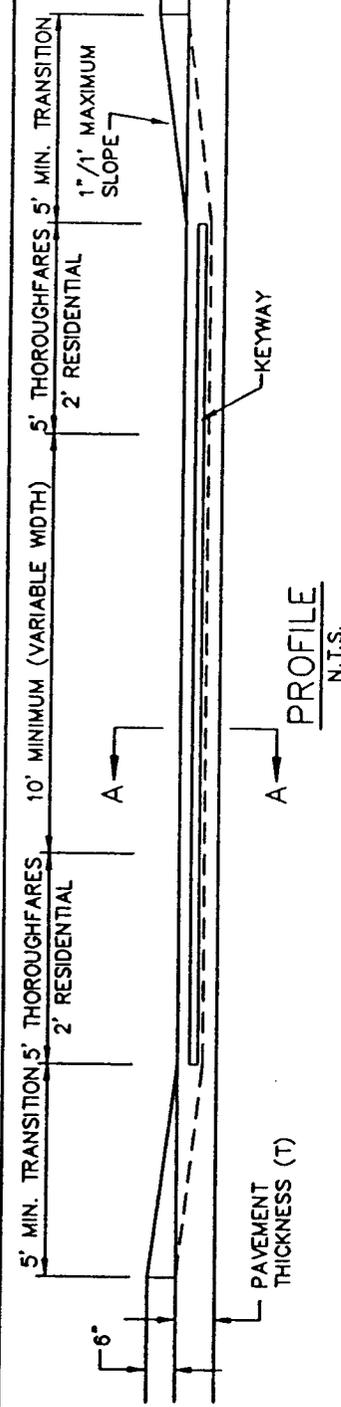
8.4.

DATE

NOV. '96

STANDARD DRAWING NO.

2140



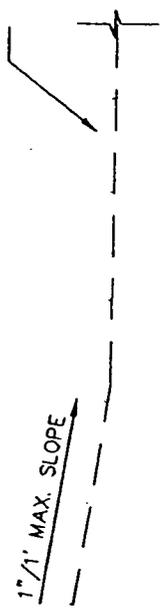
STANDARD DRAWING NO. 2150A

SEE NOTES, STANDARD DRAWING NO. 2150B.

DRIVEWAY APPROACH
 FLARED RETURN TYPE

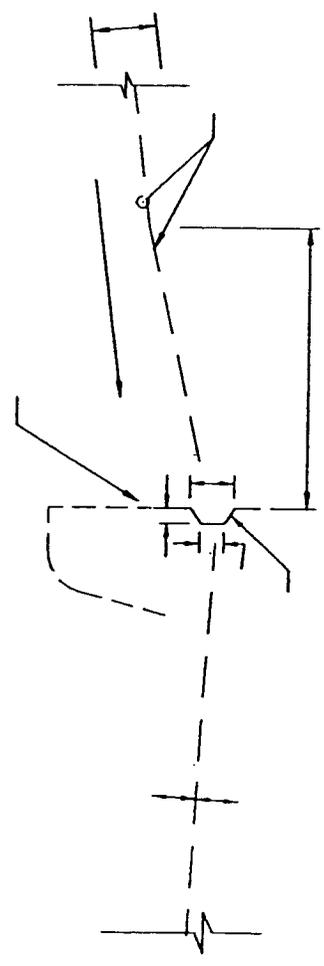


STANDARD SPECIFICATION REFERENCE 8.3.
 DATE NOV. '96
 STANDARD DRAWING NO. 2150A



1" / 1' MAX. SLOPE

SECTION "B-B"



SECTION "A - A"

STANDARD DRAWING NO.
2150B

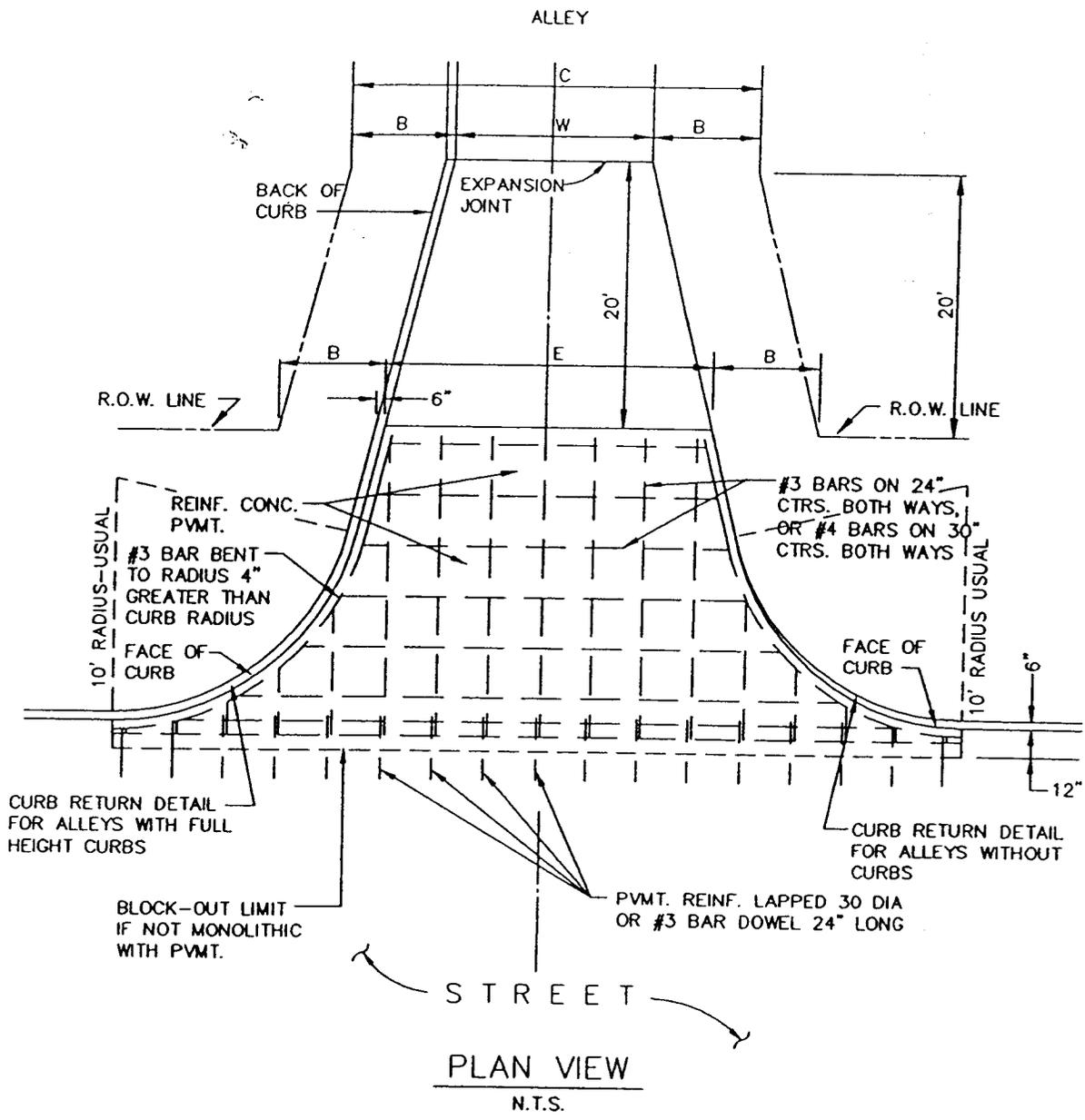
DRIVEWAY APPROACH
FLARED RETURN TYPE

North Central Texas Council of Governments

STANDARD SPECIFICATION REFERENCE
8.3.

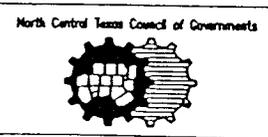
DATE
NOV. '96

STANDARD DRAWING NO.
2150B

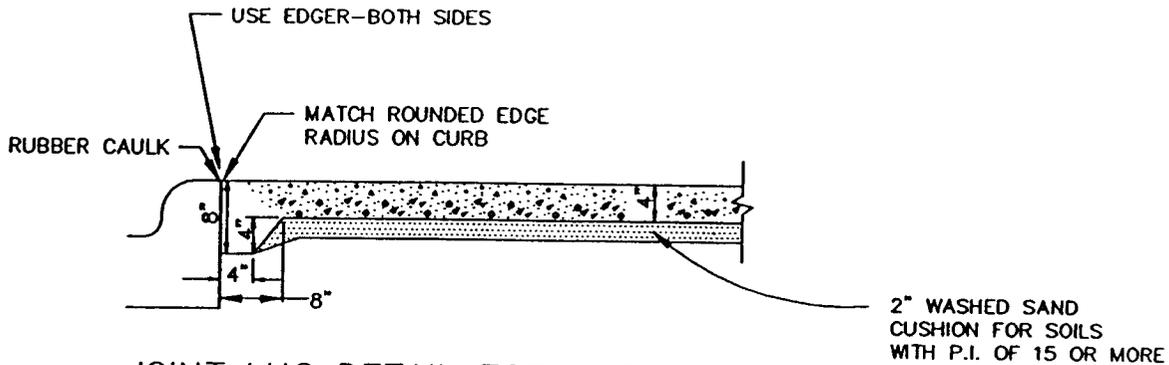
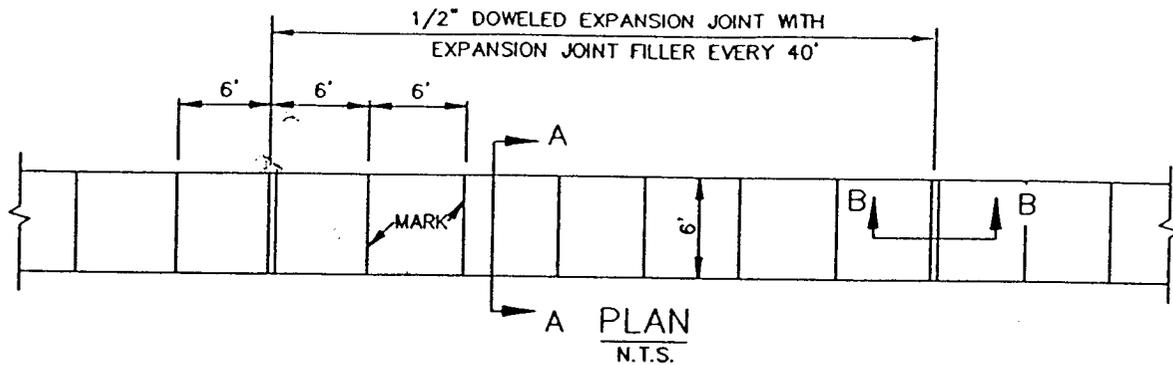


ALLEY WIDTH (W)	R.O.W. WIDTH (C)	B	E
10'	15'	2' - 6"	12'
12'	17'	2' - 6"	14'
16'	21'	2' - 6"	18'
20'	25'	2' - 6"	22'

ALLEY APPROACH
RADIUS RETURN TYPE

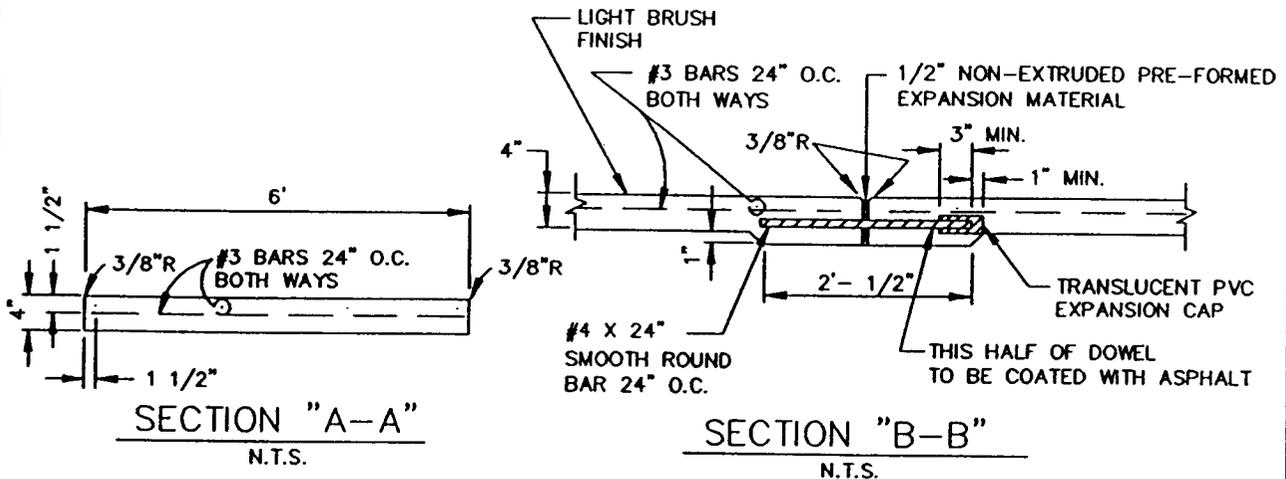


STANDARD SPECIFICATION REFERENCE 8.3.	
DATE NOV. '96	STANDARD DRAWING NO. 2160



JOINT LUG DETAIL FOR MEDIAN PAVEMENT
OR SIDEWALK ADJACENT TO CURB

N.T.S.



NOTE:

1. REFER TO STANDARD SPECIFICATION ITEM 8.3. FOR ALTERNATE REINFORCEMENT.
2. CROSS SLOPE OF SIDEWALK SHALL BE $\pm 1/4"$ PER FT. MIN. TO $\pm 3/8"$ PER FT. MAX.
3. OTHER THAN 6'-0" SIDEWALK WIDTH MAY BE SPECIFIED BY OWNER.
4. SIDEWALK SHALL BE CLASS "A" CONCRETE UNLESS OTHERWISE SPECIFIED BY OWNER.
5. ALL HONEYCOMB IN BACK OF CURB TO BE TROWEL-PLASTERED BEFORE POURING SIDEWALK.
6. LUG MAY BE FORMED BY SHAPING SUBGRADE TO APPROXIMATE DIMENSIONS SHOWN.

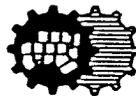
REINFORCED CONCRETE SIDEWALKS

North Central Texas Council of Governments

STANDARD SPECIFICATION REFERENCE

8.3.

JOINTS AND SPACING

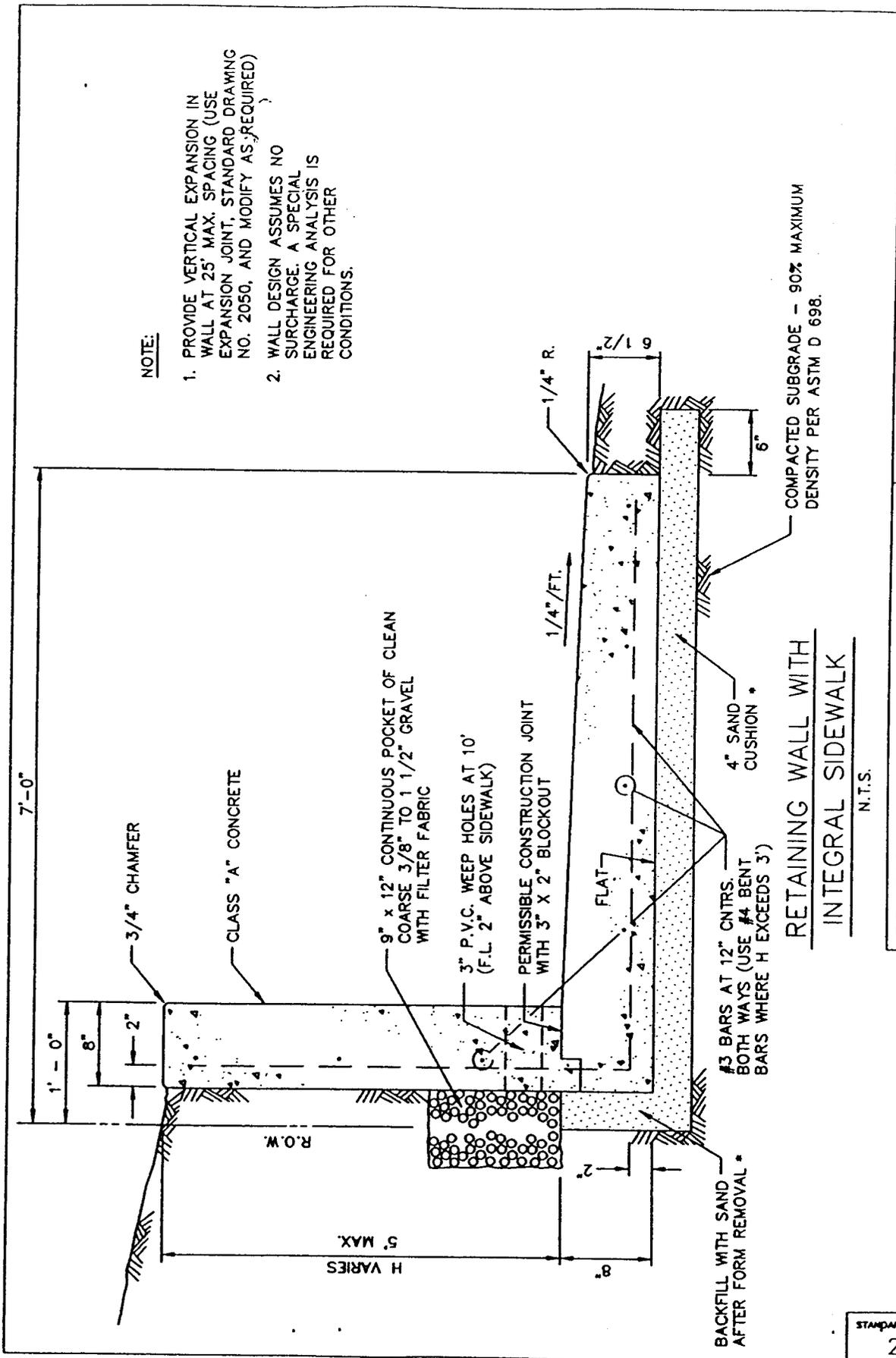


DATE

STANDARD DRAWING NO.

NOV. '96

2170



NOTE:

1. PROVIDE VERTICAL EXPANSION IN WALL AT 25' MAX. SPACING (USE EXPANSION JOINT, STANDARD DRAWING NO. 2050, AND MODIFY AS REQUIRED)
2. WALL DESIGN ASSUMES NO SURCHARGE. A SPECIAL ENGINEERING ANALYSIS IS REQUIRED FOR OTHER CONDITIONS.

RETAINING WALL WITH INTEGRAL SIDEWALK
N.T.S.

STANDARD DRAWING NO. 2180



REINFORCED CONCRETE RETAINING WALL
INTEGRAL WITH SIDEWALK

* WHEN SPECIFIED ON PLANS

STANDARD DRAWING NO. 2180

GENERAL NOTES:

1. REINFORCED CONCRETE PAVEMENT:
 - A. ALL CURBS SHALL BE PLACED INTEGRAL WITH PAVEMENT UNLESS OTHERWISE APPROVED BY THE OWNER.
 - B. CURBS SHALL MEET THE SAME COMPRESSIVE STRENGTH AS SPECIFIED FOR THE PAVEMENT.
 - C. BAR LAPS SHALL BE 30 DIAMETERS.
 - D. REINFORCING BARS SHALL BE SUPPORTED BY CHAIRS OR OTHER DEVICES APPROVED BY THE OWNER.

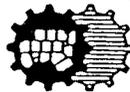
2. SUBGRADE: (UNLESS OTHERWISE SPECIFIED BY OWNER)
 - A. SUBGRADE UNDER ALL PAVEMENTS SHALL BE STABILIZED TO A MINIMUM DEPTH OF 6" WITH HYDRATED LIME OR CEMENT WHEN THE P.I. OF THE INPLACE MATERIAL IS GREATER THAN 15. LABORATORY TESTS MUST BE PERFORMED TO DETERMINE THE AMOUNT OF LIME OR CEMENT REQUIRED TO LOWER THE P.I. TO 15 OR BELOW.
 - B. WHERE THE INPLACE MATERIAL HAS A P.I. OF LESS THAN 15, THE SUBGRADE SHALL BE SCARIFIED TO A MINIMUM DEPTH OF 6" AND RECOMPACTED.

3. IF THE ROADWAY IS A DESIGNATED BIKE ROUTE OR BIKE USAGE IS ANTICIPATED, REFER TO NCTCOG'S REGIONAL BICYCLE AND PEDESTRIAN FACILITIES DESIGN MANUAL.

PAVEMENT SYSTEMS

GENERAL NOTES

North Central Texas Council of Governments



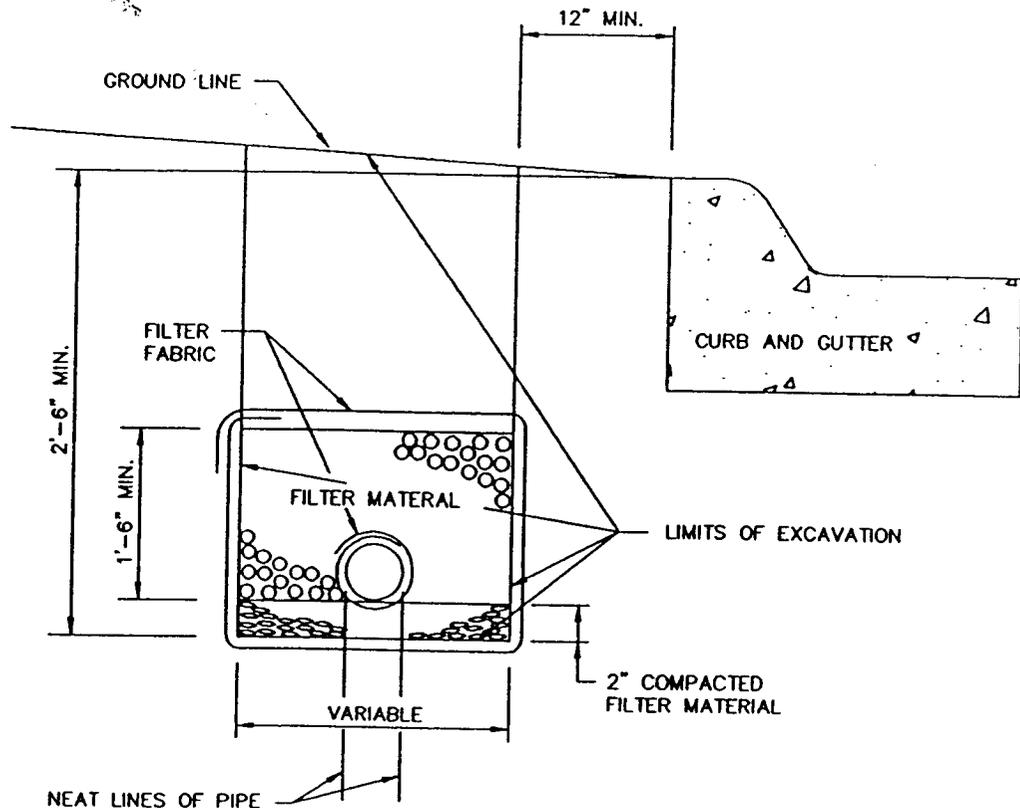
STANDARD SPECIFICATION REFERENCE

DATE

NOV. '96

STANDARD DRAWING NO.

2190



SECTION
N.T.S.

LIMITS OF EXCAVATION

DEPTH OF TRENCH (FT.)	DIST. IN FT. OUTSIDE NEAT LINES OF PIPE SUBDRAIN
0 TO 6	1.00
6 TO 10	1.50
10 TO 15	2.00
OVER 15	2.50

FILTER MATERIAL SPECIFICATIONS

SIEVE SIZE	PERCENTAGE RETAINED ON SIEVE	
	TYPE A	TYPE B
1 1/2	---	0 - 10
3/4	0 - 10	20 - 40
3/8	15 - 35	---
NO. 4	35 - 55	40 - 60

TYPES OF PIPE ACCEPTABLE FOR USE AS SUBDRAIN

1. PERFORATED CORRUGATED METAL PIPE.
2. PERFORATED PVC PIPE.
3. PERFORATED POLYETHYLENE PIPE.

MATERIAL FINER THAN NO. 4 SIEVE

4	---
20	35 - 65
50	75 - 100

SUBDRAINS

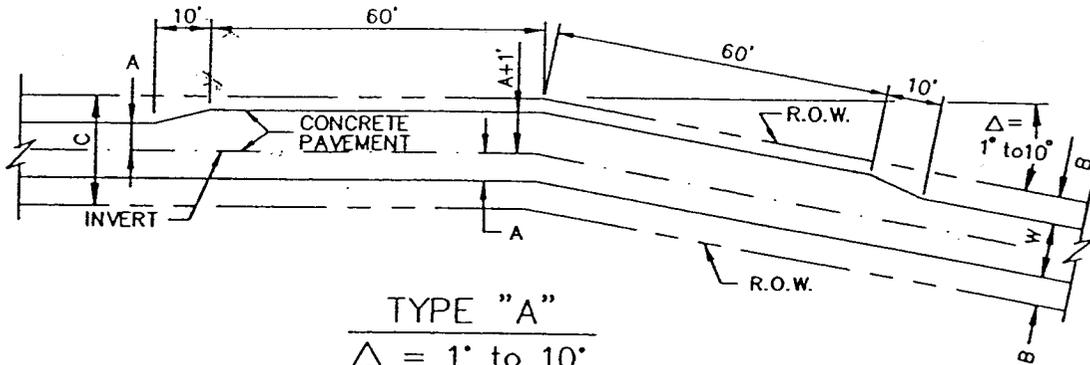
PAVEMENT SUBGRADE

North Central Texas Council of Governments

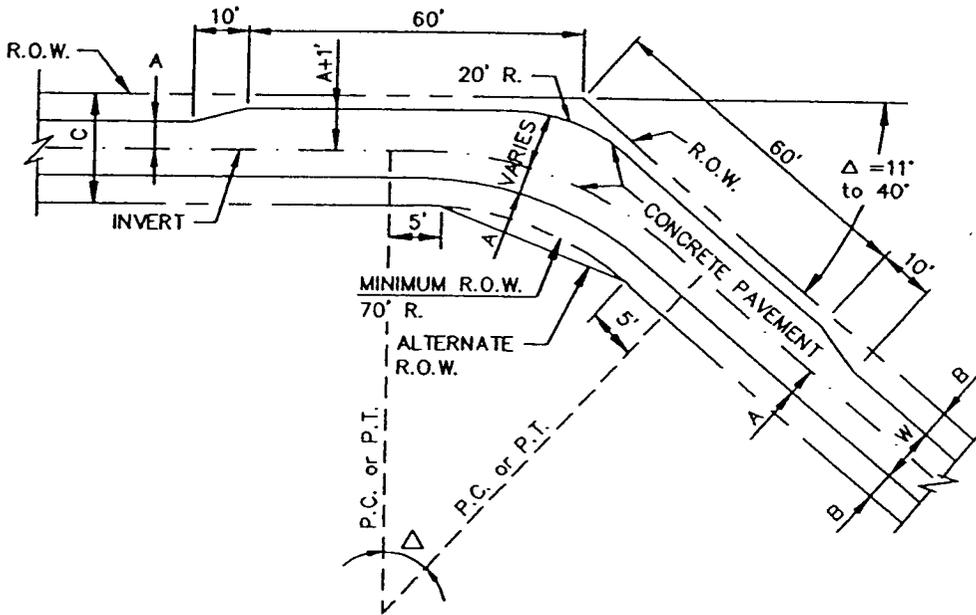


STANDARD SPECIFICATION REFERENCE

DATE: NOV. '96
STANDARD DRAWING NO.: 2200



TYPE "A"
 $\Delta = 1^\circ \text{ to } 10^\circ$
 N.T.S.



TYPE "B"
 $\Delta = 11^\circ \text{ to } 40^\circ$
 N.T.S.

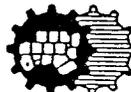
NOTES:

1. DIMENSIONS W, C, A, AND B SHALL BE SPECIFIED ON THE PLANS IN ACCORDANCE WITH STD. DWG. NO. 2040.

ALLEY GEOMETRICS

TYPE "A" & TYPE "B"

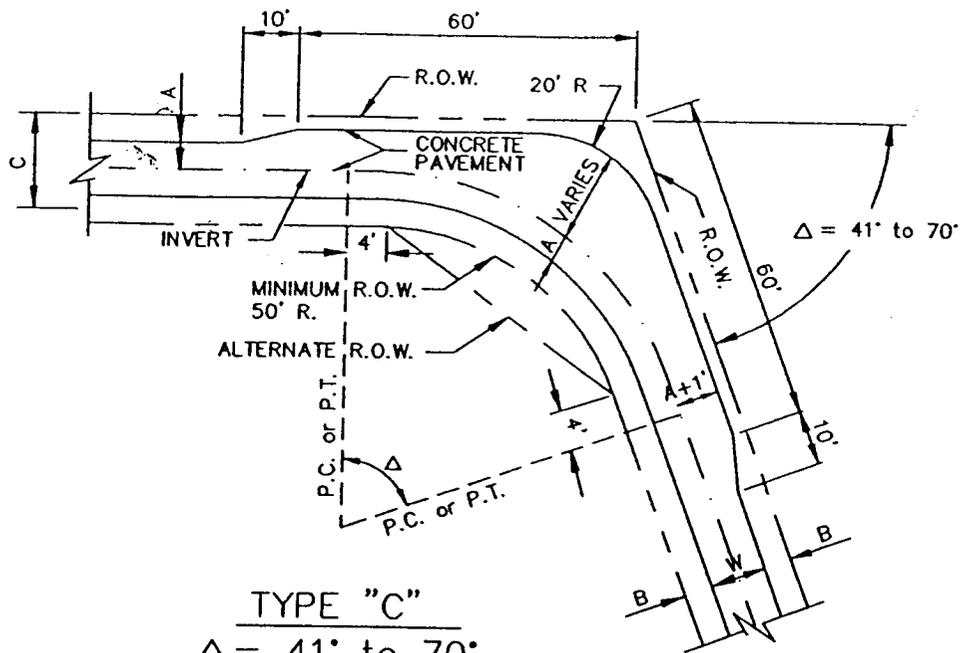
North Central Texas Council of Governments



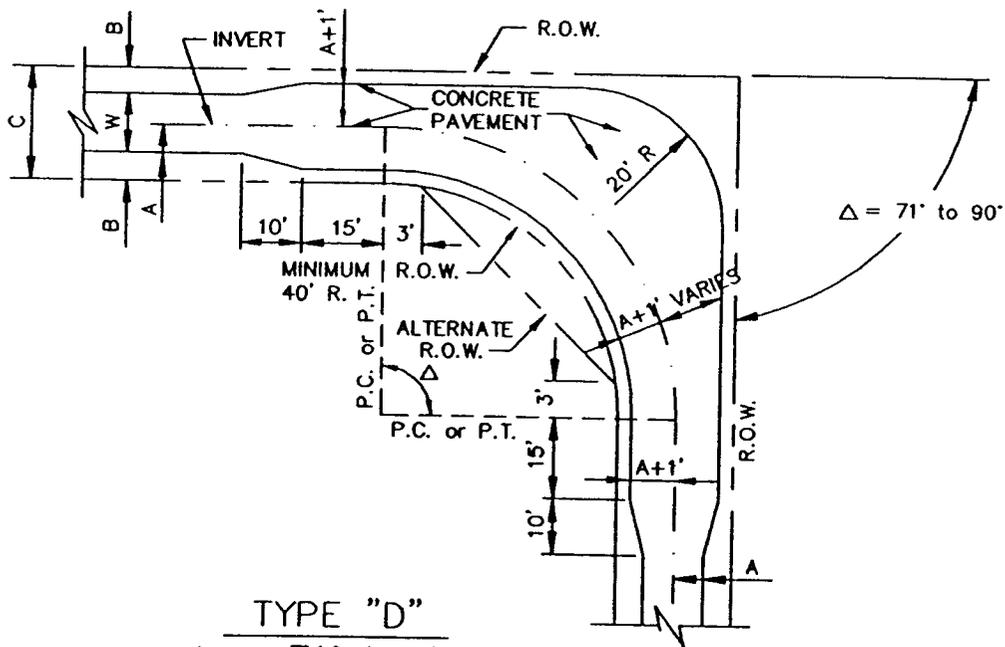
STANDARD SPECIFICATION REFERENCE

DATE
 NOV. '96

STANDARD DRAWING NO.
 2210



TYPE "C"
 $\Delta = 41^\circ \text{ to } 70^\circ$
 N.T.S.



TYPE "D"
 $\Delta = 71^\circ \text{ to } 90^\circ$
 N.T.S.

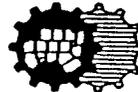
NOTES:

1. DIMENSIONS W, C, A, AND B SHALL BE SPECIFIED ON THE PLANS IN ACCORDANCE WITH STD. DWG. NO. 2040.

ALLEY GEOMETRICS

TYPE "C" & TYPE "D"

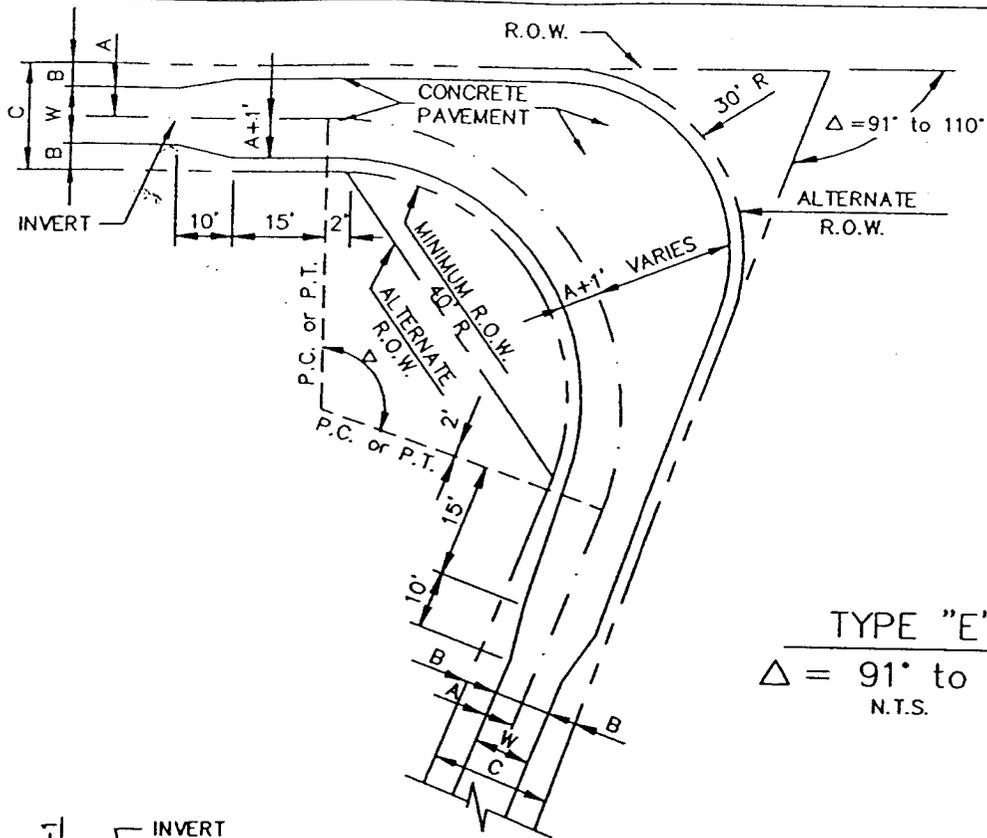
North Central Texas Council of Governments



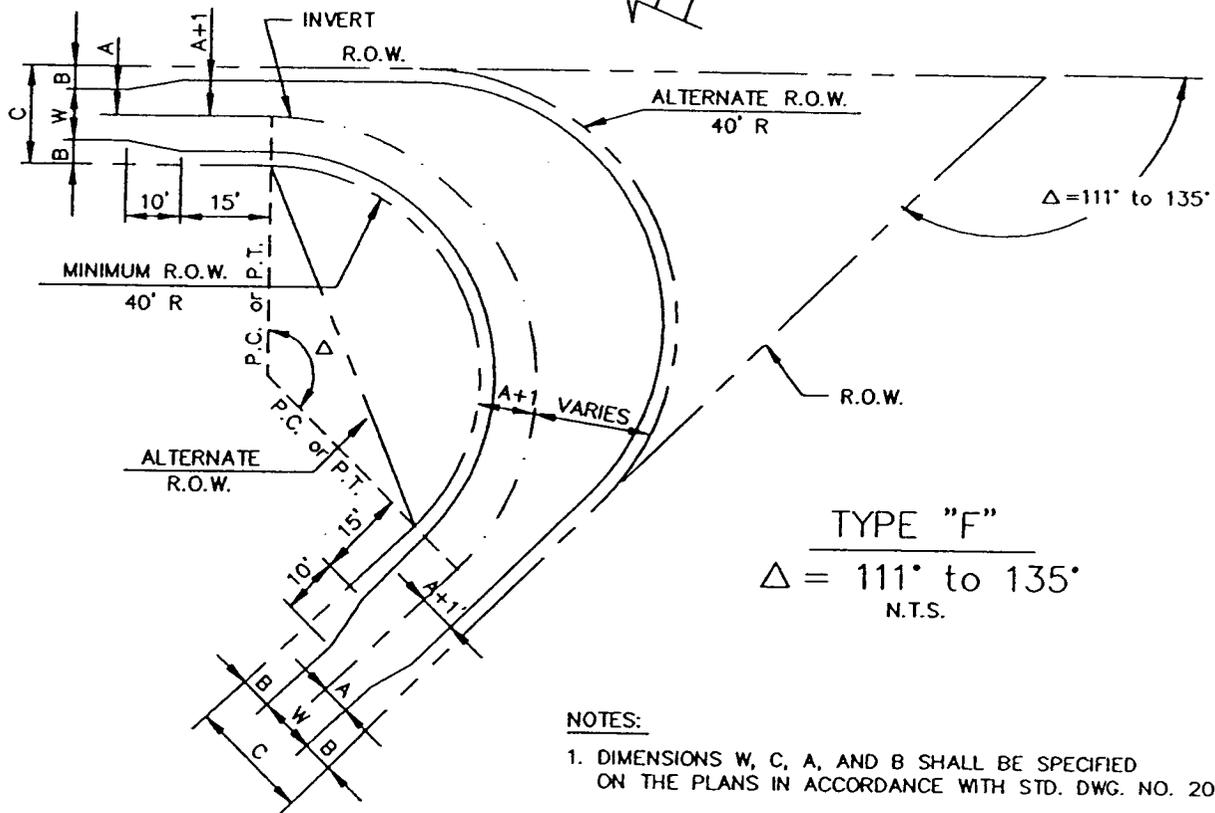
STANDARD SPECIFICATION REFERENCE

DATE
 NOV. '96

STANDARD DRAWING NO.
 2220



TYPE "E"
 $\Delta = 91^\circ$ to 110°
 N.T.S.



TYPE "F"
 $\Delta = 111^\circ$ to 135°
 N.T.S.

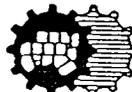
NOTES:

1. DIMENSIONS W, C, A, AND B SHALL BE SPECIFIED ON THE PLANS IN ACCORDANCE WITH STD. DWG. NO. 2040.

ALLEY GEOMETRICS

TYPE "E" & TYPE "F"

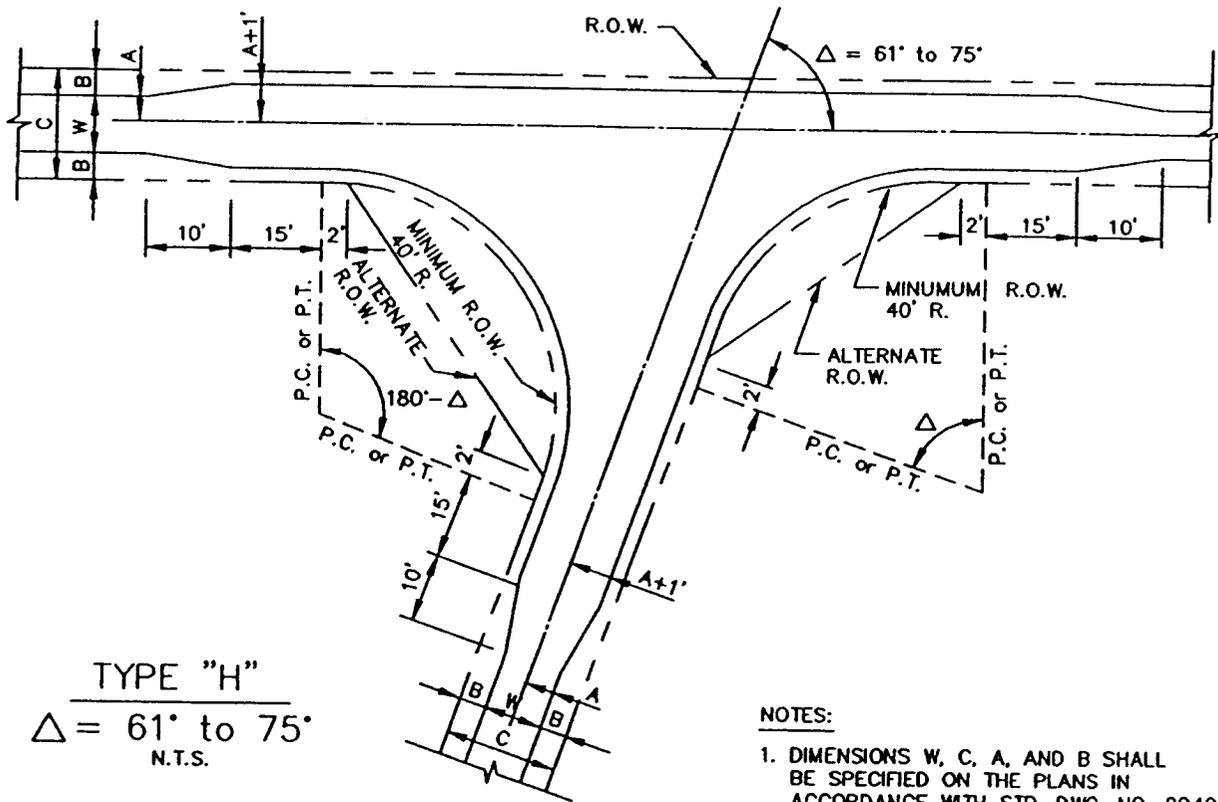
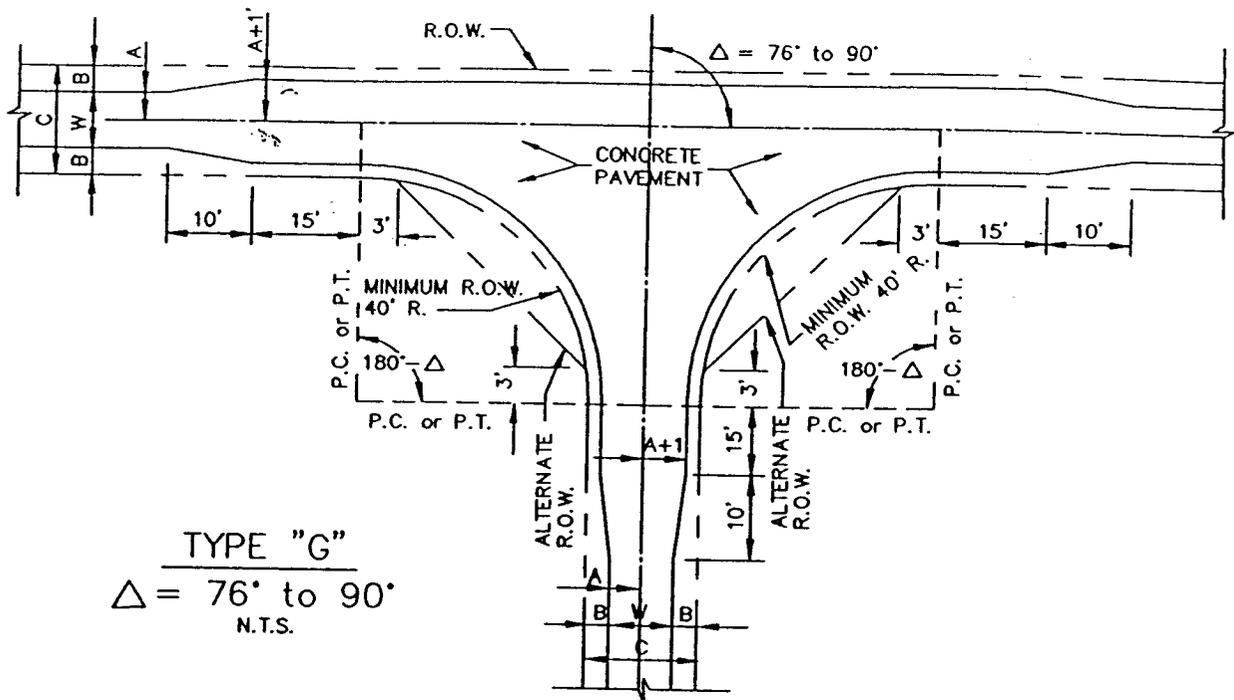
North Central Texas Council of Governments



STANDARD SPECIFICATION REFERENCE

DATE
 NOV. '96

STANDARD DRAWING NO.
 2230



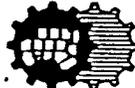
NOTES:

1. DIMENSIONS W, C, A, AND B SHALL BE SPECIFIED ON THE PLANS IN ACCORDANCE WITH STD. DWG. NO. 2040.

ALLEY GEOMETRICS

TYPE "G" & TYPE "H"

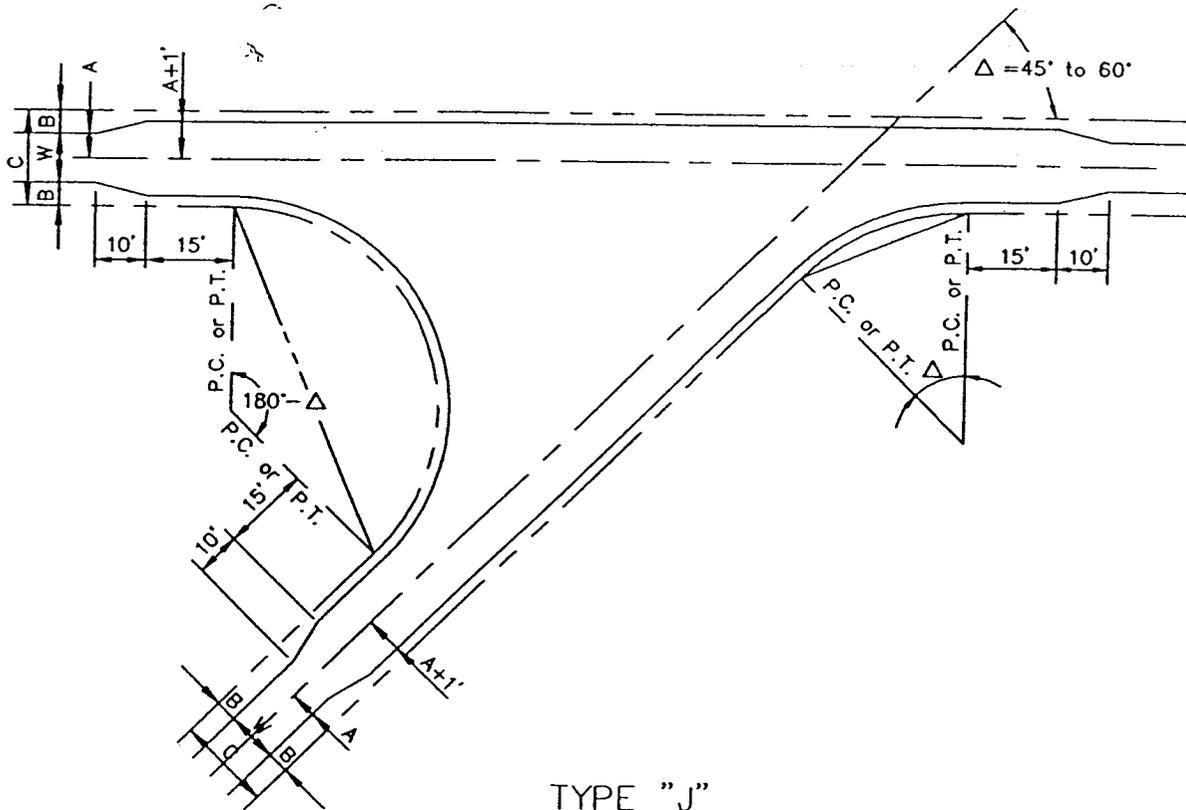
North Central Texas Council of Governments



STANDARD SPECIFICATION REFERENCE

DATE
 NOV. '96

STANDARD DRAWING NO.
 2240

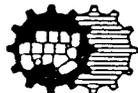


TYPE "J"
 $\Delta = 45^\circ \text{ to } 60^\circ$
 N.T.S.

ALLEY GEOMETRICS

TYPE "J"

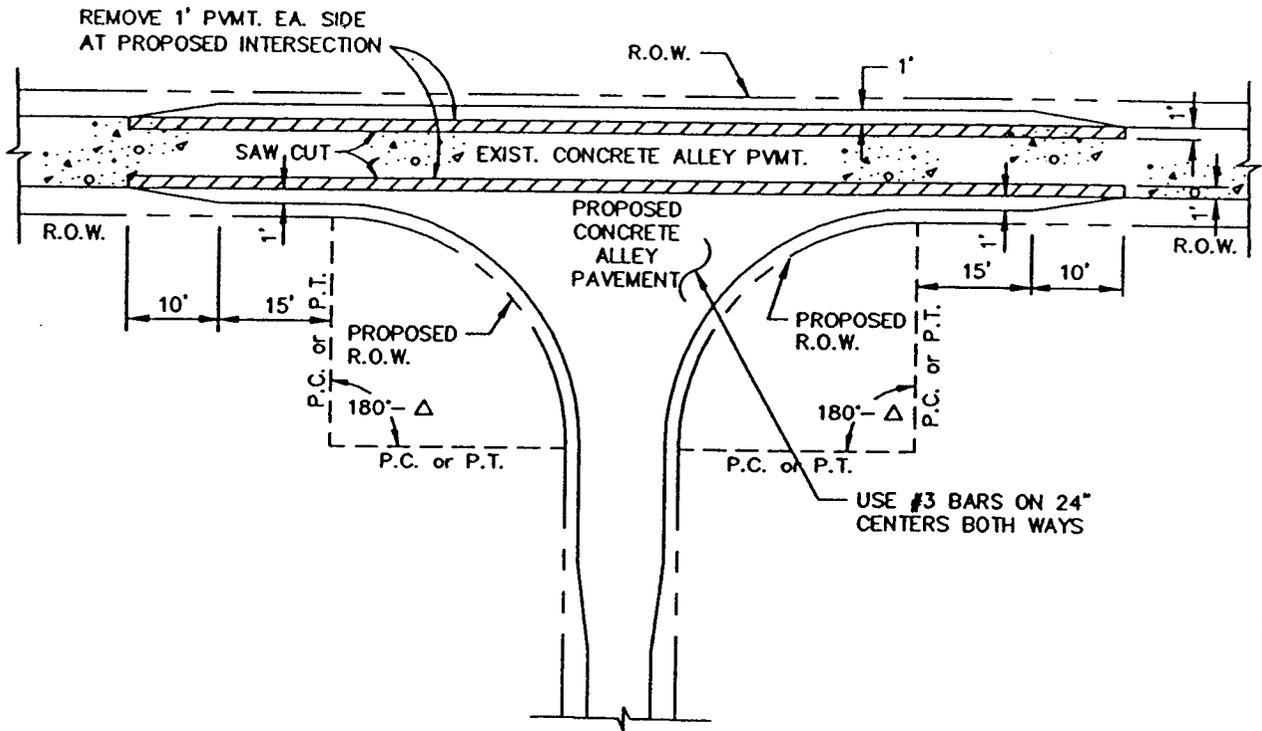
North Central Texas Council of Governments



STANDARD SPECIFICATION REFERENCE

DATE
 NOV. '96

STANDARD DRAWING NO.
 2250



INTERSECTION OF PROPOSED ALLEY
WITH EXISTING ALLEY PAVEMENT

N.T.S.

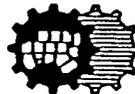
NOTE:

GEOMETRICS OF PROPOSED ALLEY SHALL
BE SHOWN ON THE PLANS IN ACCORDANCE
WITH TYPE "G", "H", OR "J".

ALLEY INTERSECTION

PROPOSED TO EXISTING

North Central Texas Council of Governments



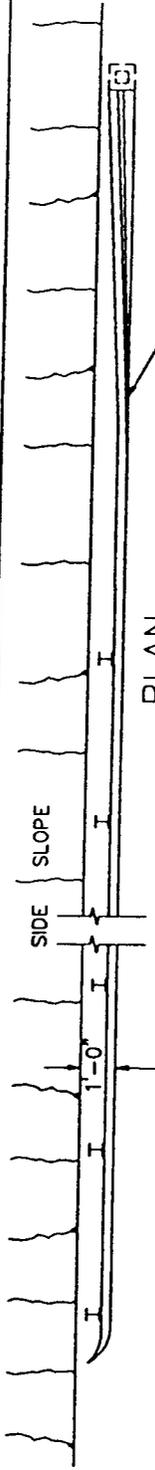
STANDARD SPECIFICATION REFERENCE

DATE

NOV. '96

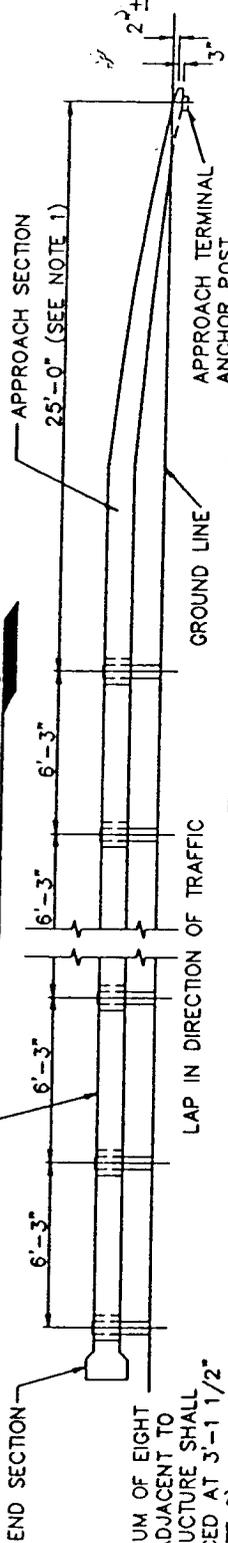
STANDARD DRAWING NO.

2260



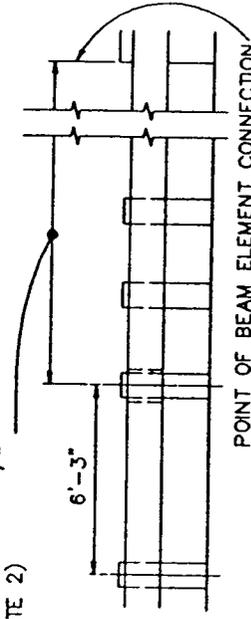
PLAN
N.T.S.

THIS METAL BEAM ELEMENT IS TO BE TWISTED THROUGH 90° IN THE FIELD.



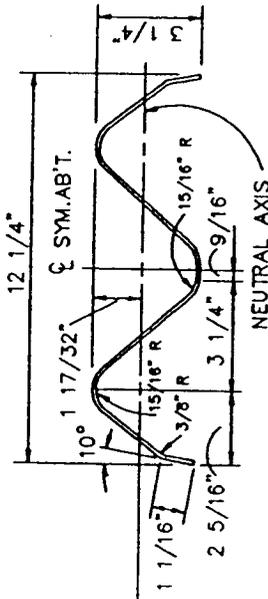
ELEVATION
N.T.S.

A MAXIMUM OF EIGHT POSTS ADJACENT TO THE STRUCTURE SHALL BE SPACED AT 3'-1 1/2" (SEE NOTE 2)



POST TREATMENT AT STRUCTURES
N.T.S.

29/32" X 1 1/8" SLOTTED HOLES



SECTION THRU METAL BEAM ELEMENT
N.T.S.

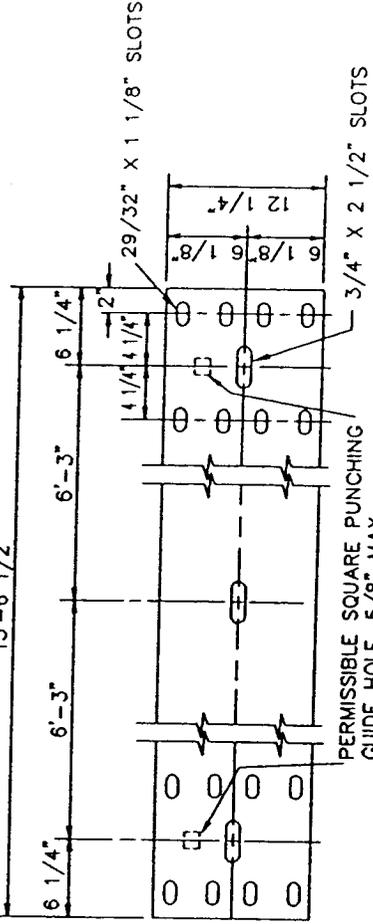
ACTUAL SECTION MAY BE SLIGHTLY DIFFERENT DEPENDING UPON THE MANUFACTURER

STANDARD DRAWING NO. 2270A

NOTES:

1. THIS DIMENSION MEASURED TO CENTER OF SPLICE WHEN SPECIAL END SHOE IS USED.
2. VARIATIONS IN POST SPACING AND/OR THE USE OF SPACER BLOCKS OR SHIMS, MAY BE REQUIRED BY THE ENGINEER, IN ORDER TO ACCOMMODATE THE REQUIRED BEAM ELEMENT CONNECTION TO STRUCTURES.

13'-6 1/2"



ELEVATION OF NOMINAL 12 1/2 FOOT METAL BEAM ELEMENT
N.T.S.

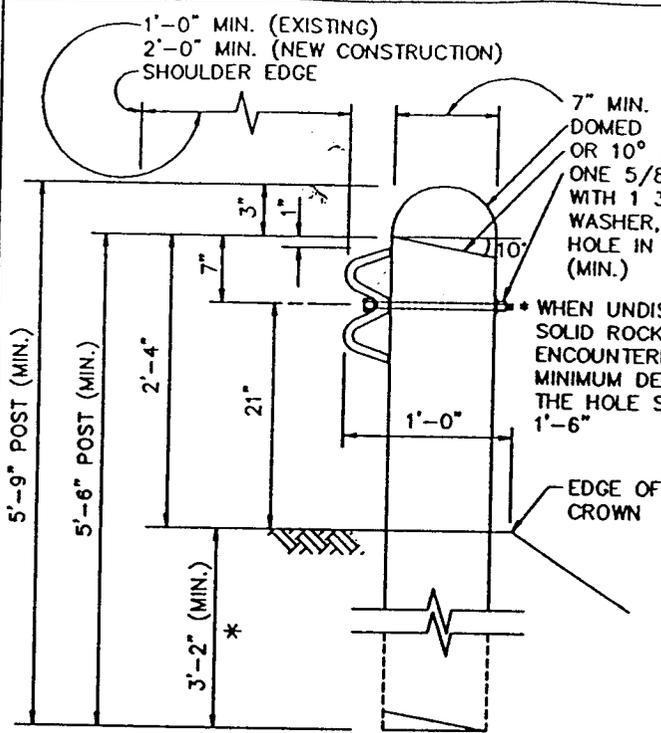
STANDARD SPECIFICATION REFERENCE 8.11.

North Central Texas Council of Governments



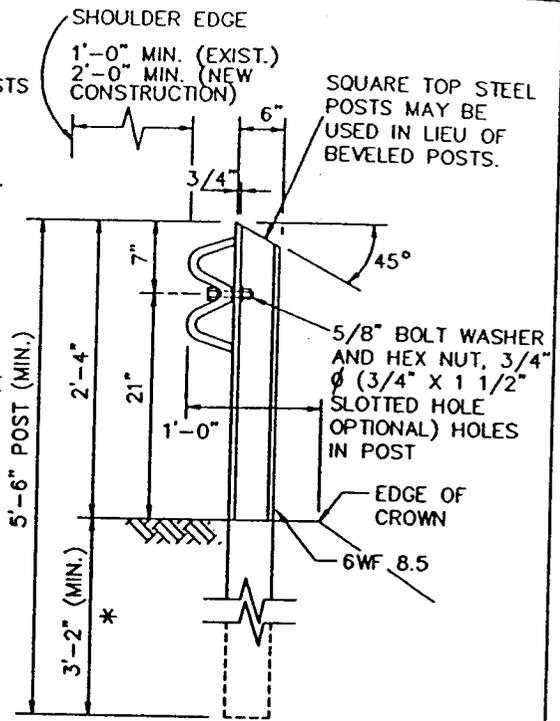
METAL BEAM GUARDRAIL
ROADSIDE PLACEMENT & BEAM ELEMENTS

DATE NOV. '96
STANDARD DRAWING NO. 2270A



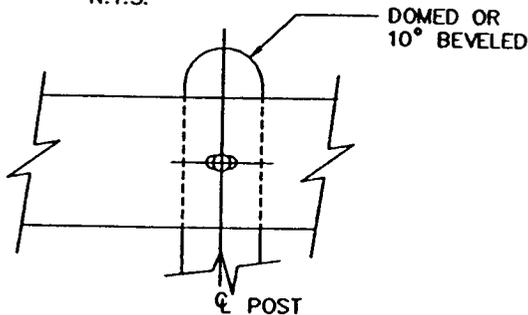
WOOD LINE POST

N.T.S.



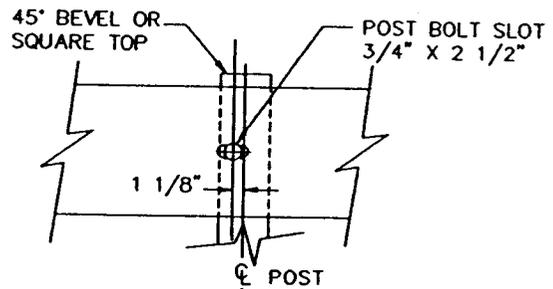
STEEL LINE POST

N.T.S.



WOOD POST CONNECTION

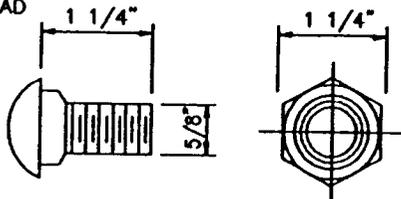
WOOD POST MAY BE DOMED OR BEVELED.
N.T.S.



STEEL POST CONNECTION

N.T.S.

OVAL SHOULDER
BUTTON HEAD

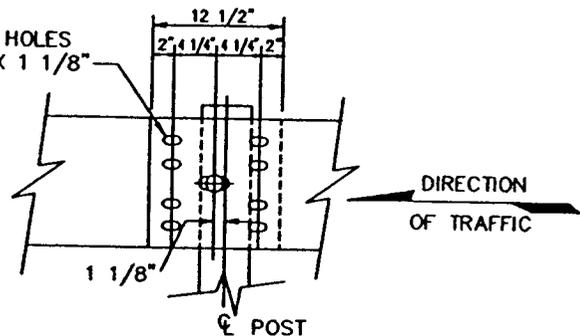


**ANCHOR OR SPLICE BOLT 5/8" NUT
POST BOLT: SIMILAR EXCEPT LENGTH.**

(7/8" HEX BOLTS REQUIRED FOR
SPECIAL END SHOE)

N.T.S.

SLOTTED HOLES
29/32" X 1 1/8"



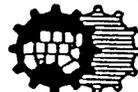
BEAM ELEMENT SPLICE

N.T.S.

METAL BEAM GUARDRAIL

LINE POST & CONNECTIONS

North Central Texas Council of Governments



STANDARD SPECIFICATION REFERENCE

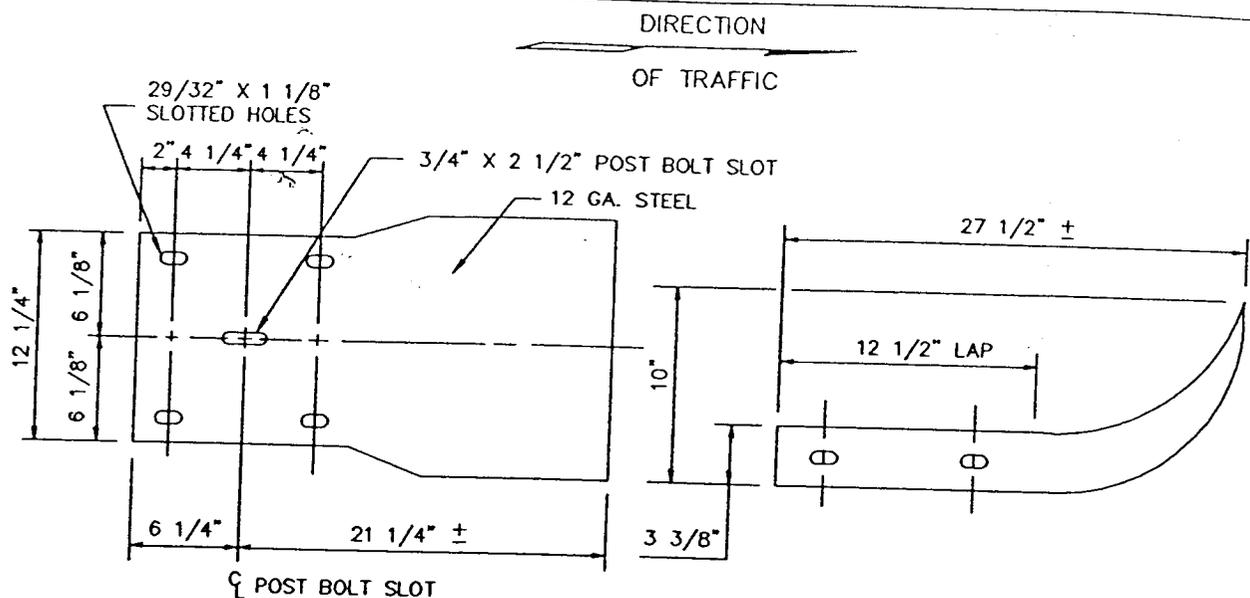
8.11.

DATE

NOV. '96

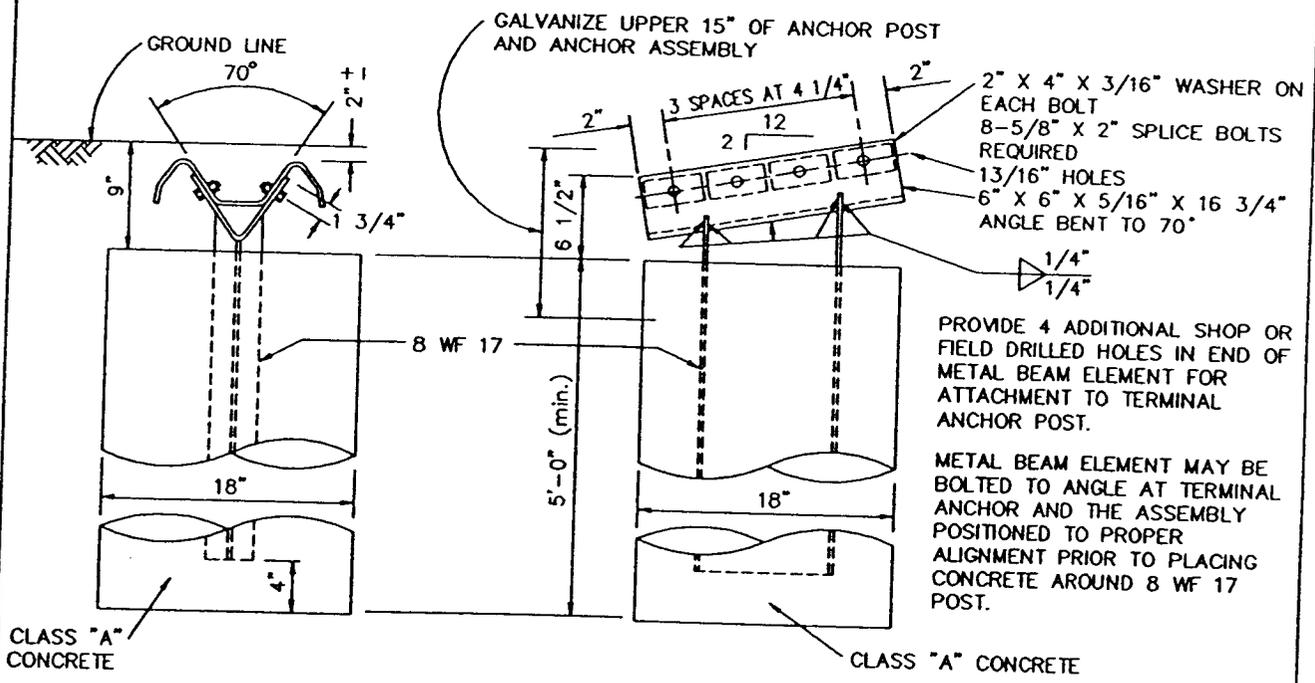
STANDARD DRAWING NO.

2270B



END SECTION - AWAY FROM DIRECTION OF TRAFFIC

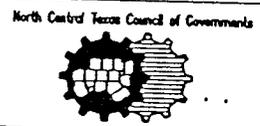
N.T.S.



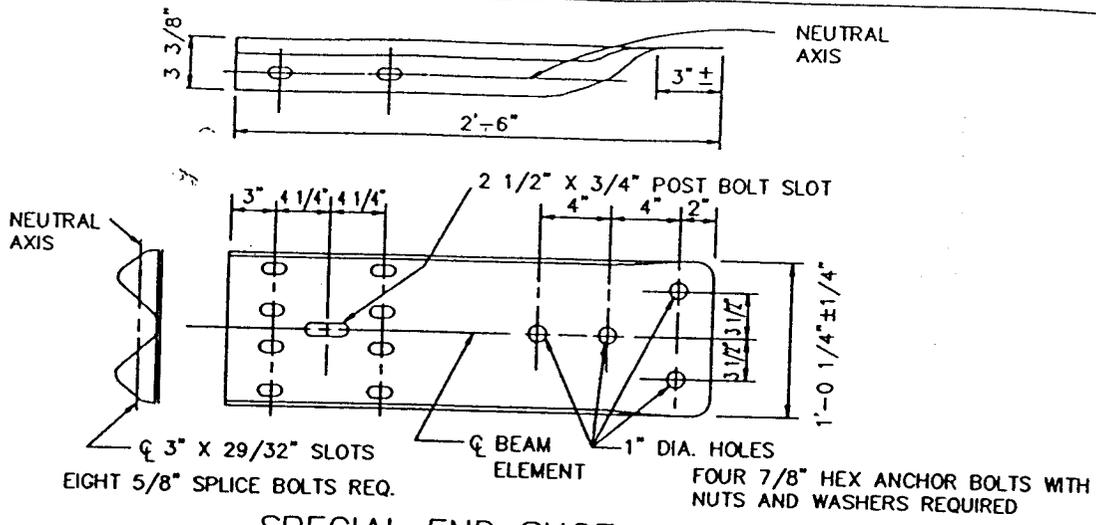
TERMINAL ANGLE ANCHOR POST

N.T.S.

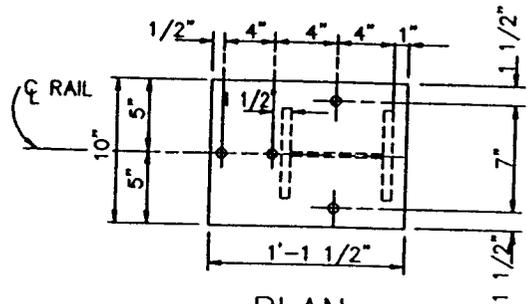
METAL BEAM GUARDRAIL
END SECTION & ANGLE ANCHOR POST



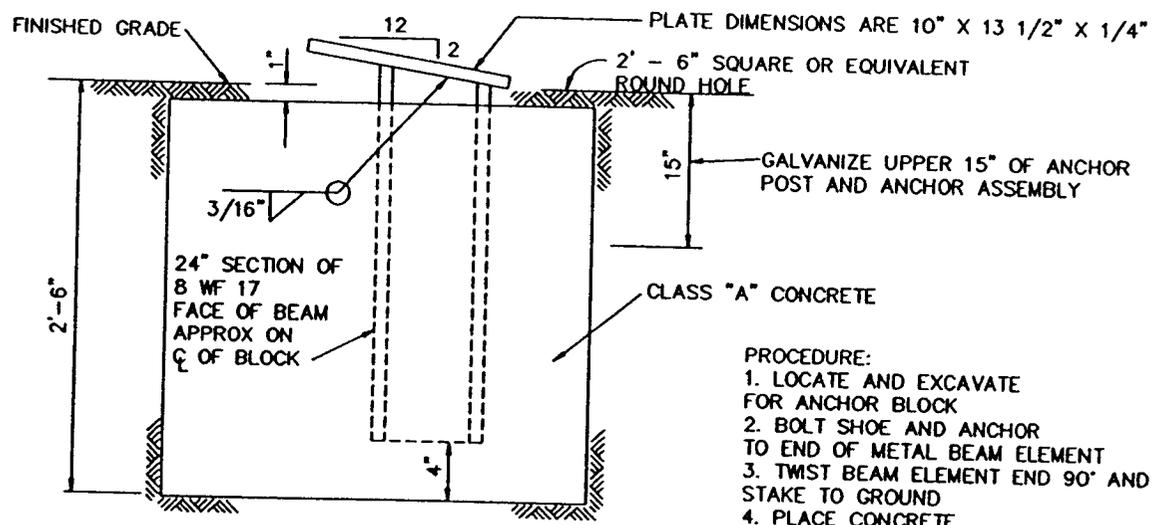
STANDARD SPECIFICATION REFERENCE 8.11.	
DATE NOV. '96	STANDARD DRAWING NO. 2270C



SPECIAL END SHOE
N.T.S.

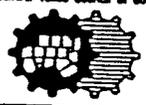


PLAN
N.T.S.



ELEVATION
N.T.S.

SPECIAL END SHOE ANCHOR POST

METAL BEAM GUARDRAIL SPECIAL END SHOE & ANCHOR POST	North Central Texas Council of Governments 	STANDARD SPECIFICATION REFERENCE 8.11.	
		DATE NOV. '96.	STANDARD DRAWING NO. 2270D

METAL BEAM GUARDRAIL
GENERAL NOTES

1. EXCEPT WHERE USED AT STRUCTURES THAT ARE NARROWER THAN CROWN WIDTH OR WHERE OTHERWISE INDICATED ON PLANS, THE FACE OF THE GUARDRAIL SHALL BE LOCATED A MINIMUM OF ONE FOOT FROM THE SHOULDER EDGE ON EXISTING ROADWAYS AND A MINIMUM OF TWO FEET FROM THE SHOULDER EDGE ON NEW CONSTRUCTION. THE EXACT POSITION SHALL BE AS SHOWN ELSEWHERE ON THE PLANS OR AS DIRECTED BY THE ENGINEER. BEAM ELEMENTS SHALL BE TRANSITIONED TO A SMOOTH CONNECTION WITH OTHER STRUCTURES OR BEAM ELEMENTS AS SHOWN ELSEWHERE ON PLANS.
2. AT THE OPTION OF THE CONTRACTOR THE METAL BEAM ELEMENTS FOR THE GUARDRAIL MAY BE FURNISHED IN EITHER 12 1/2 OR 25 FOOT NOMINAL LENGTHS. BEAM ELEMENTS SHALL BE FURNISHED WITH POST BOLT SLOTS FOR 5/8" DIAMETER BOLT CONNECTIONS TO POSTS.
3. BOLTS SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND NO MORE THAN 3/4" BEYOND IT.
4. THE TOP OF THE TERMINAL ANCHOR POST ASSEMBLY AND ALL STEEL FITTINGS THEREON SHALL BE GALVANIZED AS SHOWN.
5. WHERE ROCK IS ENCOUNTERED OR WHERE SHOWN ON THE PLANS, THE DIAMETER OF THE HOLES AND THE MATERIAL FOR BACKFILLING SHALL BE AS DIRECTED BY THE ENGINEER. TIMBER POSTS SHALL NOT BE SET IN CONCRETE.
6. THE TERMINAL ANCHOR POST SHALL BE SET IN CLASS "A" CONCRETE. CONCRETE SHALL BE SUBSIDIARY TO THE BID ITEM "METAL BEAM GUARDRAIL."
7. TIMBER POSTS MAY BE BEVELED AT APPROXIMATELY 10 DEGREES ON THE TOP OR BOTH ENDS WITH HIGH SIDE OF TOP OF POST PLACED TOWARD THE ROADWAY OR THEY MAY BE DOMED.
8. AN ANCHOR OTHER THAN TO A TERMINAL ANCHOR POST SHALL CONSIST OF A CONNECTION SIMILAR TO THE BEAM ELEMENT SPLICE OR SIMILAR TO THE SPECIAL END SHOE.
9. SPECIAL FABRICATION WILL BE REQUIRED IN INSTALLATIONS HAVING A CURVATURE OF LESS THAN 150' RADIUS.
10. WOOD POSTS MUST BE TREATED IN MANNER APPROVED BY THE ENGINEER.
11. THE SPECIAL END SHOE ANCHOR MAY BE USED WITH THE 18" X 5'-0" CONCRETE FOOTING OR THE ANGLE ANCHOR MAY BE USED WITH THE 2'-6" SQUARE OR EQUIVALENT CONCRETE FOOTING.
12. ALL METAL ELEMENTS WILL BE 12 GAUGE STEEL UNLESS STATED OTHERWISE ON PLANS.

METAL BEAM GUARDRAIL
GENERAL NOTES

North Central Texas Council of Governments



STANDARD SPECIFICATION REFERENCE

8.11.

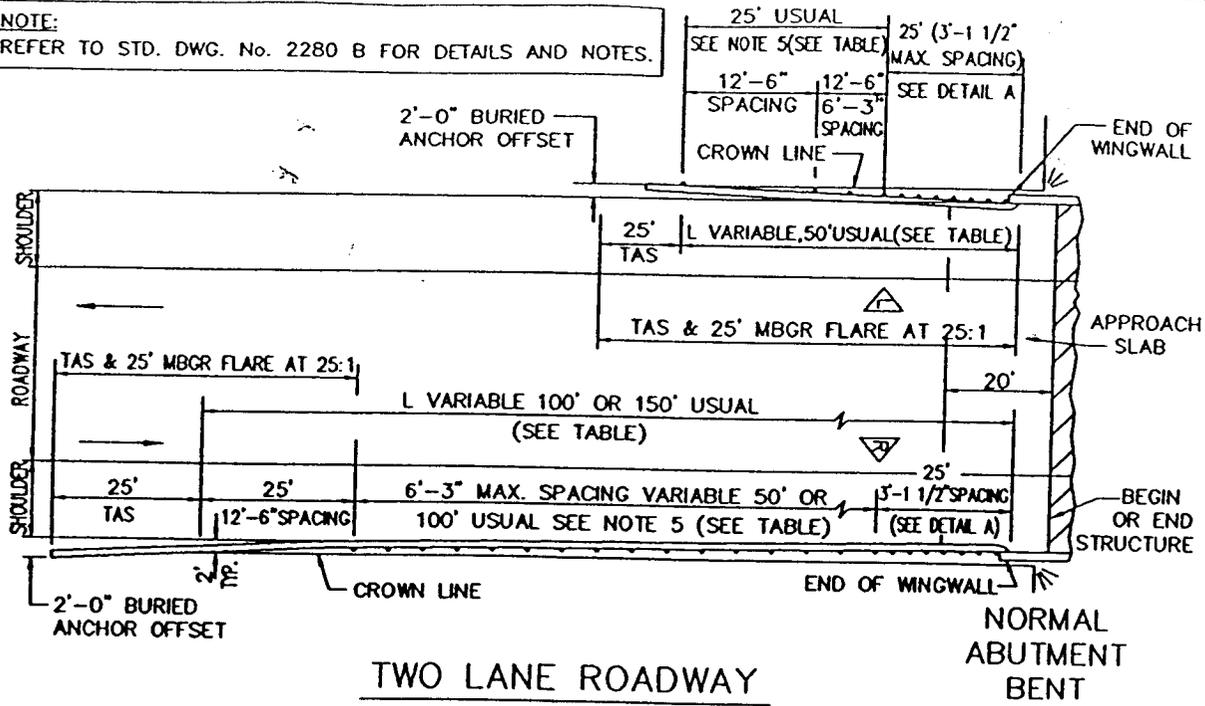
DATE

NOV. '96

STANDARD DRAWING NO.

2270E

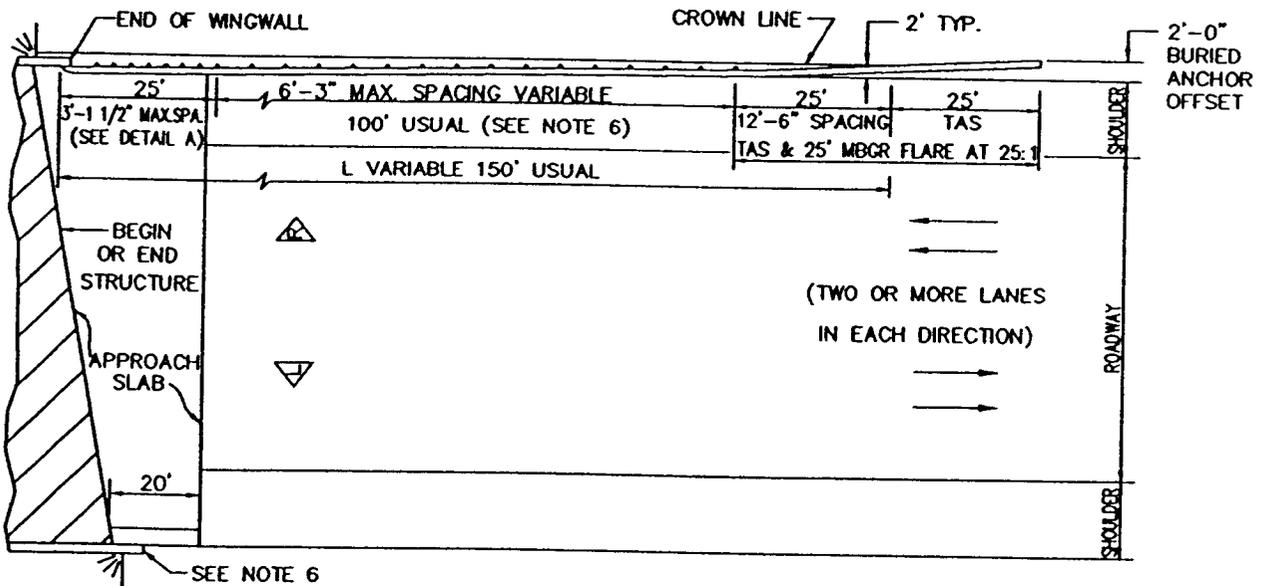
NOTE:
REFER TO STD. DWG. No. 2280 B FOR DETAILS AND NOTES.



TWO LANE ROADWAY

N.T.S.

TAS: TERMINAL ANCHOR SECTION



MULTILANE UNDIVIDED ROADWAY

N.T.S.

SKewed
ABUTMENT
BENT

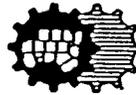
CROWN WIDTH BRIDGE

(SEE NOTE 7 FOR RESTRICTIVE WIDTH BRIDGE)

METAL BEAM GUARDRAIL

TWO-WAY TRAFFIC BRIDGE END

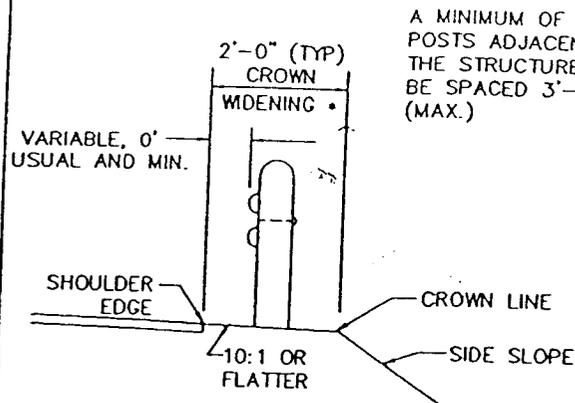
North Central Texas Council of Governments



STANDARD SPECIFICATION REFERENCE

DATE
NOV. '96

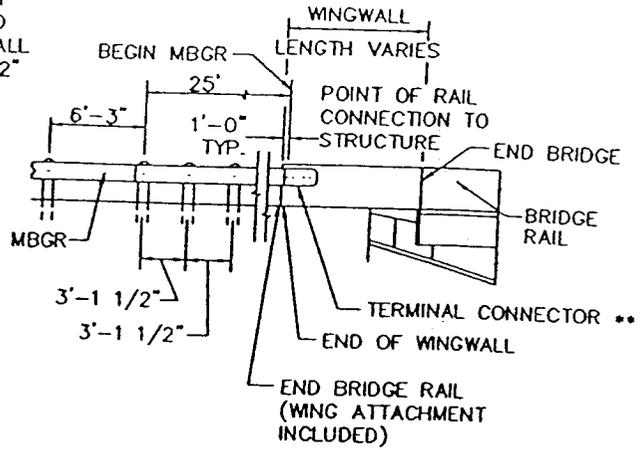
STANDARD DRAWING NO.
2280A



TYPICAL CROSS SECTION
N.T.S.

- APPLIES TO CONSTRUCTION ON NEW ALIGNMENT OR WHERE EXISTING ROADWAY CROSS SECTION IS TO BE WIDENED TO INCREASE ROADWAY WIDTH. DOES NOT APPLY TO REHABILITATION WORK WHERE EXISTING ROADWAY CROWN WIDTH IS TO BE RETAINED.

A MINIMUM OF EIGHT POSTS ADJACENT TO THE STRUCTURE SHALL BE SPACED 3'-1 1/2" (MAX.)



POST TREATMENT AT STRUCTURES
DETAIL A
N.T.S.

- ** TYPICAL CONNECTION—SEE BRIDGE RAIL OR OTHER PLAN SHEETS FOR DETAILS OF MBGR TO BRIDGE RAIL CONNECTION.

LENGTH Ⓞ OF NEED, L, FT.

TWO LANE HIGHWAYS				MULTILANE UNDIVIDED HWYS.	
750 or less ADT		more than 750 ADT		all ADT's	
◀ side	▶ side	◀ side	▶ side	◀ side	▶ side
50 Ⓞ	100	50 Ⓞ	150	0	150

- Ⓞ LENGTHS ARE FOR TYPICAL CROSS SECTIONAL & PLACEMENT CONDITIONS. FOR UNUSUAL CONDITIONS, A CUSTOM DESIGN SHOULD BE DEVELOPED.

- ◀ INDICATES LEFT SIDE OF TRAFFIC APPROACHING BRIDGE.
- ▶ INDICATES RIGHT SIDE OF TRAFFIC APPROACHING BRIDGE.

DESIGN NOTES:

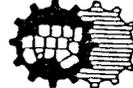
1. THE T.A.S. AND TYPICALLY ADJACENT 25' MBGR SHOULD BE FLARED FROM THE SHOULDER EDGE AT 25:1 TO PROVIDE A 2' USUAL OFFSET TO BURIED ANCHOR.
2. WHERE LENGTH (L) OF MBGR IS 50 FEET, POST SPACING SHALL BE AS DETAILED HEREON (SEE PLAN LAYOUT FOR TWO LANE (RURAL) HIGHWAY), LEFT SIDE OF TRAFFIC APPROACHING BRIDGE. WHERE LENGTH (L) OF MBGR IS 75 FEET OR MORE, POST SPACING SHALL BE 3'-1 1/2" FOR THE 25' SECTION ADJACENT TO THE BRIDGE, 12'-6" FOR THE REMAINING INTERVENING LENGTH.
3. THE SLOPE BETWEEN THE CROWN LINE AND OUTSIDE EDGE OF SHOULDER SHOULD BE 10:1 OR FLATTER. THE CROWN SHOULD BE WIDENED TO ACCOMMODATE MBGR. TYPICALLY THE CROWN LINE SHOULD BE 2 FEET FROM THE OUTSIDE SHOULDER EDGE (SEE TYPICAL CROSS SECTION).
4. FOR RESTRICTIVE WIDTH BRIDGES, A 25 FOOT TANGENT SECTION OF MBGR SHOULD CONNECT TO THE WINGWALL. THE ADJOINING MBGR THAT LIES WITHIN THE ROADWAY (LANE & SHOULDER AREAS) CROWN SHOULD BE FLARED AT THE RATE OF 25:1 (LONGITUDINAL:LATERAL). LENGTH SHOULD BE GOVERNED BY TABULATED VALUES OR THE LENGTH NECESSARY TO LOCATE THE BURIED ANCHOR AT A 2-FOOT OFFSET FROM SHOULDER EDGE, WHICHEVER IS GREATER.
5. AVERAGE DAILY TRAFFIC (ADT) IS FOR THE CURRENT YEAR. WHERE SIGNIFICANT TRAFFIC VOLUME GROWTH IS ANTICIPATED ON LOW VOLUME (0-750 ADT) HIGHWAYS, USE LENGTHS SHOWN FOR HIGHER VOLUME CATEGORY.
6. PROVIDE MINIMUM 50 FT. MBGR PLUS T.A.S. FOR FOUR LANE UNDIVIDED HIGHWAYS. FOR FOUR LANE HIGHWAYS WITH A FLUSH MEDIAN OR FOR HIGHWAYS WITH SIX OR MORE LANES, MBGR IS NOT A REQUIRED BRIDGE END TREATMENT. HOWEVER, OTHER NEARBY HAZARDS MAY WARRANT SHIELDING WITH MBGR.

GENERAL NOTES:

1. FOR METAL BEAM GUARDRAIL DETAILS AND METHOD OF TERMINATION, SEE STD. DWGS. No. 2270A - 2270E.
2. VARIATIONS IN POST SPACINGS AND/OR THE USE OF SPACER BLOCKS OR SHIMS MAY BE REQUIRED BY THE ENGINEER IN ORDER TO ACCOMMODATE THE REQUIRED BEAM ELEMENT CONNECTION TO STRUCTURES.
3. QUANTITIES OF METAL BEAM GUARDRAIL (MBGR) AT INDIVIDUAL BRIDGE ENDS ARE SHOWN ELSEWHERE IN THE PLANS.

METAL BEAM GUARD RAIL
TWO-WAY TRAFFIC BRIDGE END

North Central Texas Council of Governments



STANDARD SPECIFICATION REFERENCE

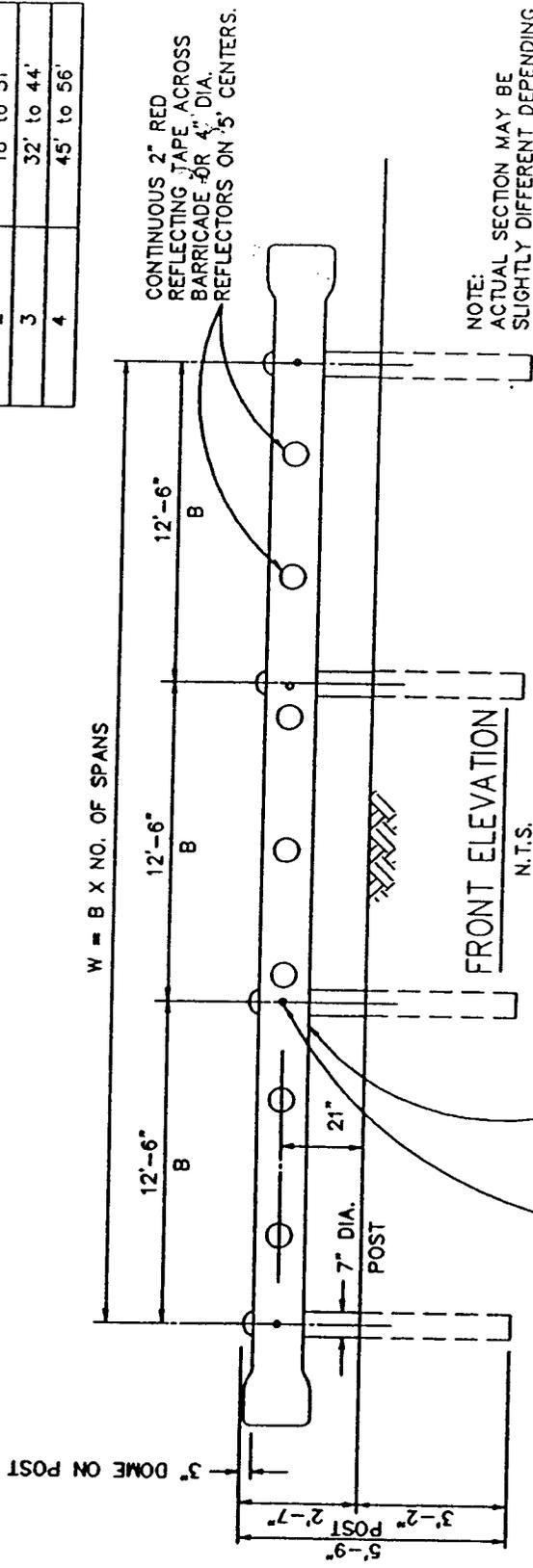
DATE

NOV. '96

STANDARD DRAWING NO.

2280B

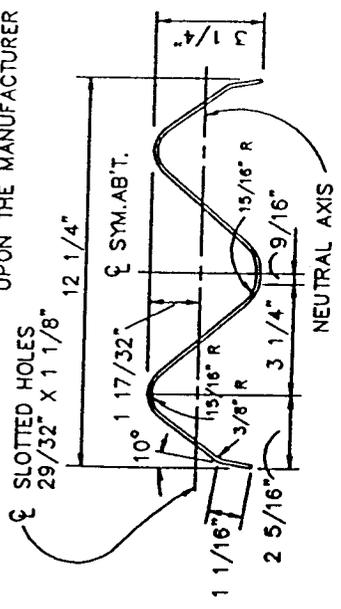
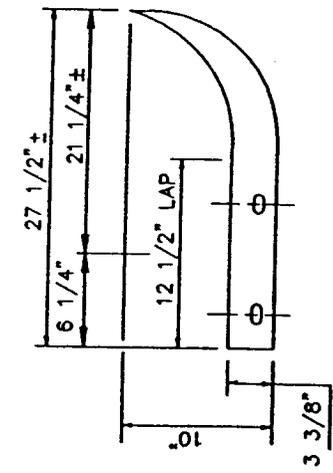
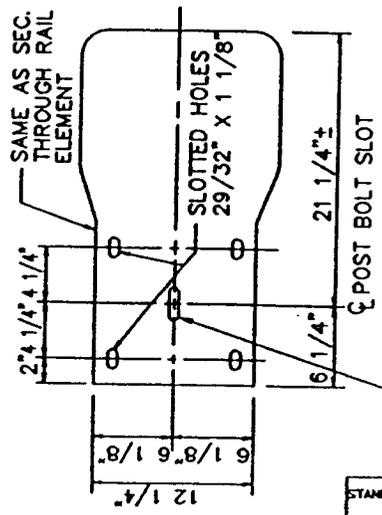
NO. OF SPANS	ROADWAY SECTION WIDTH
2	18' to 31'
3	32' to 44'
4	45' to 56'



NOTE:
ACTUAL SECTION MAY BE SLIGHTLY DIFFERENT DEPENDING UPON THE MANUFACTURER

FASTEN TO POST WITH ONE 5/8" BOLT WITH 1 3/4" O.D. WASHER BEHIND POST, 7/8" Ø HOLE IN POST.

METAL BEAM GUARD RAIL SHALL BE GALVANIZED STEEL (12 GA.)



SECTION THRU RAIL ELEMENT
N.T.S.

METAL BEAM BARRICADE
END OF ROAD

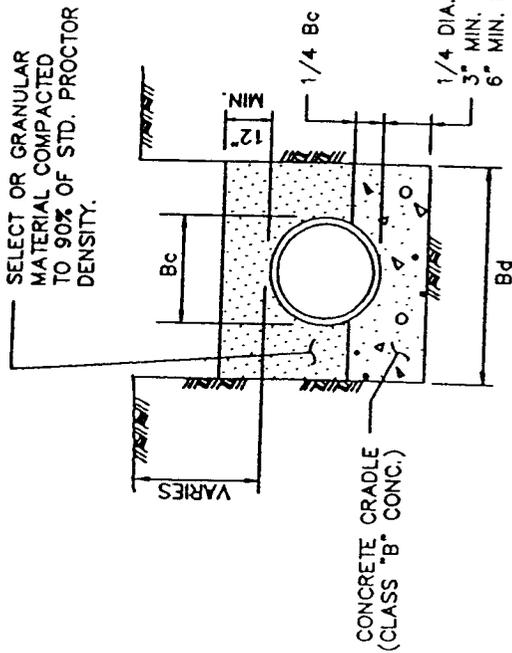
TERMINAL SECTION
N.T.S.

North Central Texas Council of Governments

STANDARD SPECIFICATION REFERENCE

DATE NOV. '96

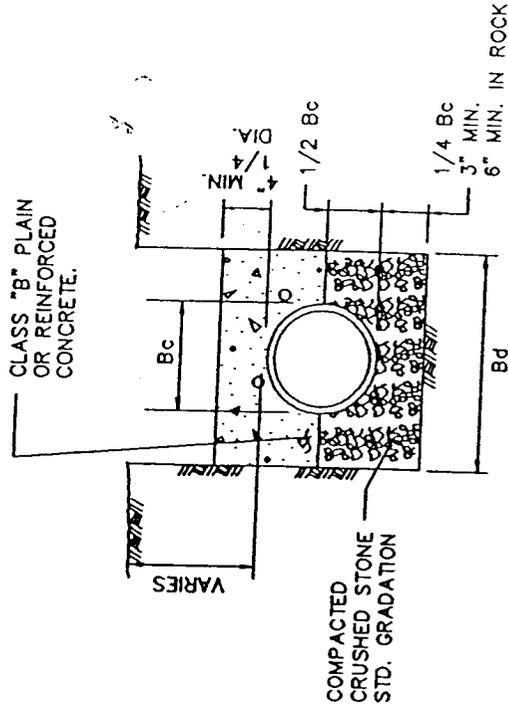
STANDARD DRAWING NO. 2290



CLASS "A"

CLASS "B" CONCRETE CRADLE
PLAIN CONC. LF 2.8
REINF. CONC. LF 3.4 P=0.4%

N.T.S.



CLASS "A-1"

CLASS "B" CONCRETE CAP
PLAIN CONC. LF 2.8
REINF. CONC. LF 3.4 P=0.4%
REINF. CONC. LF 4.8 P=1.0%

N.T.S.

NOTES:

1. LF. = LOAD FACTOR TO BE USED TO DETERMINE 3 EDGE BEARING BASED ON TYPE OF EMBEDMENT.
2. FREE-FALL OF CONCRETE NOT TO EXCEED 5 FT. MAXIMUM.
3. P = Rho FOR STEEL %
4. Bc = OUTSIDE DIAMETER OF PIPE
5. Bd = TRENCH WIDTH

EMBEDMENT

CLASS "A" & "A-1"

STANDARD SPECIFICATION REFERENCE
6.2.

DATE
NOV. '96

STANDARD DRAWING NO
3010

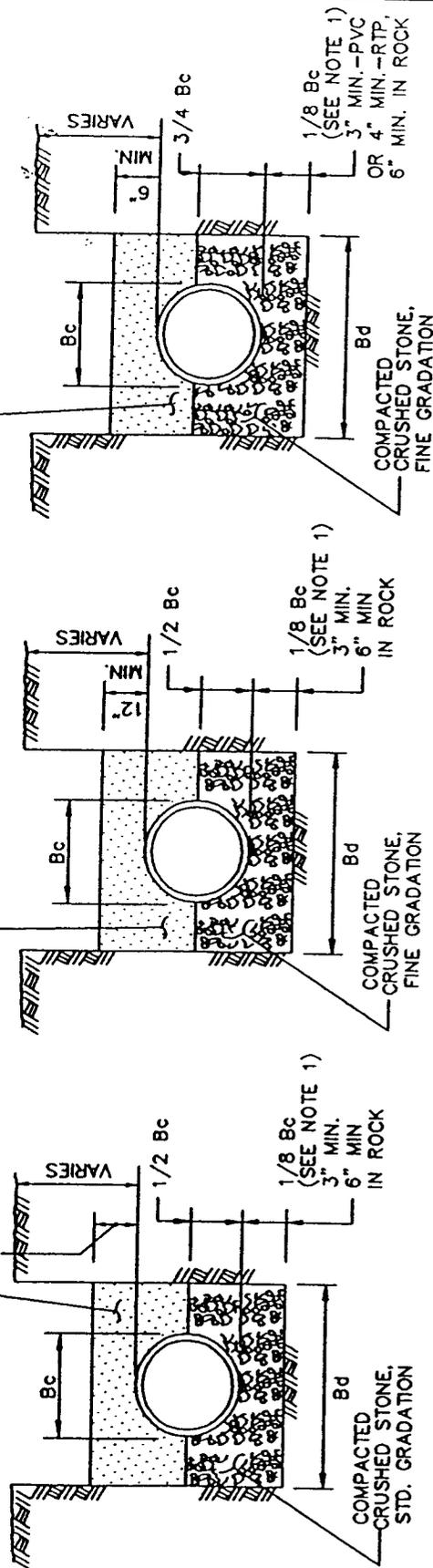
STANDARD DRAWING NO

3010

SELECT OR GRANULAR MATERIAL COMPACTED TO 90% OF STD. PROCTOR DENSITY

AS SHOWN ON PLANS

GRANULAR MATERIAL COMPACTED TO 90% OF STD. PROCTOR DENSITY



CLASS "B"
N.T.S.

CLASS "B+"
N.T.S.

CLASS "B-1"
N.T.S.

NOTES:

1. FOR MAINS 42" DIAMETER AND LARGER LARGER, 1/8 Bc SHALL BE TAKEN AS 6".
2. Bc = OUTSIDE DIAMETER OF PIPE
3. Bd = TRENCH WIDTH

EMBEDMENT

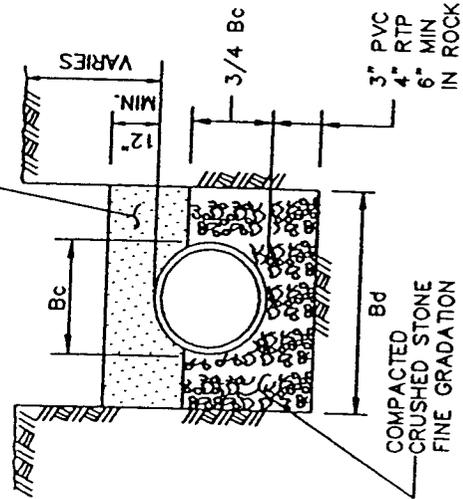
CLASS "B", "B+", & "B-1"

STANDARD SPECIFICATION REFERENCE
6.2.

DATE NOV. '96
STANDARD DRAWING NO. 3020

STANDARD DRAWING NO.
3020

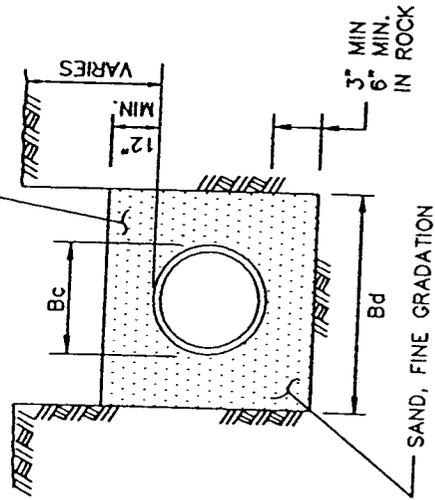
COMPACTED SELECT OR GRANULAR MATERIAL COMPACTED TO 90% OF STD. PROCTOR DENSITY



CLASS "B-2"

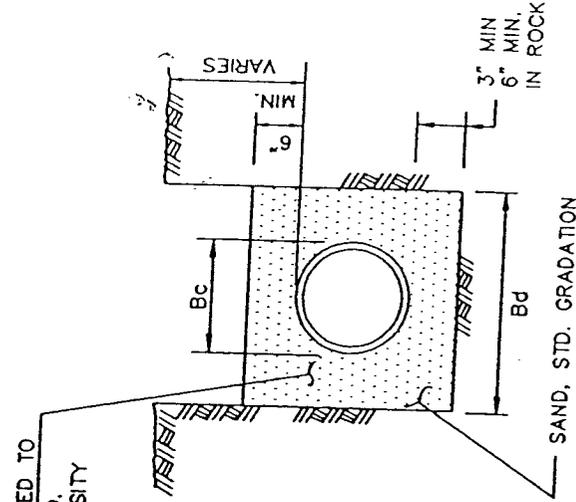
N.T.S.

SAND COMPACTED TO 90% OF STD. PROCTOR DENSITY



CLASS "B-3"

N.T.S.



CLASS "B-4"

N.T.S.

NOTES:

1. Bc = OUTSIDE DIAMETER OF PIPE
2. Bd = TRENCH WIDTH

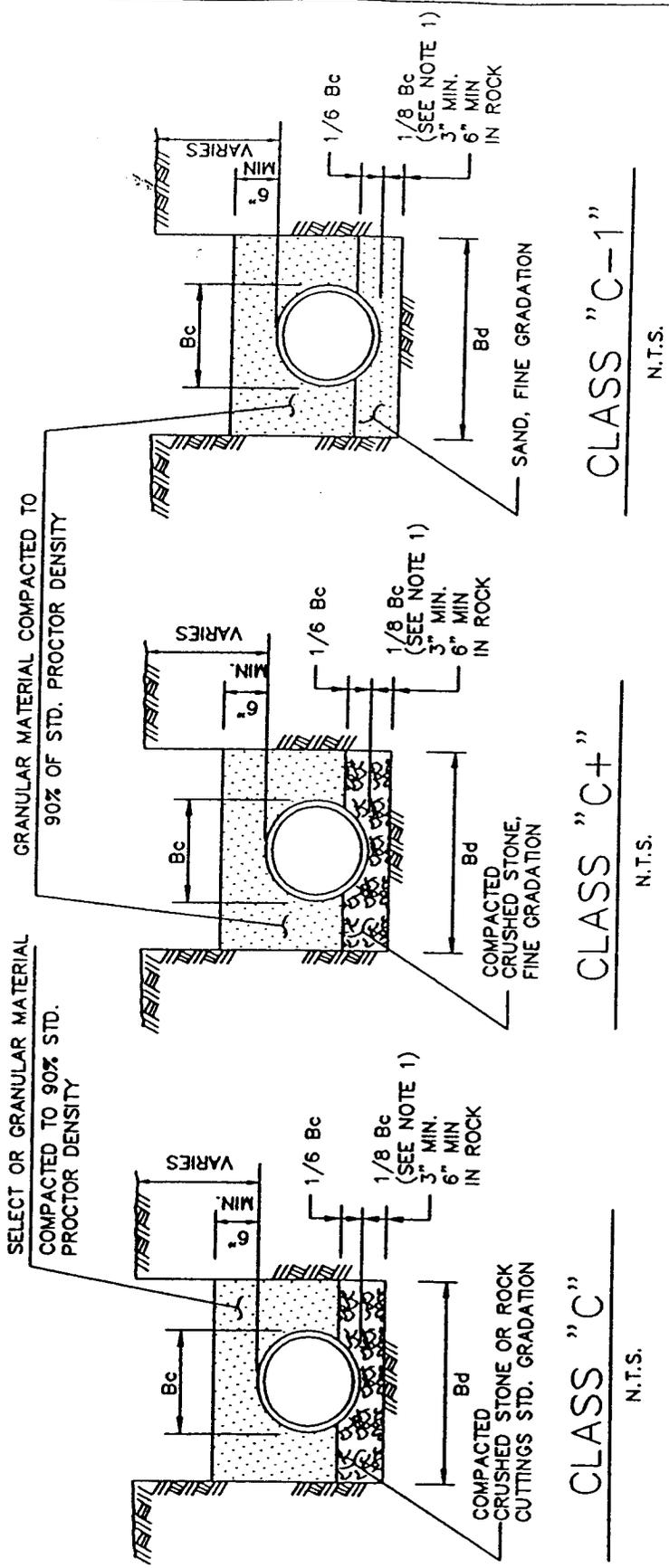
EMBEDMENT

CLASS "B-2", "B-3", & "B-4"

STANDARD SPECIFICATION REFERENCE
6.2.

DATE NOV. '96
STANDARD DRAWING NO. 3030

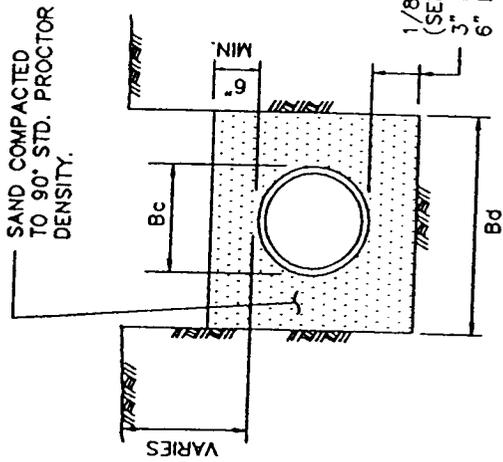
STANDARD DRAWING NO.
3030



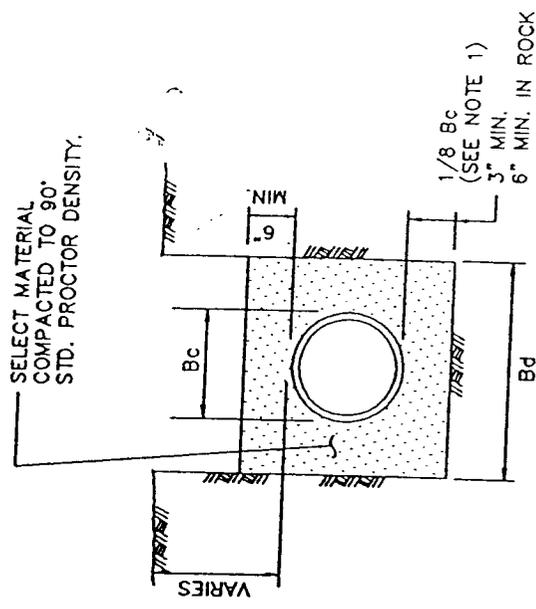
NOTES:

1. FOR MAINS 42" DIAMETER AND LARGER, 1/8 Bc SHALL BE TAKEN AS 6".
2. Bc = OUTSIDE DIAMETER OF PIPE
3. Bd = TRENCH WIDTH

CLASS "C"	CLASS "C+"	CLASS "C-1"
N.T.S.	N.T.S.	N.T.S.
EMBEDMENT		
CLASS "C", "C+", & "C-1"		
STANDARD DRAWING NO. 3040		STANDARD SPECIFICATION REFERENCE 6.2.
DATE NOV. '96		STANDARD DRAWING NO. 3040



CLASS "C-2"
N.T.S.



CLASS "D+"
N.T.S.

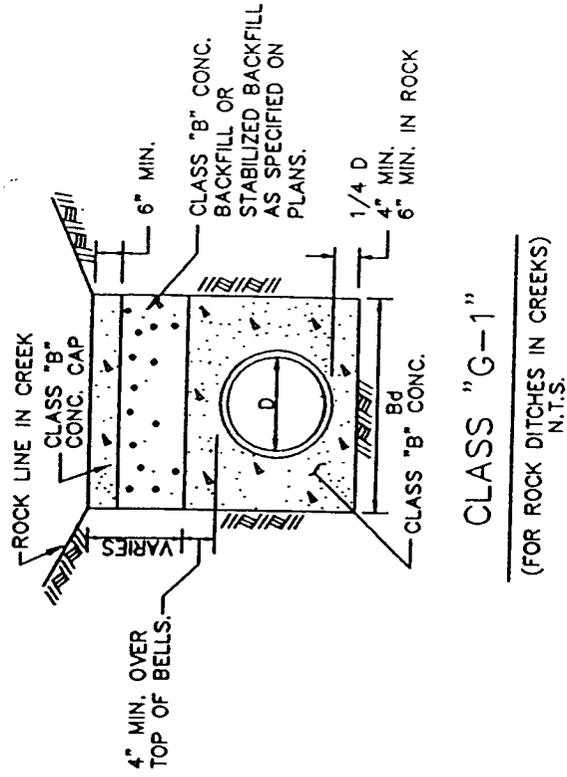
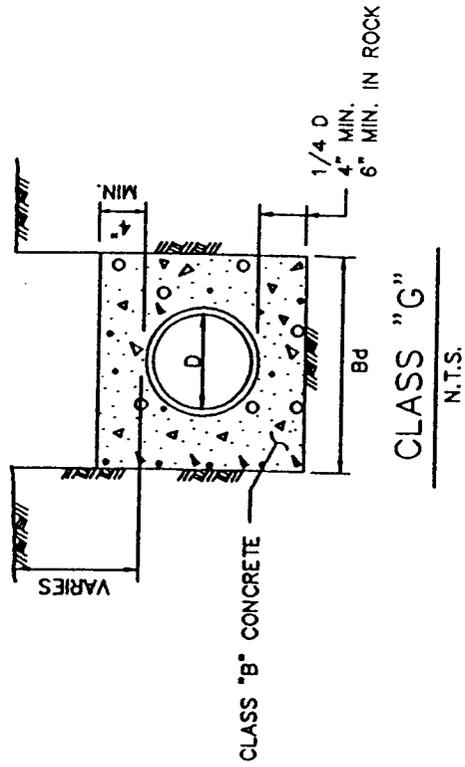
NOTES:

1. FOR MAINS 42" DIAMETER AND LARGER, 1/8 Bc SHALL BE TAKEN AS 6".
2. Bc = OUTSIDE DIAMETER OF PIPE
3. Bd = TRENCH WIDTH

STANDARD DRAWING NO.
3050

EMBEDMENT
CLASS "C-2" & "D+"

STANDARD SPECIFICATION REFERENCE	6.2.
DATE	NOV. '96
STANDARD DRAWING NO.	3050



NOTES:

1. D = INSIDE DIAMETER OF PIPE
2. Bd = TRENCH WIDTH

STANDARD DRAWING NO.
3060

EMBEDMENT

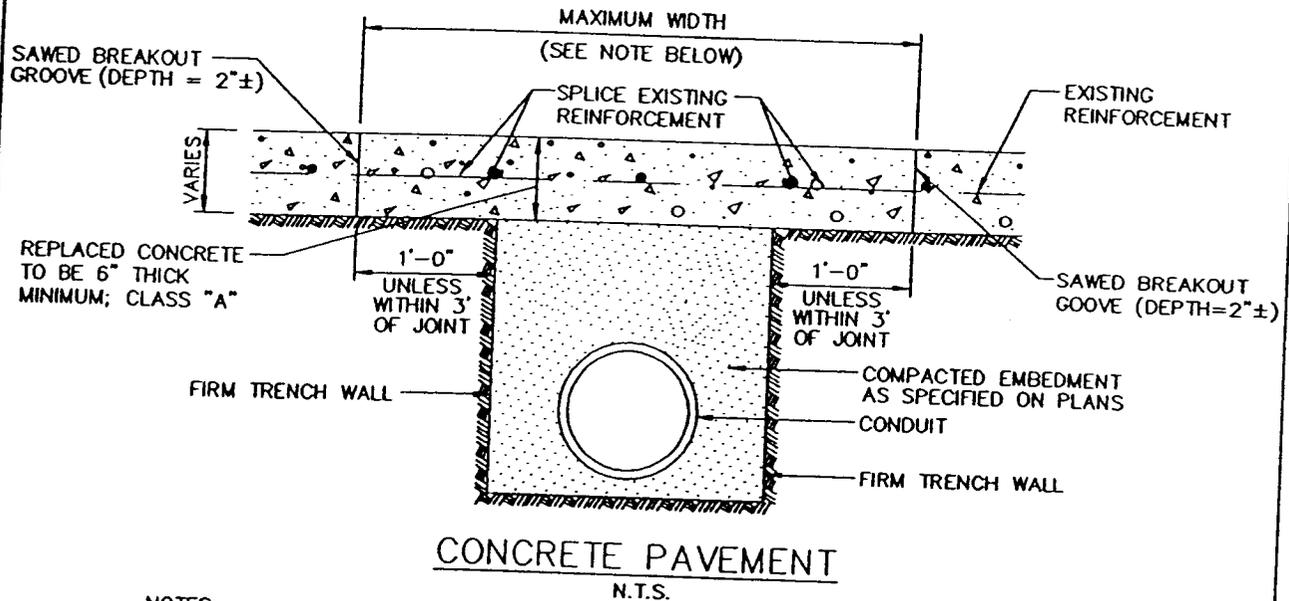
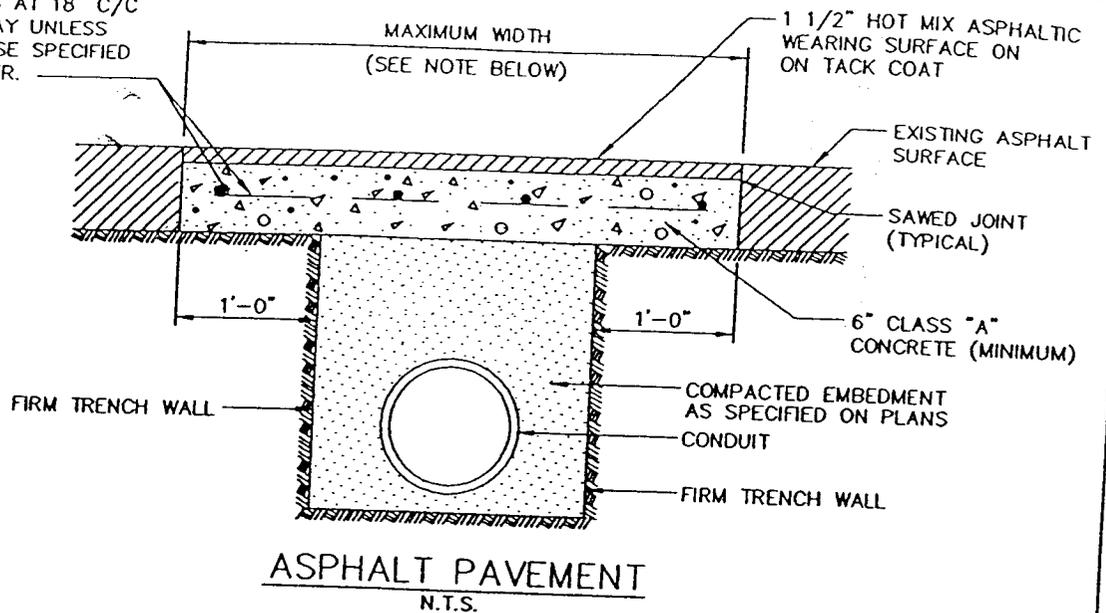
CLASS "G" & "G-1"

STANDARD SPECIFICATION REFERENCE
6.2.

DATE
NOV. '96

STANDARD DRAWING NO.
3060

#3 BARS AT 18" C/C
EACH WAY UNLESS
OTHERWISE SPECIFIED
BY OWNER.



NOTES:

1. PAYMENT TO THE CONTRACTOR FOR REPLACEMENT OF PAVEMENT AND/OR DRIVEWAYS WILL BE BASED ON ACTUAL MEASUREMENTS UP TO A MAXIMUM WIDTH EQUAL TO THE SPECIFIED MAXIMUM TRENCH WIDTH (PER STD. SPEC. ITEM 6.2.) PLUS 2 FEET. ANY EXISTING PAVEMENT DAMAGED OR REMOVED IN EXCESS OF THE MAXIMUM LIMITS SHALL BE AT THE EXPENSE OF THE CONTRACTOR.
2. WHEN REMOVING CONCRETE PAVEMENT THE CONTRACTOR SHALL ENDEAVOR TO LIMIT DAMAGE TO EXISTING REINFORCEMENT SO IT MAY BE EMPLOYED IN THE REPLACEMENT OPERATION. IF ORIGINAL REINFORCEMENT IS CUT OR BROKEN, REPLACEMENT BARS OF THE SAME SIZE SHALL BE INSTALLED BY DRILLING AND DOWELLING AS DIRECTED BY THE OWNER.

PAVEMENT CUTS

REMOVAL AND REPLACEMENT

STANDARD SPECIFICATION REFERENCE

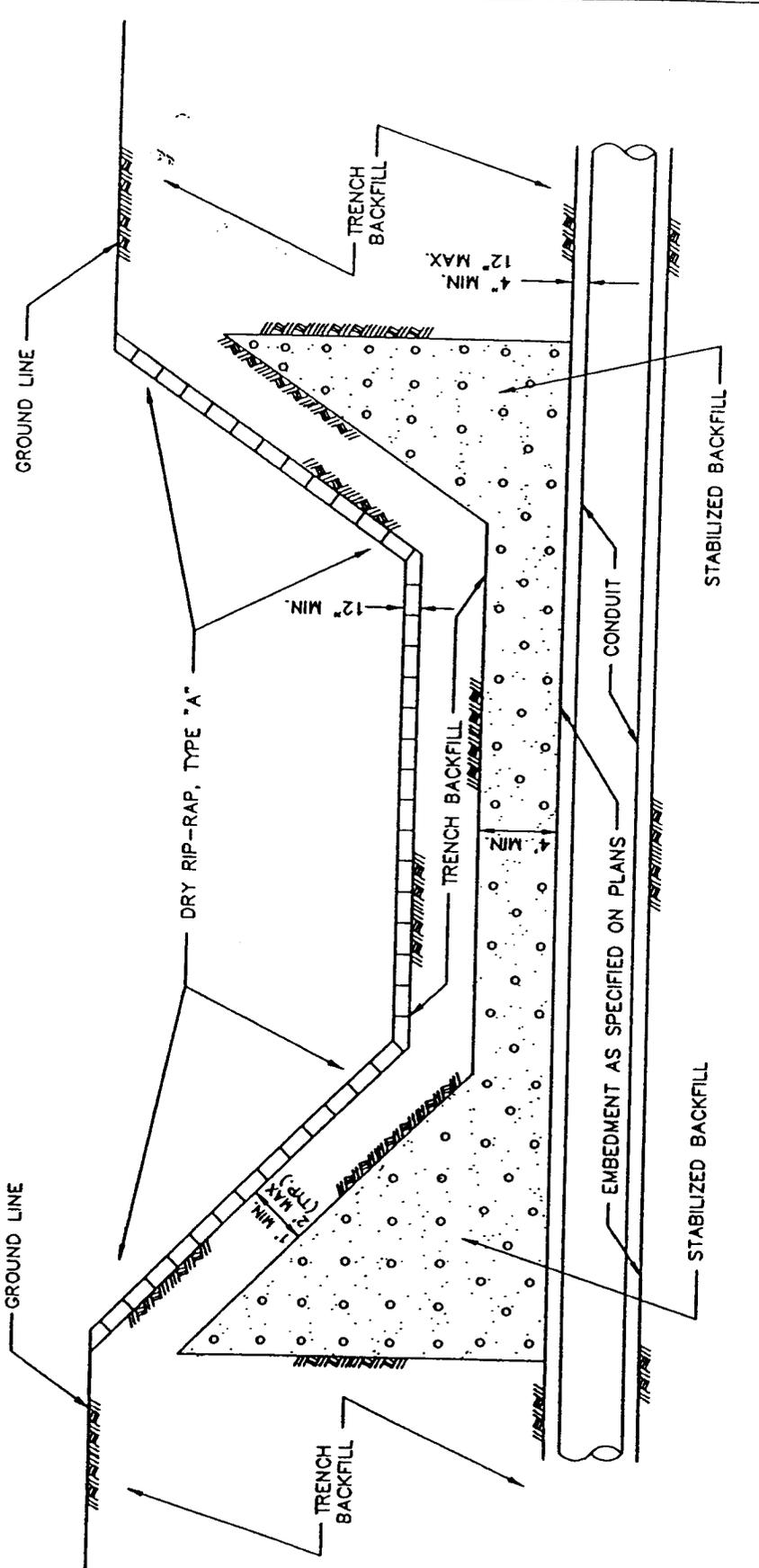
6.5.

DATE

NOV '96

STANDARD DRAWING NO.

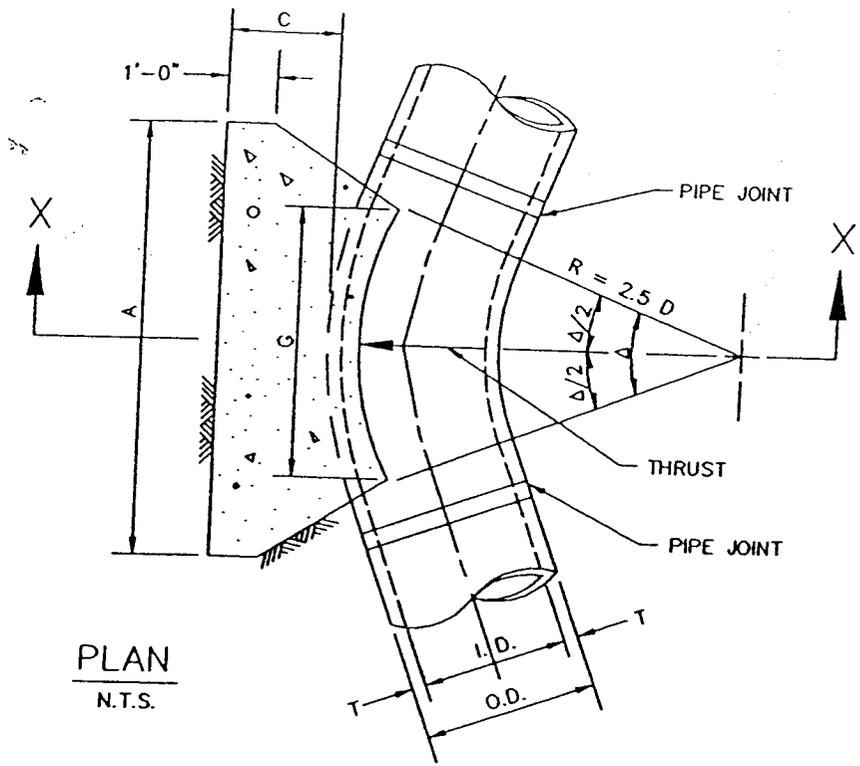
3070



INFILTRATION PROTECTION
 CONDUIT UNDER CHANNEL

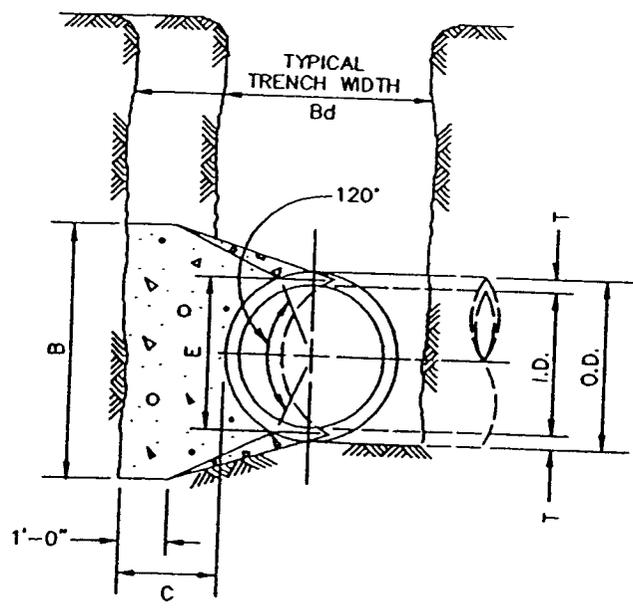
STANDARD SPECIFICATION REFERENCE
 6.2.; 8.15.
 DATE NOV. '96
 STANDARD DRAWING NO. 3080

STANDARD DRAWING NO.
 3080



PLAN
N.T.S.

REFER TO
STD. DWG. No. 4040
FOR GENERAL NOTES.



SECTION X-X
N.T.S.

HORIZONTAL THRUST BLOCK
AT PIPE BEND

STANDARD SPECIFICATION REFERENCE 6.7.	
DATE NOV. '96	STANDARD DRAWING NO. 4010A

I.D. (IN.)	T (IN.)	$\Delta =$ 11.25' (FT.)	$\Delta =$ 22.50' (FT.)	E (FT.)
4,6,8	0.4	1.5	1.5	0.9
10,12	0.5	1.5	1.5	1.2
16,18	0.6	1.5	1.5	1.6
20	0.7	1.5	1.5	1.8
24	0.9	1.5	1.5	2.1
30	2.9	1.5	1.9	2.6
36	4.5	1.5	2.3	3.3
42	5.0	1.8	2.6	3.8
48	5.5	2.0	3.0	4.3
54	6.0	2.3	3.4	4.8
60	6.5	2.5	3.8	5.3
66	6.8	2.8	4.1	5.7
72	7.5	3.0	4.5	6.3
78	7.5	3.3	4.9	6.7
84	8.0	3.5	5.3	7.2
90	8.5	3.8	5.6	7.7
96	9.0	4.0	6.0	8.2

I.D. (IN.)	$\Delta = 11.25'$									I.D. (IN.)	$\Delta = 22.50'$								
	G (FT.)	THRUST (TONS)	EARTH			ROCK			G (FT.)		THRUST (TONS)	EARTH			ROCK				
			A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)				A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)		
4,6,8	0.4	1.0	1.0	1.5	0.1	1.0	1.0	0.1	4,6,8	0.8	2.0	1.5	1.5	0.1	1.0	1.0	0.1		
10,12	0.6	2.2	1.5	1.5	0.1	1.0	1.5	0.1	10,12	1.1	4.4	2.0	2.5	0.3	1.5	1.5	0.1		
16,18	0.8	5.0	2.0	2.5	0.3	1.5	2.0	0.2	16,18	1.6	9.9	3.0	3.5	0.6	2.0	2.5	0.3		
20	0.9	6.2	2.0	3.5	0.4	1.5	3.0	0.3	20	1.8	12.3	3.5	3.5	0.7	2.0	2.5	0.3		
24	1.1	8.9	3.0	3.5	0.5	1.5	3.0	0.3	24	2.2	17.7	4.0	4.5	1.0	3.0	3.5	0.5		
30	1.4	10.4	3.0	3.5	0.6	2.0	3.5	0.4	30	2.7	20.7	5.0	4.5	1.5	3.0	4.0	0.8		
36	1.7	15.0	3.5	4.5	0.9	2.0	4.0	0.5	36	3.3	29.8	5.5	5.5	2.3	4.0	4.0	1.3		
42	1.9	20.4	4.5	5.0	1.5	2.5	5.0	0.8	42	3.8	40.5	7.0	6.0	3.9	4.5	5.0	2.1		
48	2.2	26.6	4.5	6.0	2.0	2.5	6.0	1.1	48	4.4	52.9	8.0	7.0	5.7	4.5	6.0	2.8		
54	2.5	33.7	6.0	6.0	3.0	3.0	6.0	1.4	54	4.9	67.0	9.0	8.0	8.0	6.0	6.0	4.1		
60	2.7	41.6	6.0	7.0	3.8	3.0	7.0	1.8	60	5.5	82.7	9.5	9.0	10.6	6.0	7.0	5.3		
66	3.0	50.3	6.5	8.0	5.1	3.5	8.0	2.7	66	6.0	100.1	10.5	10.0	14.1	6.5	8.0	7.2		
72	3.3	59.9	7.5	8.0	6.3	4.0	8.0	3.3	72	6.6	119.1	11.0	11.0	17.6	7.5	8.0	9.1		
78	3.6	70.2	8.0	9.0	8.1	4.0	9.0	3.9	78	7.1	139.8	12.0	12.0	22.5	8.0	9.0	11.7		
84	3.8	81.5	8.5	10.0	10.3	4.5	10.0	5.3	84	7.6	162.1	13.0	12.5	27.2	8.5	10.0	14.8		
90	4.1	93.5	9.5	10.0	12.2	5.0	10.0	6.3	90	8.2	186.1	14.0	13.5	33.7	9.5	10.0	17.7		
96	4.4	106.4	10.0	11.0	15.0	5.0	11.0	7.4	96	8.7	211.7	15.0	14.5	41.2	10.0	11.0	21.8		

TABLES OF DIMENSIONS AND QUANTITIES

HORIZONTAL THRUST BLOCK

AT PIPE BEND

STANDARD SPECIFICATION REFERENCE

DATE
NOV. '96

STANDARD DRAWING NO.
4010B

$\Delta = 30^\circ$										$\Delta = 45^\circ$									
I.D. (IN.)	G (FT.)	THRUST (TONS)	EARTH			ROCK			I.D. (IN.)	G (FT.)	THRUST (TONS)	EARTH			ROCK				
			A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)				A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)		
4,6,8	1.0	2.6	2.0	1.5	0.2	1.0	1.5	0.1	4,6,8	1.5	3.9	2.0	2.0	0.2	1.5	1.5	0.1		
10,12	1.5	5.9	2.5	2.5	0.3	2.0	1.5	0.2	10,12	2.2	8.7	3.5	2.5	0.5	2.0	2.5	0.3		
16,18	2.2	13.2	3.5	4.0	0.8	2.5	3.0	0.4	16,18	3.2	19.5	4.5	4.5	1.2	3.0	3.5	0.6		
20	2.4	16.3	4.5	4.0	1.0	3.0	3.0	0.5	20	3.6	24.1	5.5	4.5	1.5	3.5	3.5	0.7		
24	2.9	23.4	6.0	4.0	1.4	3.5	3.5	0.7	24	4.3	34.6	8.0	4.5	2.3	4.5	4.0	1.1		
30	3.6	27.5	6.5	5.0	1.9	3.5	4.0	0.9	30	5.4	40.6	8.5	5.0	3.2	5.5	4.0	1.6		
36	4.4	39.5	7.0	6.0	3.4	4.5	4.5	1.6	36	6.5	58.5	10.0	6.0	5.3	6.5	4.5	2.6		
42	5.1	53.8	8.0	7.0	5.1	5.5	5.0	2.5	42	7.5	79.6	11.5	7.0	8.1	8.0	5.0	4.2		
48	5.8	70.3	9.0	8.0	7.4	6.0	6.0	3.7	48	8.6	104.0	13.0	8.0	11.9	9.0	6.0	6.3		
54	6.5	89.0	10.0	9.0	10.3	7.0	6.5	5.3	54	9.7	131.5	15.0	9.0	17.1	10.5	6.5	8.9		
60	7.3	110.0	11.0	10.0	13.9	7.5	7.5	7.3	60	10.7	162.4	16.5	10.0	23.1	11.0	7.5	12.0		
66	8.0	132.9	12.5	11.0	18.9	8.5	8.0	9.6	66	11.8	196.5	18.0	11.0	30.1	12.0	8.5	16.2		
72	8.7	158.2	13.5	12.0	24.0	9.0	9.0	12.3	72	12.9	233.9	19.5	12.0	38.6	14.0	8.5	20.7		
78	9.4	185.6	14.5	13.0	30.0	10.0	9.5	15.6	78	13.9	274.5	21.5	13.0	49.8	14.5	9.5	25.9		
84	10.1	215.3	15.5	14.0	37.1	10.5	10.5	19.5	84	15.0	318.4	23.0	14.0	61.2	15.5	10.5	32.6		
90	10.9	247.1	16.5	15.0	45.0	11.5	11.0	23.9	90	16.1	365.5	24.5	15.0	74.5	17.5	10.5	39.6		
96	11.6	281.2	18.0	16.0	55.5	12.5	11.5	28.9	96	17.1	415.6	26.0	16.0	89.5	18.5	11.5	48.5		

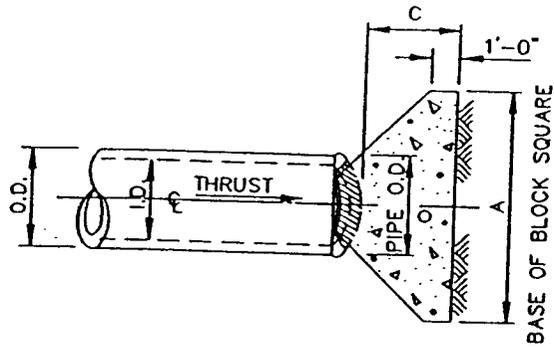
$\Delta = 67.50^\circ$										$\Delta = 90^\circ$									
I.D. (IN.)	G (FT.)	THRUST (TONS)	EARTH			ROCK			I.D. (IN.)	G (FT.)	THRUST (TONS)	EARTH			ROCK				
			A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)				A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)		
4,6,8	2.1	5.6	3.0	2.0	0.3	2.0	1.5	0.2	4,6,8	2.7	7.1	5.0	1.5	0.4	2.0	2.0	0.2		
10,12	3.1	12.6	5.5	2.5	0.8	3.5	2.0	0.4	10,12	4.0	16.0	6.5	2.5	1.0	3.5	2.5	0.5		
16,18	4.7	28.3	7.5	4.0	1.9	5.5	3.0	0.9	16,18	6.0	36.0	9.0	4.0	2.4	4.5	4.0	1.0		
20	5.2	34.9	9.0	4.0	2.3	5.5	3.5	1.2	20	6.6	44.4	10.0	4.5	3.1	6.0	4.0	1.5		
24	6.2	50.3	11.5	4.5	3.5	6.5	4.0	1.6	24	7.9	64.0	14.5	4.5	5.0	8.0	4.0	2.1		
30	7.8	58.9	12.0	5.0	4.8	7.5	4.0	2.2	30	9.9	75.0	15.0	5.0	6.7	10.0	4.0	3.3		
36	9.4	84.9	14.5	6.0	8.2	9.5	4.5	3.8	36	11.9	108.0	18.0	6.0	11.4	12.0	4.5	5.3		
42	10.9	115.5	17.0	7.0	12.8	11.0	5.5	6.3	42	13.9	147.0	21.0	7.0	17.8	14.0	5.5	8.7		
48	12.5	150.9	19.0	8.0	18.4	13.0	6.0	9.2	48	15.9	192.0	24.0	8.0	26.2	16.0	6.0	12.4		
54	14.0	191.0	21.5	9.0	26.0	15.0	6.5	12.9	54	17.9	243.0	27.0	9.0	36.9	18.0	7.0	18.1		
60	15.6	235.8	24.0	10.0	35.6	16.0	7.5	17.6	60	19.9	299.8	30.0	10.0	50.3	20.0	7.5	24.0		
66	17.1	285.3	26.0	11.0	46.0	18.0	8.0	23.0	66	21.8	362.8	33.0	11.0	66.2	22.0	8.5	32.5		
72	18.7	339.5	28.5	12.0	57.8	19.0	9.0	28.4	72	23.8	431.8	36.0	12.0	85.6	24.0	9.0	41.0		
78	20.2	398.5	31.0	13.0	75.7	21.0	9.5	37.4	78	25.7	506.7	39.0	13.0	108.2	26.0	10.0	53.2		
84	21.8	462.1	33.5	14.0	94.7	22.0	10.5	46.5	84	27.7	587.7	42.0	14.0	134.4	28.0	10.5	64.8		
90	23.3	530.5	35.5	15.0	114.4	24.5	11.0	58.2	90	29.0	674.6	45.0	15.0	164.9	30.0	11.5	81.2		
96	24.9	603.6	38.0	16.0	138.9	25.5	12.0	70.0	96	31.6	767.5	48.0	16.0	199.0	32.0	12.0	95.1		

TABLES OF DIMENSIONS AND QUANTITIES

HORIZONTAL THRUST BLOCK
AT PIPE BEND

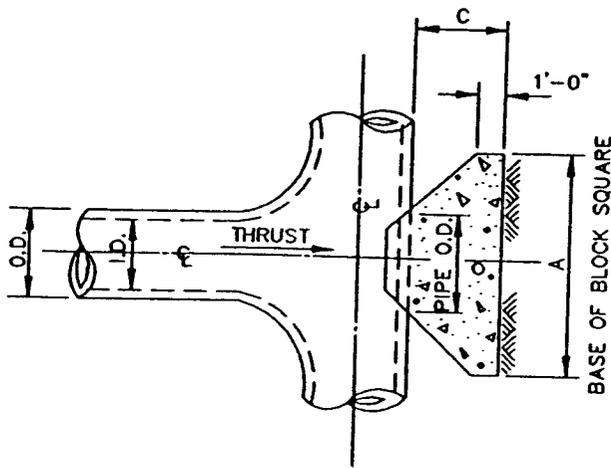
STANDARD SPECIFICATION REFERENCE

DATE
NOV. '96. STANDARD DRAWING NO.
4010C



PLAN OF PLUG THRUST BLOCK

N.T.S.



REFER TO
STD. DWG. No. 4040
FOR GENERAL NOTES.

PLAN OF TEE THRUST BLOCK

N.T.S.

I.D. (IN.)	THRUST (TONS)	C (FT.)	EARTH		ROCK	
			A (FT.)	VOL. (C.Y.)	A (FT.)	VOL. (C.Y.)
4,6,8	5.1	1.5	2.5	0.3	2.0	0.2
10,12	11.3	1.5	3.5	0.6	2.5	0.3
16,18	25.5	2.0	5.5	1.6	4.0	0.9
20	31.5	2.0	6.0	1.9	4.0	0.9
24	45.2	2.5	7.0	3.1	5.0	1.7
30	53.0	3.0	7.5	4.1	5.5	2.4
36	76.3	4.0	9.0	7.3	6.5	4.2
42	104.0	4.5	10.5	11.0	7.5	6.2
48	136.0	5.0	12.0	15.6	8.5	8.7
54	172.0	5.5	13.5	21.4	9.5	11.9
60	212.0	6.0	15.0	28.4	10.5	15.7
66	257.0	6.5	16.5	36.8	11.5	20.5
72	305.0	7.5	17.5	47.2	12.5	27.2
78	358.0	8.0	19.0	58.9	13.5	33.7
84	416.0	8.5	20.5	72.3	14.5	41.2
90	477.0	9.0	22.0	87.7	15.5	49.7
96	543.0	9.5	23.5	104.8	16.5	61.0

HORIZONTAL THRUST BLOCK

AT TEES AND PLUGS

STANDARD SPECIFICATION REFERENCE

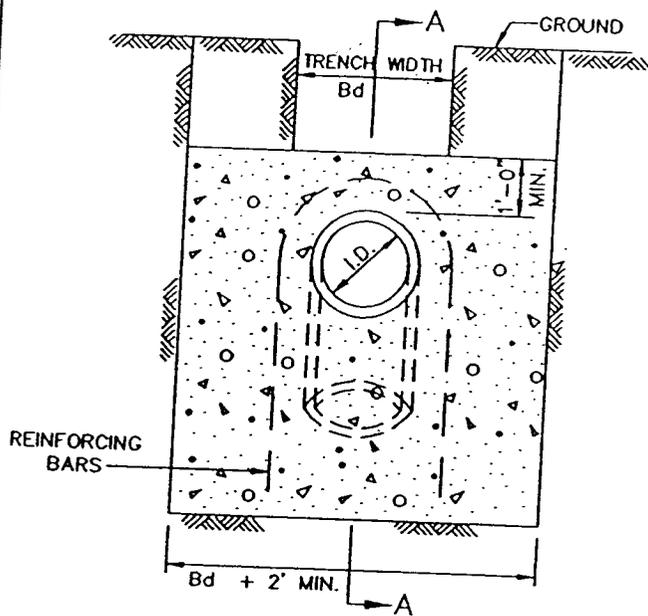
6.7.

DATE

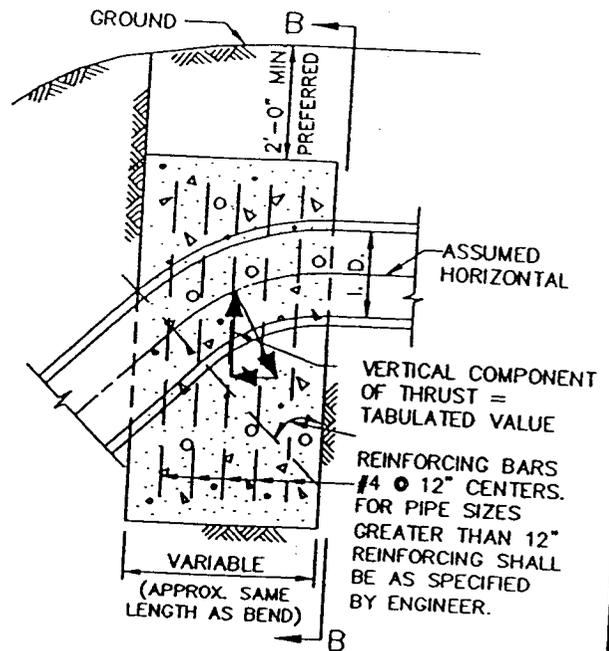
NOV. '96

STANDARD DRAWING NO.

4020



ELEVATION "B-B"
N.T.S.



SECTION "A-A"
N.T.S.

Δ →	11.25°		22.50°		30°		45°		67.50°		90°		← Δ
I.D. (IN.)	THRUST (TONS)	VOL. (C.Y.)	I.D. (IN.)										
4,6,8	1.0	0.5	2.0	1.0	2.5	1.3	3.6	1.8	4.6	2.3	5.0	2.5	4,6,8
10,12	2.2	1.1	4.3	2.2	5.7	2.8	8.0	4.0	10.5	5.2	11.3	5.7	10,12
16,18	5.0	2.5	9.7	4.9	12.7	6.4	18.0	9.0	23.5	11.8	25.5	12.7	16,18
20	6.1	3.1	12.0	6.0	15.7	7.9	22.2	11.1	29.2	14.5	31.4	15.7	20
24	8.2	4.4	17.3	8.7	22.6	11.3	32.0	16.0	41.8	20.9	45.2	22.6	24
30	10.5	5.2	20.3	10.1	26.5	13.3	37.5	18.8	49.0	24.5	53.1	26.5	30
36	14.9	7.5	29.2	14.6	38.2	19.1	54.0	27.0	70.5	35.3	76.4	38.2	36
42	20.3	10.1	39.8	19.9	52.0	26.0	73.5	36.7	96.0	48.0	104.0	52.0	42
48	26.5	13.2	51.9	26.0	67.9	33.9	96.0	48.0	126.0	62.7	136.0	67.9	48
54	33.5	16.8	65.7	32.9	85.9	42.9	122.0	60.7	159.0	79.4	172.0	85.9	54
60	41.4	20.7	81.2	40.6	106.0	53.0	150.0	75.0	196.0	98.0	212.0	106.0	60
66	50.1	25.0	98.2	49.1	128.0	64.2	182.0	90.7	237.0	119.0	257.0	128.0	66
72	59.6	29.8	117.0	58.4	153.0	76.3	216.0	108.0	282.0	141.0	305.0	153.0	72
78	69.9	35.0	137.0	68.6	179.0	90.0	254.0	127.0	331.0	166.0	358.0	179.0	78
84	81.1	40.5	159.0	79.5	208.0	104.0	294.0	147.0	384.0	192.0	416.0	208.0	84
90	93.1	46.5	183.0	91.3	239.0	119.0	337.0	169.0	441.0	221.0	477.0	239.0	90
96	106.0	53.0	208.0	104.0	272.0	136.0	384.0	192.0	502.0	251.0	543.0	272.0	96

VERTICAL THRUST BLOCK

AT PIPE BEND

STANDARD SPECIFICATION REFERENCE

6.7.

DATE

NOV. '96

STANDARD DRAWING NO.

4030

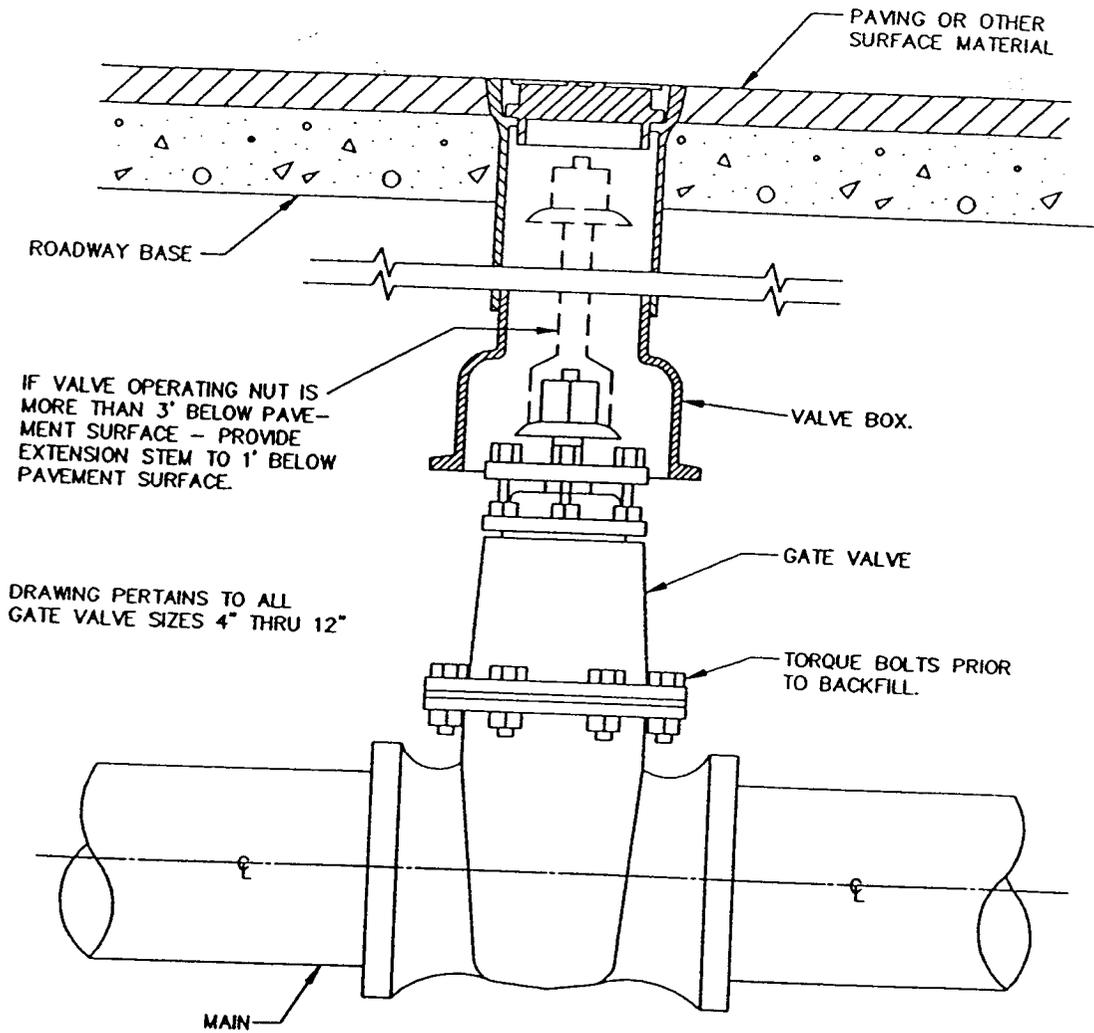
GENERAL NOTES FOR ALL THRUST BLOCKS:

1. CONCRETE FOR BLOCKING SHALL BE CLASS "B".
2. ALL CALCULATIONS ARE BASED ON INTERNAL PRESSURE OF 200 PSI FOR DUCTILE IRON, P.V.C., AND 150 PSI FOR CONCRETE PIPE.
3. VOLUMES OF THRUST BLOCKS ARE NET VOLUMES OF CONCRETE TO BE FURNISHED. THE CORRESPONDING WEIGHT OF THE CONCRETE (CLASS "B") IS EQUAL TO OR GREATER THAN THE VERTICAL COMPONENT OF THE THRUST ON THE VERTICAL BEND.
4. WALL THICKNESS (T) ASSUMED HERE FOR ESTIMATING PURPOSES ONLY.
5. POUR CONCRETE FOR BLOCK AGAINST UNDISTURBED EARTH.
6. DIMENSIONS MAY BE VARIED AS REQUIRED BY FIELD CONDITIONS WHERE AND AS DIRECTED BY THE ENGINEER. THE VOLUME OF CONCRETE BLOCKING SHALL NOT BE LESS THAN SHOWN HERE.
7. THE SOIL BEARING PRESSURES ARE BASED ON 1000 LBS./S.F. IN SOIL AND 2000 LBS./S.F. IN ROCK.
8. USE POLYETHYLENE WRAP OR EQUAL BETWEEN CONCRETE AND BEND, TEE, OR PLUG TO PREVENT THE CONCRETE FROM STICKING TO IT.
9. CONCRETE SHALL NOT EXTEND BEYOND JOINTS.

THRUST BLOCK		STANDARD SPECIFICATION REFERENCE 6.7.
GENERAL NOTES		DATE NOV. '96
		STANDARD DRAWING NO. 4040

NOTE:

IN UNPAVED AREAS, INSTALL 2' x 2' x 6" CONCRETE VALVE PAD FLUSH WITH THE TOP OF VALVE BOX. REINFORCE WITH #3 BARS ON 6" CENTERS BOTH WAYS.



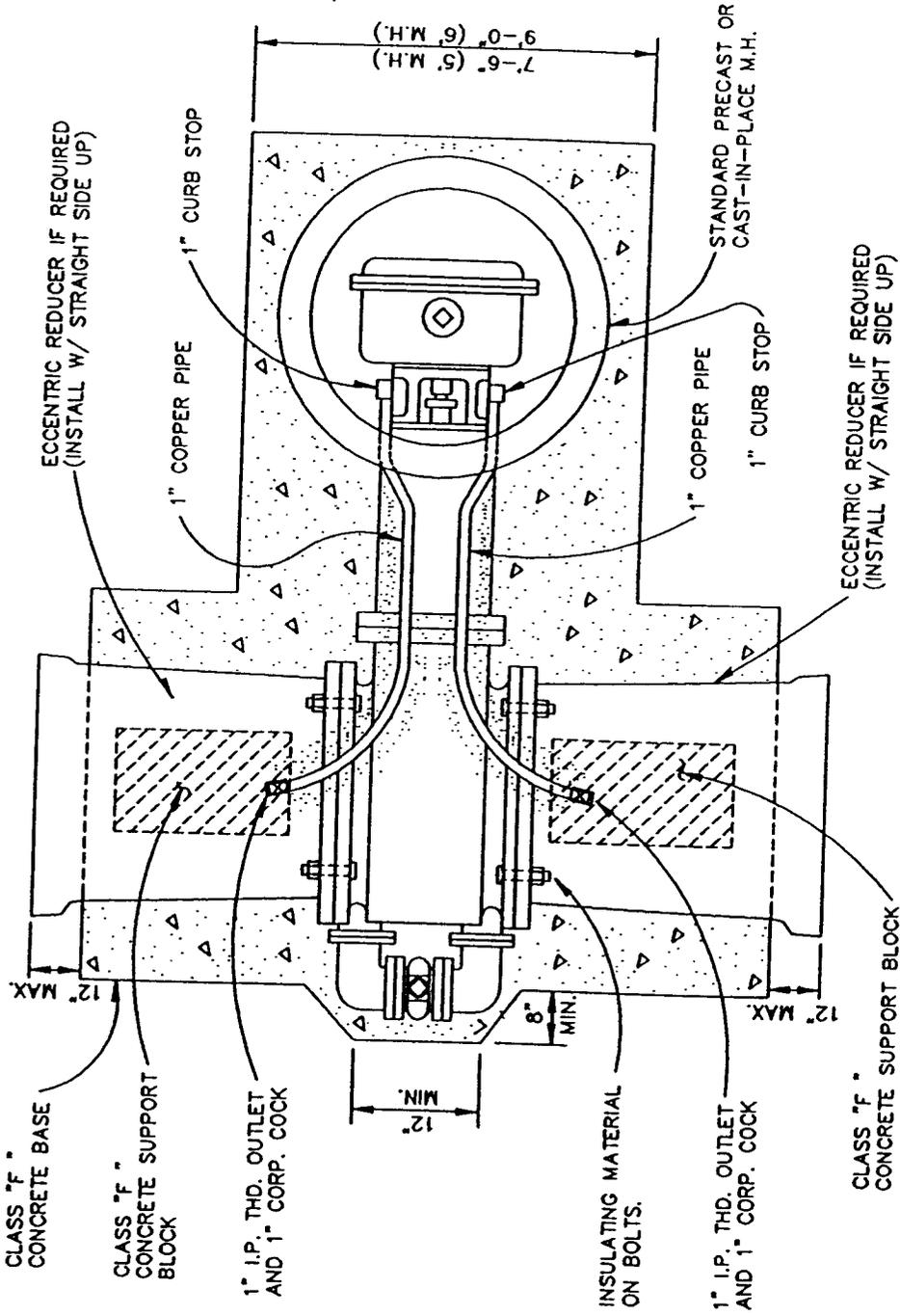
IF VALVE OPERATING NUT IS MORE THAN 3" BELOW PAVEMENT SURFACE - PROVIDE EXTENSION STEM TO 1" BELOW PAVEMENT SURFACE.

DRAWING PERTAINS TO ALL GATE VALVE SIZES 4" THRU 12"

**GATE VALVE BOX AND
EXTENSION STEM**

N.T.S.

GATE VALVE 4" TO 12" BOX & EXTENSION STEM		STANDARD SPECIFICATION REFERENCE	
		6.7.	
		DATE	STANDARD DRAWING NO.
		NOV. '96	4050



PLAN
N.T.S.

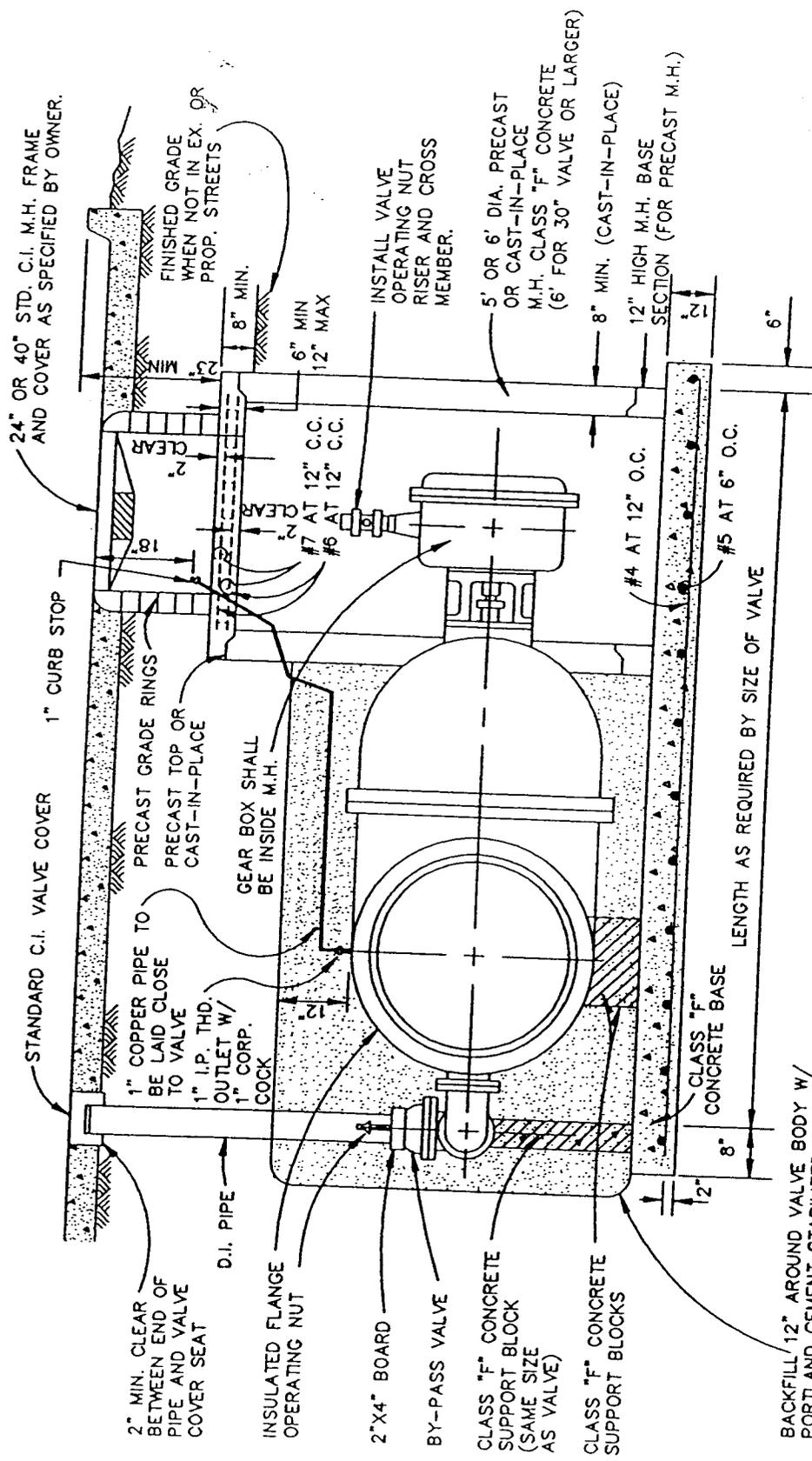
VAULT CONSTRUCTION

HORIZONTAL GATE VALVE $\geq 16"$

STANDARD SPECIFICATION REFERENCE
7.4.

DATE NOV. '96
STANDARD DRAWING NO. 4060A

STANDARD DRAWING NO. 4060A



PROFILE
N.T.S.

BACKFILL 12" AROUND VALVE BODY W/
PORTLAND CEMENT STABILIZED SAND
2 SACKS PER CUBIC YARD.

24" OR 40" STD. C.I. M.H. FRAME
AND COVER AS SPECIFIED BY OWNER.

FINISHED GRADE
WHEN NOT IN EX. OR
PROP. STREETS

INSTALL VALVE
OPERATING NUT
RISER AND CROSS
MEMBER.

5' OR 6' DIA. PRECAST
OR CAST-IN-PLACE
M.H. CLASS "F" CONCRETE
(6' FOR 30" VALVE OR LARGER)

8" MIN. (CAST-IN-PLACE)
12" HIGH M.H. BASE
SECTION (FOR PRECAST M.H.)

1" CURB STOP

PRECAST GRADE RINGS
PRECAST TOP OR
CAST-IN-PLACE

GEAR BOX SHALL
BE INSIDE M.H.

#7 AT 12" C.C.
#6 AT 12" C.C.

#4 AT 12" O.C.

#5 AT 6" O.C.

LENGTH AS REQUIRED BY SIZE OF VALVE

STANDARD C.I. VALVE COVER

1" COPPER PIPE TO
BE LAID CLOSE
TO VALVE

1" I.P. THD.
OUTLET W/
1" CORP.
COCK

INSULATED FLANGE
OPERATING NUT

2"X4" BOARD

BY-PASS VALVE

CLASS "F" CONCRETE
SUPPORT BLOCK
(SAME SIZE
AS VALVE)

CLASS "F" CONCRETE
SUPPORT BLOCKS

CLASS "F"
CONCRETE BASE

2" MIN. CLEAR
BETWEEN END OF
PIPE AND VALVE
COVER SEAT

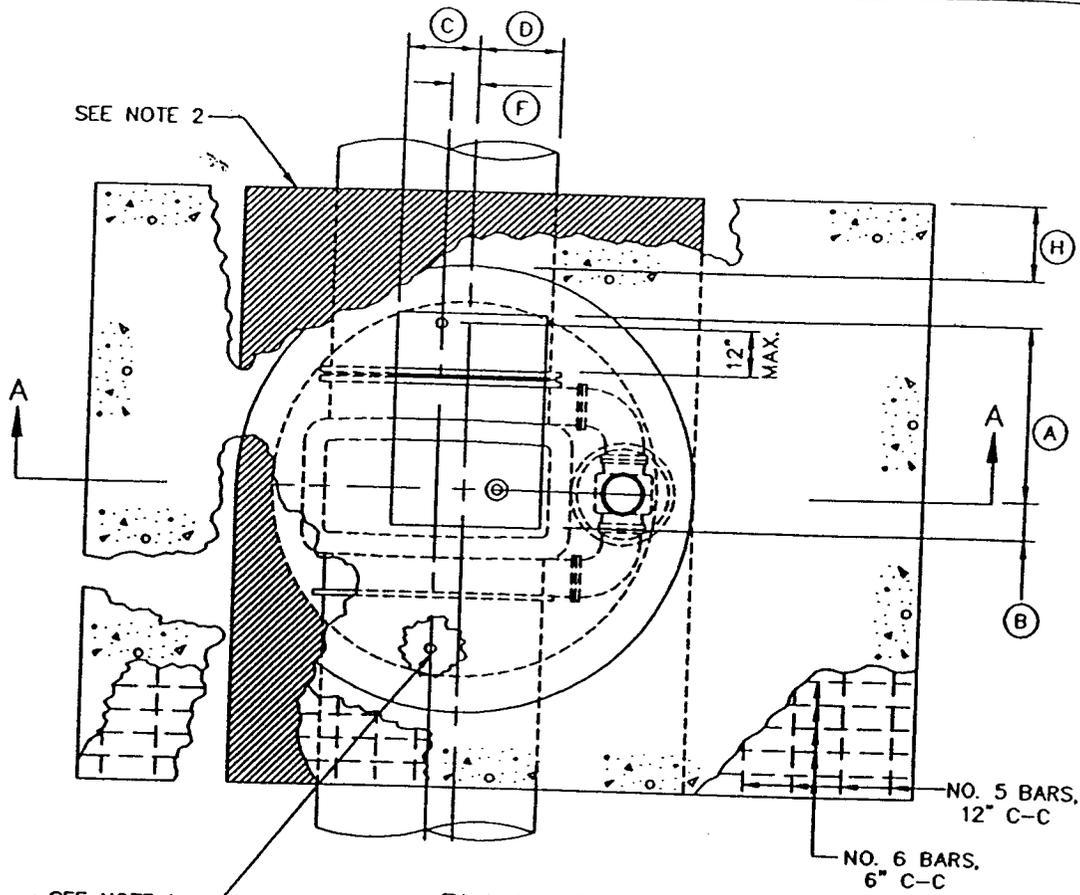
D.I. PIPE

STANDARD DRAWING NO.
4060B

VAULT CONSTRUCTION
HORIZONTAL GATE VALVE \cong 16"

STANDARD SPECIFICATION REFERENCE
7.4.

DATE
NOV. '96
STANDARD DRAWING NO.
4060B



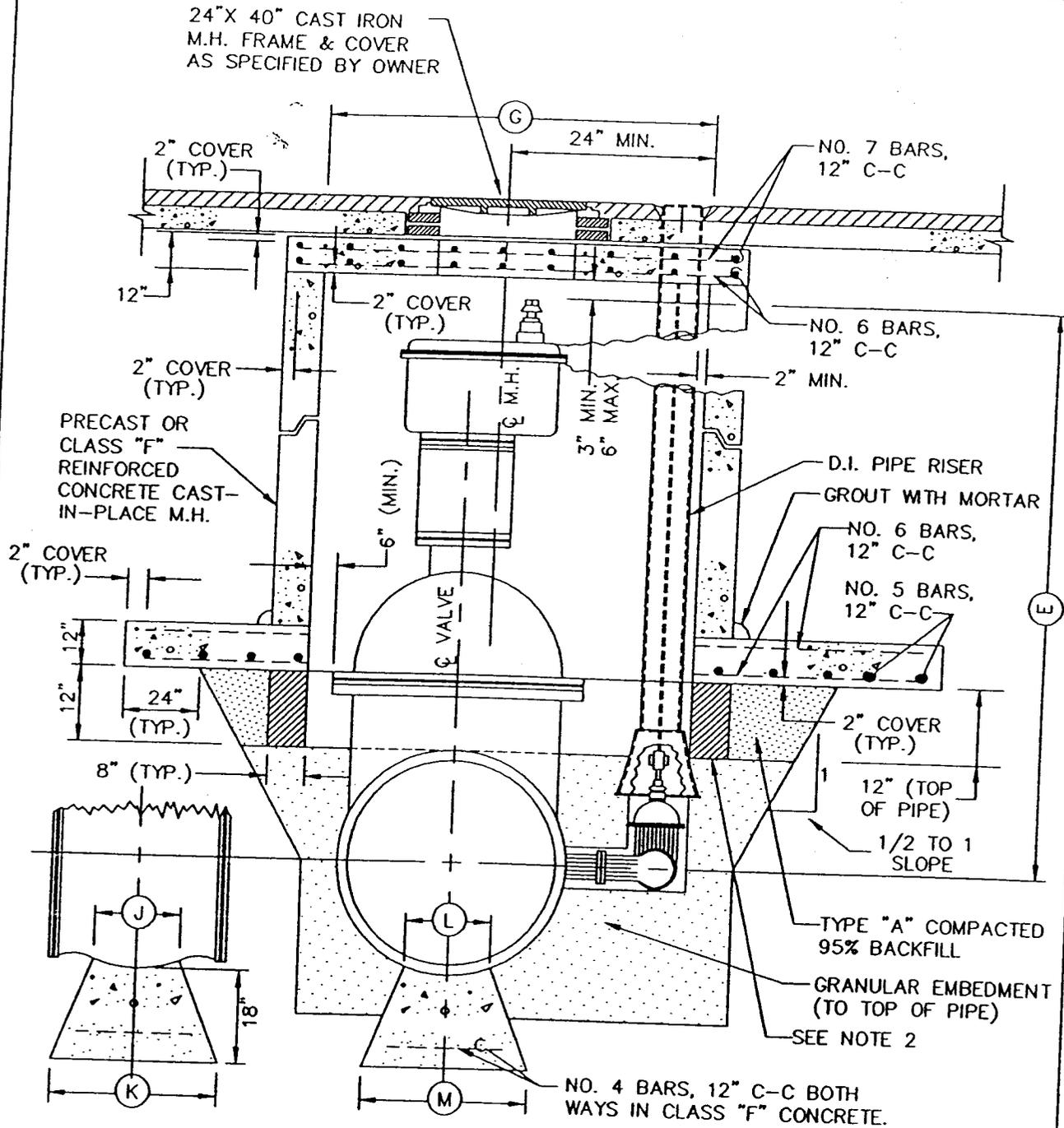
SEE NOTE 1
PLAN VIEW
 (LESS MANHOLE FRAME & COVER INSTALLATION)
 N.T.S.

GATE VALVE SIZE	DIMENSION TABLE												
	A	B	C	D	E	F	G	H	J	K	L	M	
16"	20"	20"	12"	12"	44 1/2"	1"	48"	12"	10"	24"	12"	16"	
18"	20"	20"	12"	12"	51 3/8"	2"	48"	12"	12"	24"	12"	18"	
20"	22"	18"	12"	12"	56 5/8"	1"	54"	12"	12"	24"	16"	20"	
24"	26"	14"	12"	12"	64 3/8"	1"	60"	18"	14"	30"	18"	24"	
30"	28"	12"	12"	12"	80 5/8"	3"	66"	18"	18"	30"	20"	30"	
36"	32"	8"	12"	12"	90 1/16"	4"	72"	18"	18"	36"	24"	36"	
42"	34"	6"	15"	9"	107 3/4"	5"	78"	24"	20"	36"	30"	42"	
48"	36"	4"	14"	10"	121 5/8"	4"	90"	24"	26"	42"	36"	48"	
54"	36"	4"	9"	15"	142 1/2"	3"	102"	24"	32"	46"	40"	54"	

NOTES:

1. PROVIDE CORPORATION AND CURB STOPS A MAXIMUM OF 12" FROM EACH END OF GATE VALVE, AS SHOWN. CORPORATION AND CURB STOP SIZES SHALL BE 1" FOR 16", 20", AND 24" NOMINAL PIPE DIAMETERS; 2" FOR 30" AND LARGER DIAMETERS. 2" TAPS SHALL BE MADE AS A 2" FLANGED OUTLET WITH INSULATED ADAPTOR KIT. COPPER RISERS SHALL BE PROVIDED BETWEEN THE CORPORATION AND CURB STOPS. CURB STOPS SHALL BE INSTALLED AT AN ELEVATION 12" ABOVE THE TOP SURFACE OF VAULT BOTTOM SLAB.
2. POLYURETHANE CUSHION PAD.

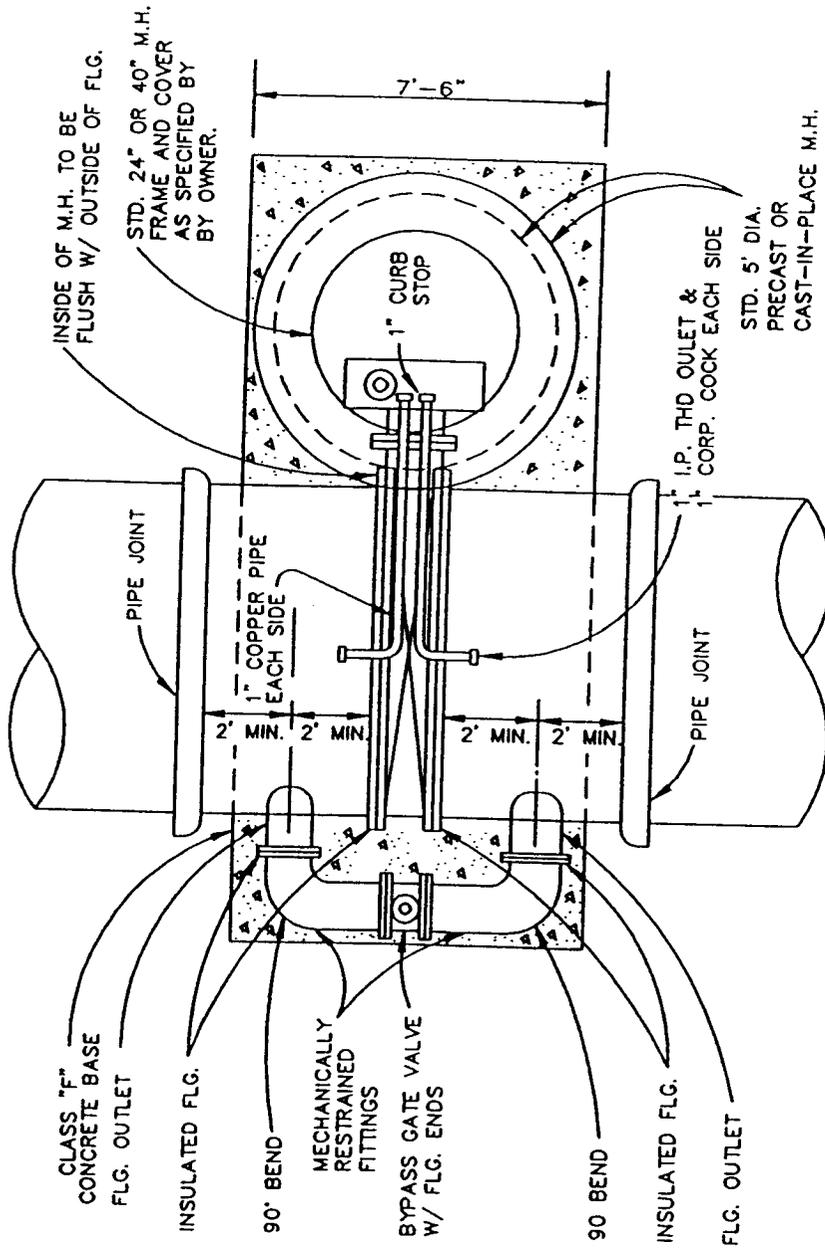
VAULT CONSTRUCTION VERTICAL GATE VALVE ≥ 16"	STANDARD SPECIFICATION REFERENCE
	7.4.
DATE	STANDARD DRAWING NO.
NOV. '96	4070A



SECTION "A-A"

REFER TO STD. DWG. 4070A FOR DIMENSION TABLE AND GENERAL NOTES.

VAULT CONSTRUCTION		STANDARD SPECIFICATION REFERENCE 7.4.	
VERTICAL GATE VALVE \cong 16"		DATE NOV. '96	STANDARD DRAWING NO. 4070B



PLAN
N.T.S.

VAULT CONSTRUCTION
BUTTERFLY VALVE \cong 48"

STANDARD SPECIFICATION REFERENCE
7.4.

DATE NOV. '96
STANDARD DRAWING NO. 4080A

STANDARD DRAWING NO.
4080A

24" OR 40" STD. C.I.
M.H. FRAME & COVER
AS SPECIFIED BY OWNER

STANDARD C.I.
VALVE COVER

2" MIN. CLEAR BETWEEN
END OF PIPE AND VALVE
COVER SEAT.

PRECAST GRADE RINGS
CAST-IN-PLACE OR
PRECAST TOP

D.I. PIPE

#7 AT 12" C.C.

INSULATED FLG.

OPERATING NUT

2"x4" BOARD

BYPASS GATE
VALVE W/
FLG. ENDS

CLASS "F" CONCRETE
SUPPORT BLOCKS
(SAME SIZE AS
VALVE)

CLASS "F"
CONCRETE BASE

1" I.P. THD. OUTLET
W/ 1" CORP. COCK

12" HIGH M.H. BASE
SECTION (FOR PRE-
CAST M.H.)

2" CLEAR

1" CURB STOP
1" COPPER PIPE
TO BE LAID CLOSE
TO VALVE

VALVE
ACTUATOR

5' OR 6' DIA.
CAST-IN-PLACE
OR PRECAST M.H.
TO BE CLASS "F"
CONCRETE

8" MIN
(CAST-IN-PLACE)
#4 AT 12" C.C.
#5 AT 6" C.C.

FINISHED GRADE
WHEN NOT IN EX.
OR PROP. STREETS

#6 AT 12" C.C.

LENGTH AS REQUIRED BY SIZE OF VALVE

BACKFILL 12" AROUND VALVE
BODY W/ PORTLAND CEMENT
STABILIZED SAND 2 SACKS
PER CUBIC YARD.

PROFILE
N.T.S.

VAULT CONSTRUCTION
BUTTERFLY VALVE \cong 48"

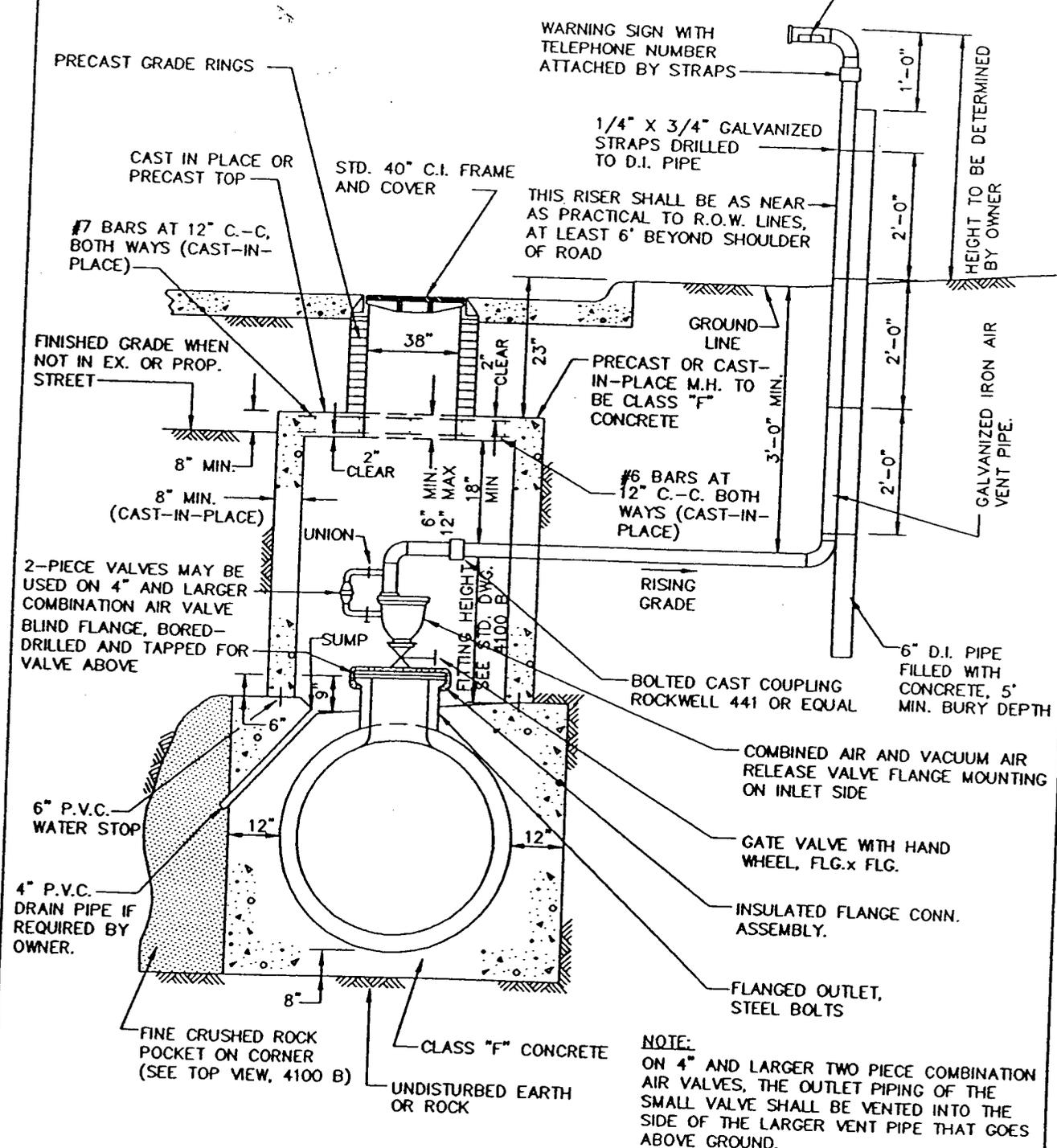
STANDARD SPECIFICATION REFERENCE
7.4.

DATE NOV. '96
STANDARD DRAWING NO. 4080B

STANDARD DRAWING NO.
4080B

NOTE:
 WHEN NOT IN PAVING OR WALK, A CONCRETE PAD REINFORCED W/ #3 BARS AT 12" C-C EACH WAY, SHALL EXTEND A MINIMUM OF 2' AROUND THE M.H. AND VENT PIPE, AND SHALL BE A MINIMUM OF 4" THICK.

SEE AIR VENT
 STD. DWG. NO. 4100B

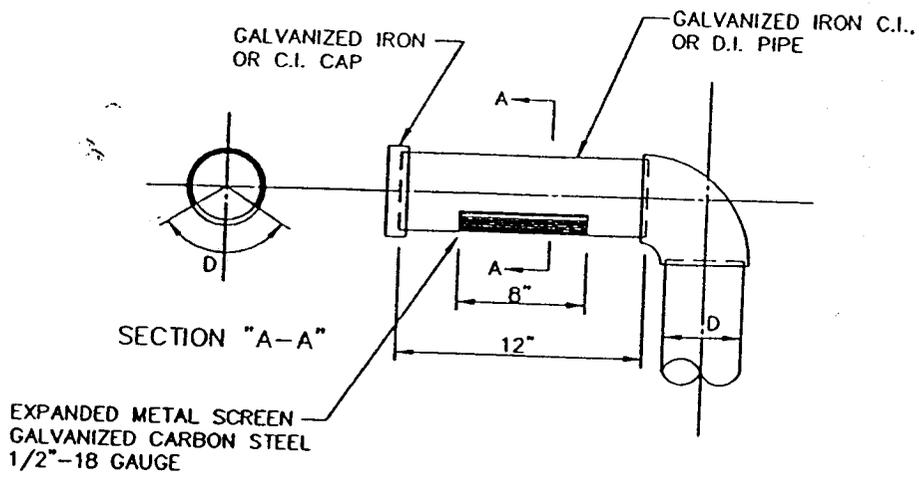


NOTE:
 ON 4" AND LARGER TWO PIECE COMBINATION AIR VALVES, THE OUTLET PIPING OF THE SMALL VALVE SHALL BE VENTED INTO THE SIDE OF THE LARGER VENT PIPE THAT GOES ABOVE GROUND.

TYPE "2" AIR VALVE
 N.T.S.

AIR RELEASE VALVE
TYPE "2"

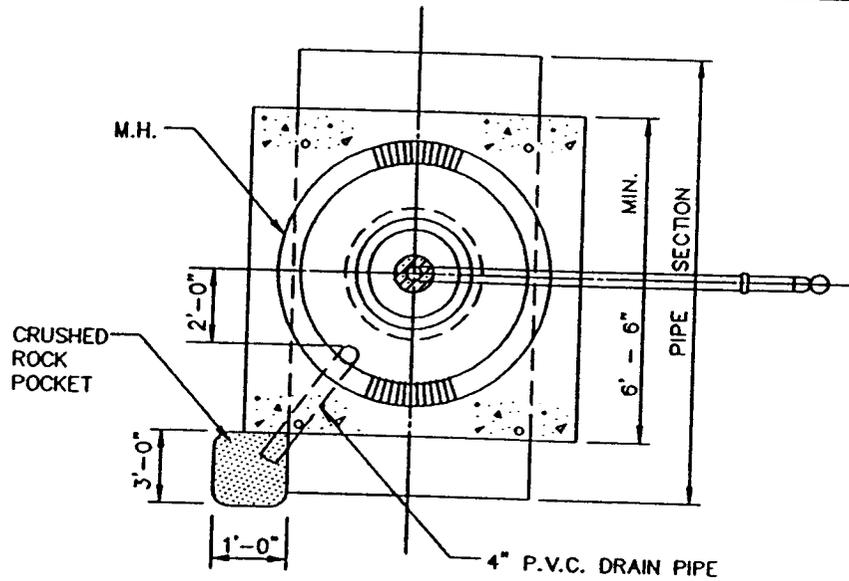
STANDARD SPECIFICATION REFERENCE	
6.7.	
DATE	STANDARD DRAWING NO.
NOV. '96	4100A



AIR VENT

N.T.S.

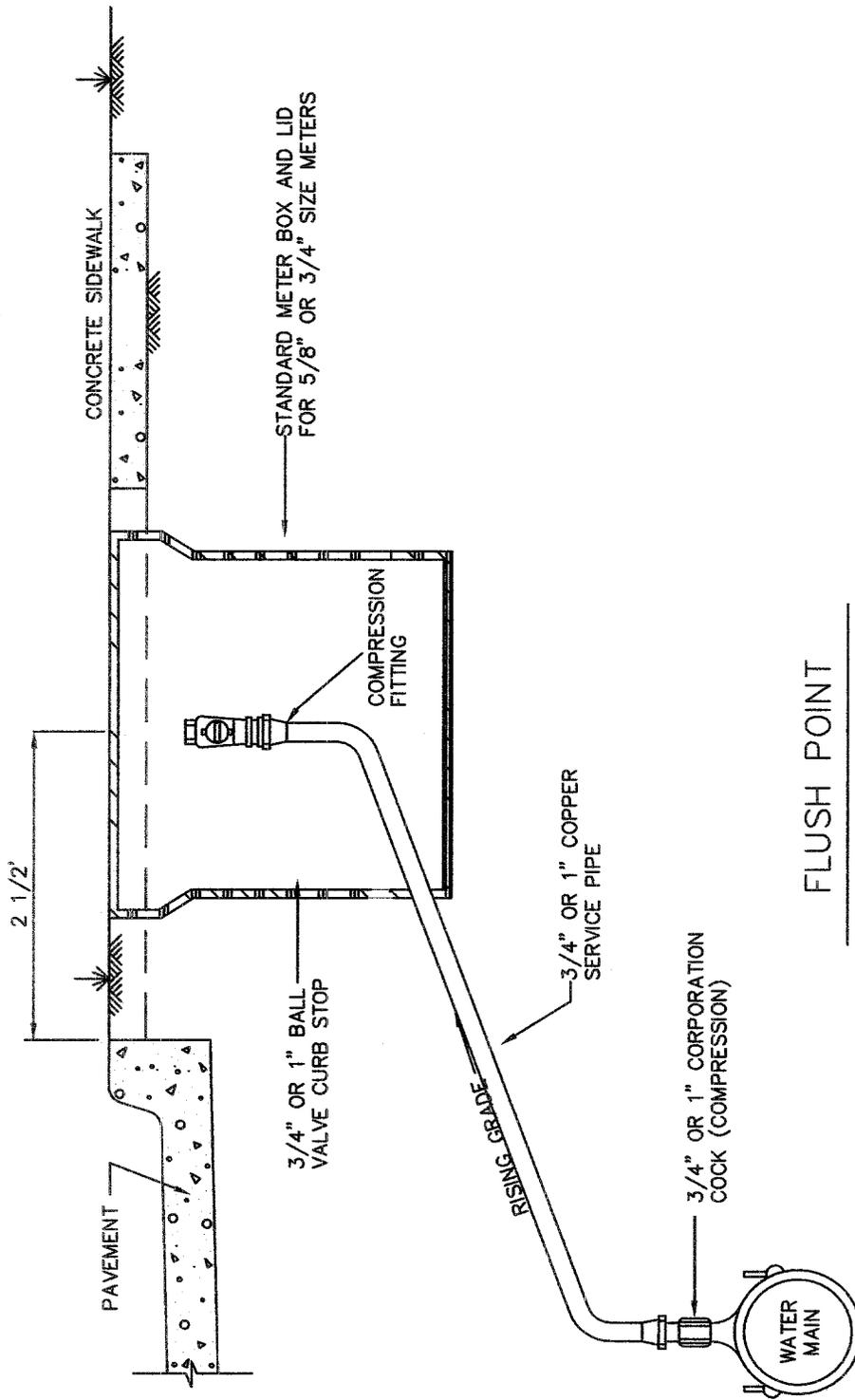
AIR VALVE	GATE VALVE	FLG. OUTLET	MIN. FITTING HEIGHT	VENT PIPE D	M.H. DIA.
2"	2"	8"	26"	2"	5'
3"	3"	18"	31"	3"	5'
4"	4"	18"	38"	4"	5'
6"	6"	18"	46"	6"	5'
8"	8"	18"	53"	8"	6'
10"	10"	20"	62"	10"	6'
12"	12"	24"	72"	12"	6'



PLAN VIEW

N.T.S.

AIR RELEASE VALVE TYPE "2"		STANDARD SPECIFICATION REFERENCE 6.7.	
		DATE NOV. '96	STANDARD DRAWING NO. 4100B



FLUSH POINT

(SIZE DESIGNATED ON PLANS)
N.T.S.

STANDARD DRAWING NO.
4110-R

FLUSH POINT INSTALLATION

TYPE "1"

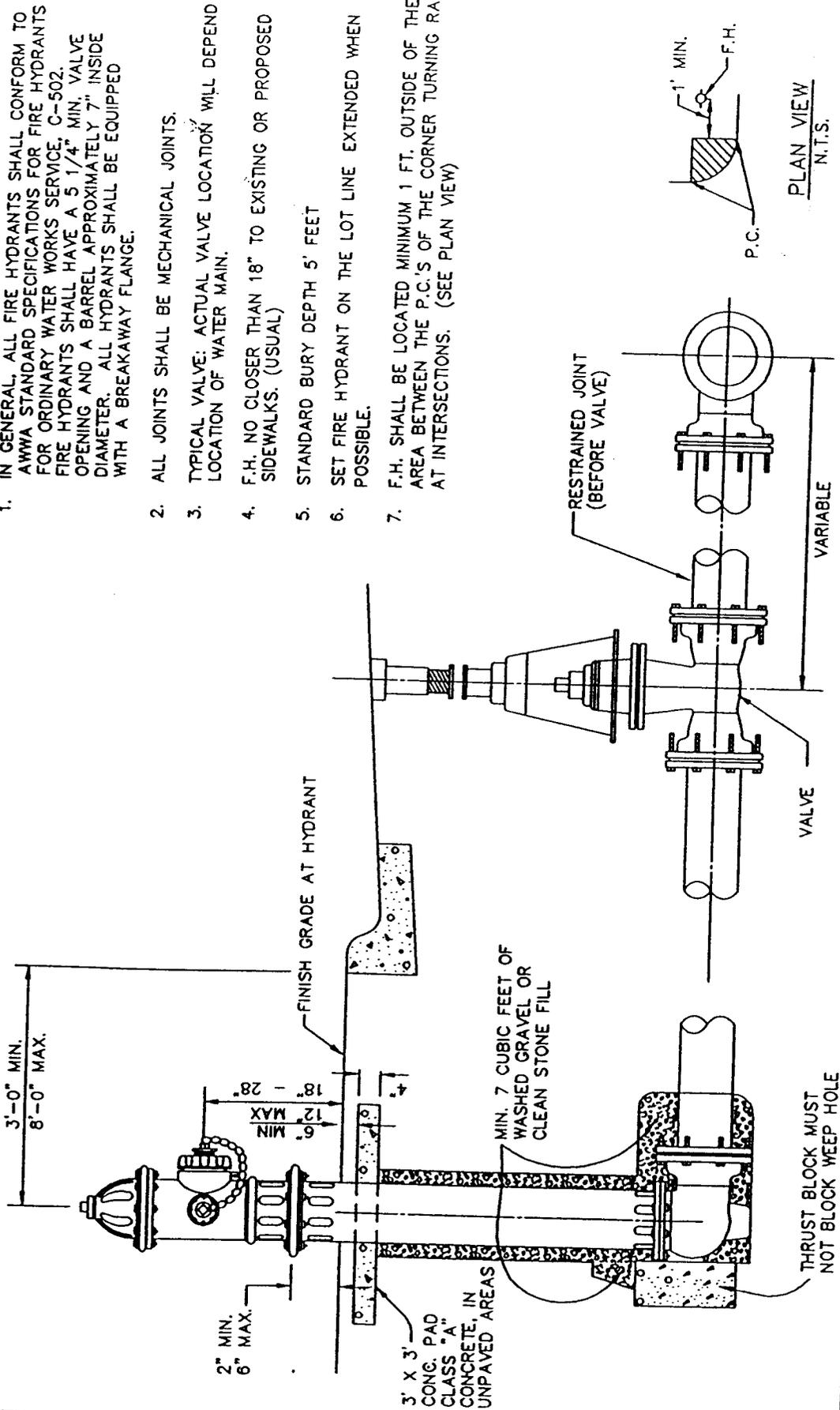
STANDARD SPECIFICATION REFERENCE
6.7.

DATE
MAR '05

STANDARD DRAWING NO.
4110-R

NOTES:

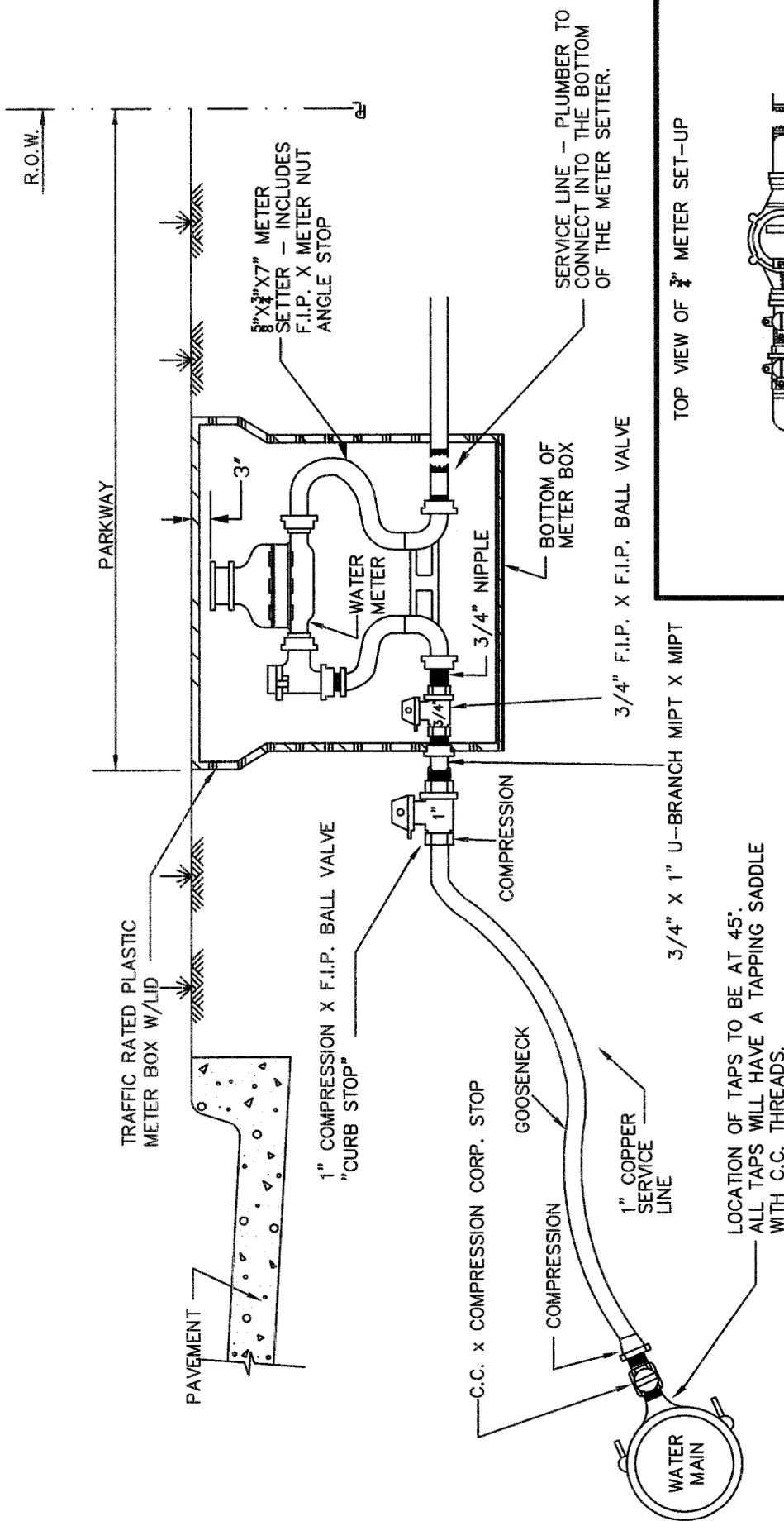
1. IN GENERAL, ALL FIRE HYDRANTS SHALL CONFORM TO AWWA STANDARD SPECIFICATIONS FOR FIRE HYDRANTS FOR ORDINARY WATER WORKS SERVICE, C-502. FIRE HYDRANTS SHALL HAVE A 5 1/4" MIN. VALVE OPENING AND A BARREL APPROXIMATELY 7" INSIDE DIAMETER. ALL HYDRANTS SHALL BE EQUIPPED WITH A BREAKAWAY FLANGE.
2. ALL JOINTS SHALL BE MECHANICAL JOINTS.
3. TYPICAL VALVE: ACTUAL VALVE LOCATION WILL DEPEND ON LOCATION OF WATER MAIN.
4. F.H. NO CLOSER THAN 18" TO EXISTING OR PROPOSED SIDEWALKS. (USUAL)
5. STANDARD BURY DEPTH 5' FEET
6. SET FIRE HYDRANT ON THE LOT LINE EXTENDED WHEN POSSIBLE.
7. F.H. SHALL BE LOCATED MINIMUM 1 FT. OUTSIDE OF THE AREA BETWEEN THE P.C.'S OF THE CORNER TURNING RADII AT INTERSECTIONS. (SEE PLAN VIEW)



**FIRE HYDRANT
INSTALLATION**

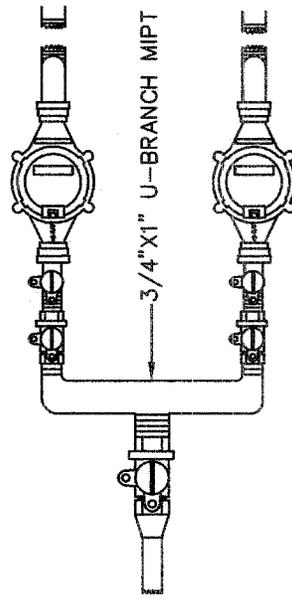
STANDARD SPECIFICATION REFERENCE 6.7.	
DATE NOV. '96	STANDARD DRAWING NO. 4120

STANDARD DRAWING NO.
4120



NOTE:
 LOCATION OF METER BOX WITHIN PARKWAY SHALL BE SPECIFIED BY OWNER. IF THE LOCATION INTERSECTS A SIDEWALK, METER BOX SHALL BE PLACED IN THE CENTER OF SIDEWALK.

TOP VIEW OF 3/4" METER SET-UP



WATER SERVICE INSTALLATION
 DUAL 3/4" METER SERVICE

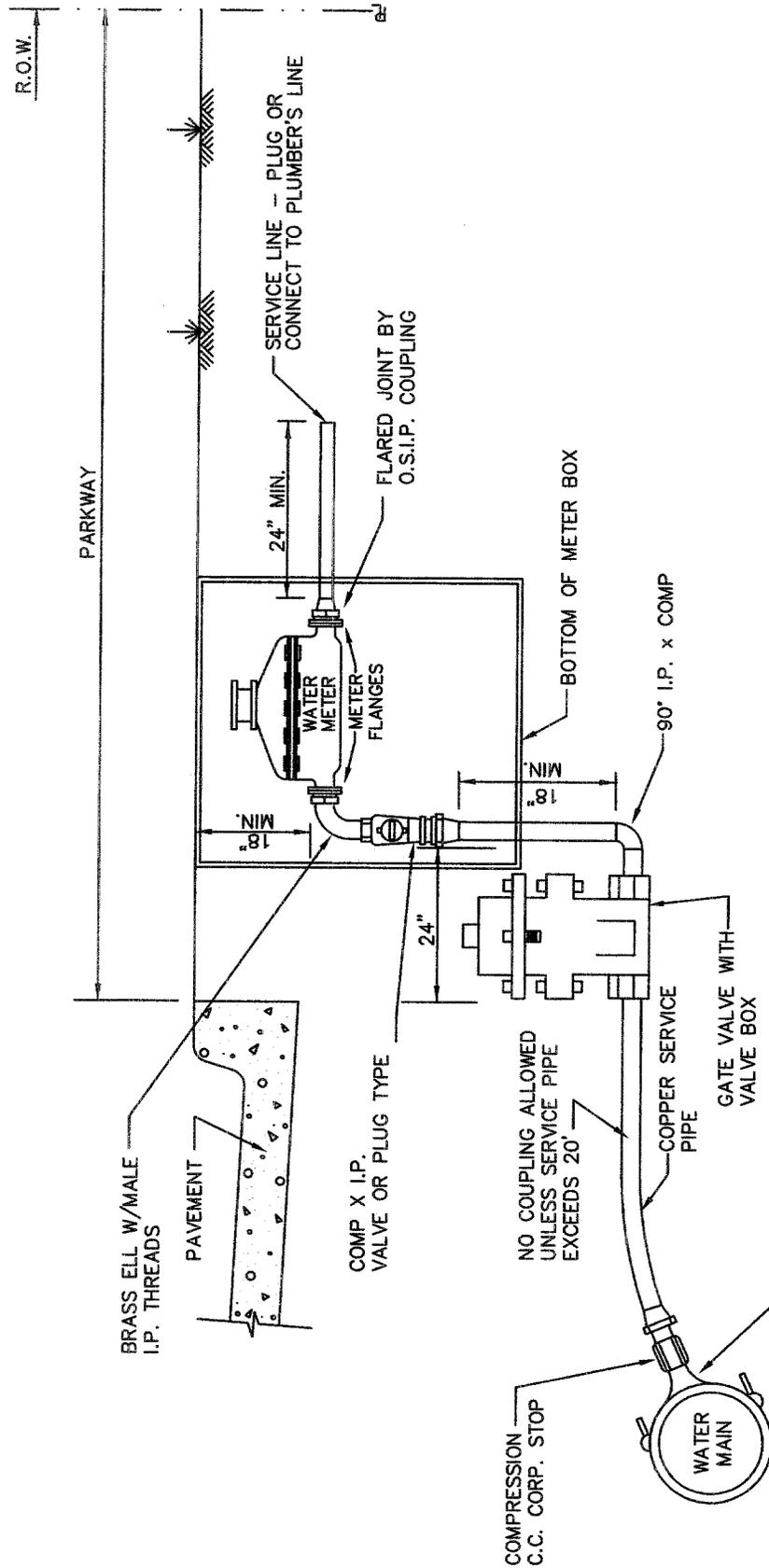
CITY OF
 AZLE

STANDARD SPECIFICATION REFERENCE
 6.7.

DATE
 MAR '05

STANDARD DRAWING NO.
 4130-R

STANDARD DRAWING NO.
 4130-R



NOTE:
 LOCATION OF METER BOX WITHIN THE AVAILABLE PARKWAY SHALL BE SPECIFIED BY OWNER. IF THE LOCATION INTERSECTS A SIDEWALK, METER BOX SHALL BE PLACED IN CENTER OF SIDEWALK.

LOCATION OF TAPS TO BE AT 45°. DIRECT TAPS TO BE MADE WITH A.W.W.A. TAPERED THREADS. TAPS USING TAPPING SADDLE TO BE MADE WITH IRON PIPE THREADS.

WATER SERVICE INSTALLATION

1 1/2" OR 2" LINE

STANDARD SPECIFICATION REFERENCE
 6.7.

DATE
 MAR '05

STANDARD DRAWING NO.
 4140-R

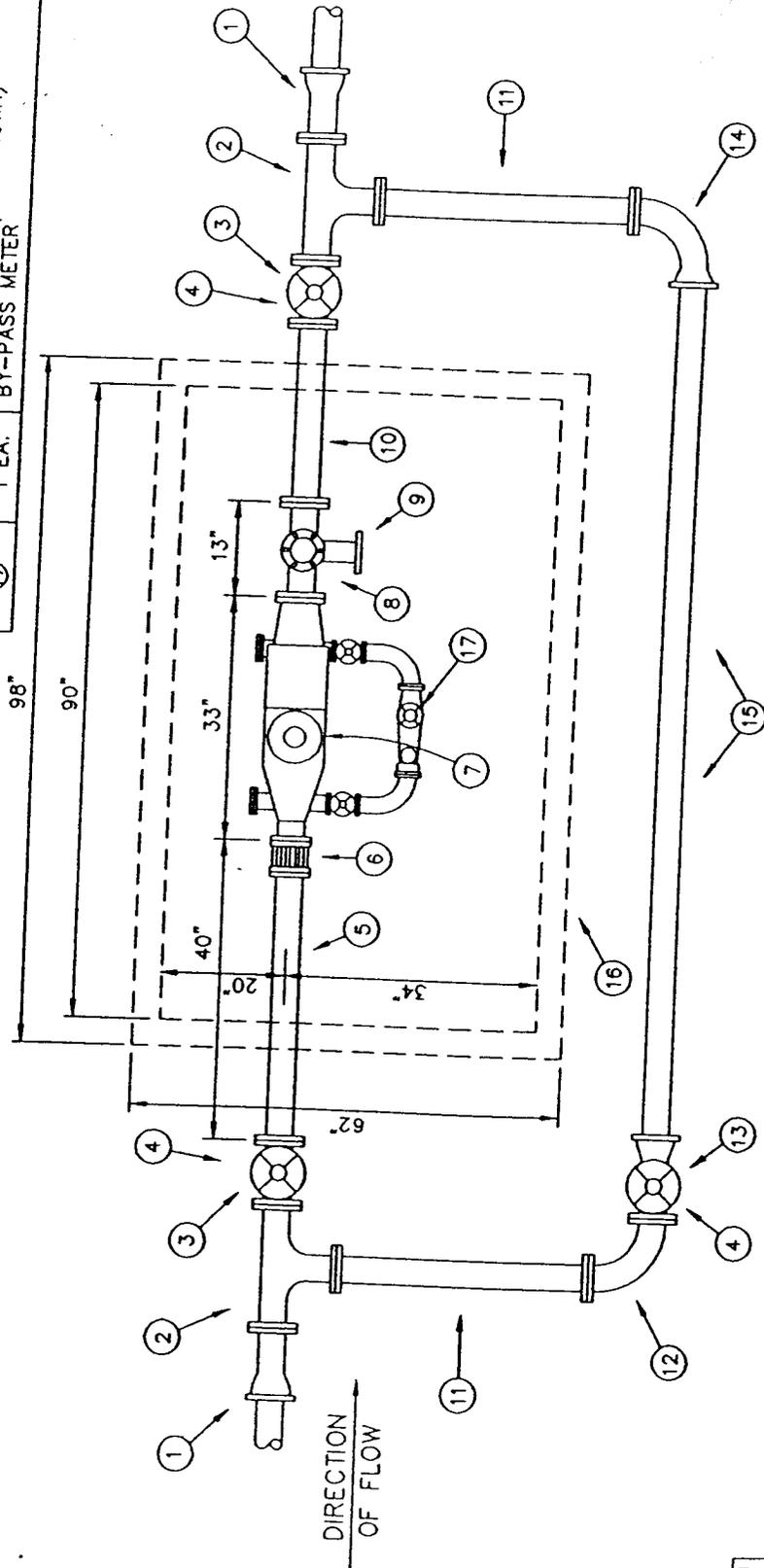
STANDARD DRAWING NO.
 4140-R

MATERIALS LIST

PART NO.	QUANTITY	DESCRIPTION
①	2 EA.	4" X 12" D.I. NIPPLE M.J. X F.
②	2 EA.	4" X 4" D.I. TEE F. X F.
③	2 EA.	4" GATE VALVE F. X F.
④	3 EA.	VALVE STACK RISER COVER & LID
⑤	1 EA.	4" X 40" D.I. NIPPLE F. X SLEEVE
⑥	1 EA.	4" FLANGED COUPLING ADAPTER
⑦	1 EA.	4" METER AS SPECIFIED (TYPE F.M. SHOWN)
⑧	1 EA.	4" X 4" D.I. TEE F. X F. (TEST POINT)
⑨	1 EA.	4" BLIND FLG.

MATERIALS LIST

PART NO.	QUANTITY	DESCRIPTION
⑩	1 EA.	4" X 24" D.I. NIPPLE F. X F.
⑪	2 EA.	4" X 36" D.I. NIPPLE F. X F.
⑫	1 EA.	4" D.I. 90° BEND F. X F.
⑬	1 EA.	4" GATE VALVE F. X F.
⑭	1 EA.	4" D.I. 90° BEND M.J. X F.
⑮	1 EA.	4" D.I. 90° BEND M.J. X F.
⑯	1 EA.	PRECAST METER VAULT
⑰	1 EA.	VAULT FLOOR (NOT SHOWN)
⑱	1 EA.	ACCESS HATCH (NOT SHOWN)
⑲	1 EA.	BY-PASS METER



4" COMBINED SERVICE
WITH 4" METER

STANDARD SPECIFICATION REFERENCE
6.7.

DATE NOV. '96
STANDARD DRAWING NO. 4150

STANDARD DRAWING NO.
4150



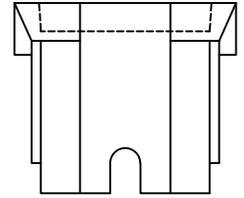
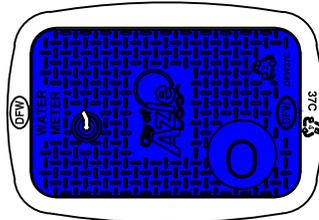
DFW PLASTICS, INC.

PO Box 648
Bedford, Texas 76095

Tel: 817.439.3600

Fax: 817.439.3700

www.dfwplasticsinc.com



DFW37C-12-3MKF AZLE

21x14x12 Black Polymer Box w/
Blue Polymer AMR Lid w/ Plastic Lock & Knockout

Page 1 of 2

This product is designed to withstand loading in non-deliberate and incidental traffic. Not to be installed in roadway. Meter box lid shall be BLUE and constructed out of modified polyethylene material for maximum durability and corrosion resistance. The BLUE material is for maximum UV protection. The BLUE material shall be uniform throughout the meter box lid for maximum longevity and **not have** a foaming agent that creates air pockets within the polymer lid.

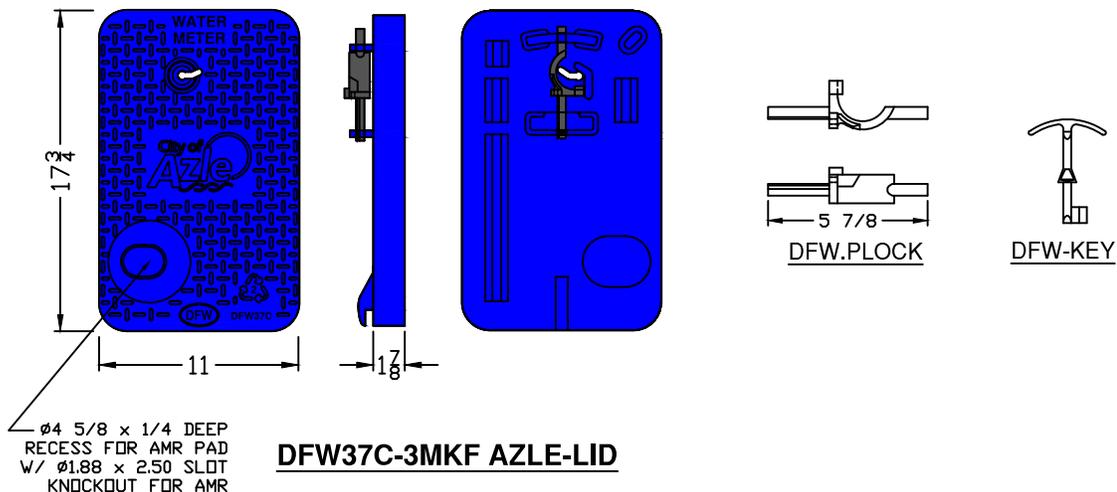
Vertical and Lateral Load Rating:

- Compliant with AASHTO, Design Load of H-10; ASTM C 857-16, Design Load of A-8, 8,000 lbs. transferred through a 10" x 10" steel plate centered in the cover and body.
- Compliant with AASHTO, Design Load of H-20; ASTM C 857-16, Design Load of A-16, 16,000 lbs. transferred through a 10" x 20" steel plate centered on the cover and body.
- This product is designed to withstand H-10 and H-20 loading in non-deliberate or incidental traffic areas.

NOT INTENDED TO BE INSTALLED IN ROADWAYS.

Polymer Lid

- The polymer lid shall have a molded key hole and plastic lock underneath lid (DFW.PLOCK) - *as illustrated.*
- The polymer lid shall have one (1) MOLDED knockout plug (1.88" x 2.50"), recessed ($4 \frac{5}{8}" \times \frac{1}{4}"$) deep - *as illustrated.*
- The polymer lid shall have a magnet molded within the lid.
- The polymer lid shall have "CITY OF AZLE" logo molded into the lid - *as illustrated.*
- The polymer lid shall seat securely and evenly inside the meter box and shall not overlap the top edge of the meter box.
- The polymer lid shall have molded **tread-pattern** for skid resistance - **tread dimensions shall be 0.188" x 0.938" x 0.150" deep.**
- The polymer lid shall have "WATER METER" molded into the lid - Font shall be Std Fadal CNC Font with 1" characters x 0.150" deep.
- The polymer lid shall retrofit existing meter boxes with similar dimensions and be able to adjust in the field.
- The polymer lid shall be BLUE and have a molded recycled emblem with a minimum of 50% Post Consumer Recycled and 50% Post Industrial/ Pre Consumer Recycled Content- Verified with a **Leed Product Documentation.**
- The polymer lid shall be DFW Plastics Inc, **MADE IN USA.** - Domestic Only.



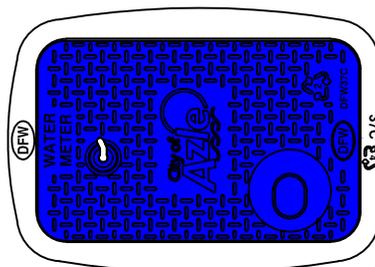
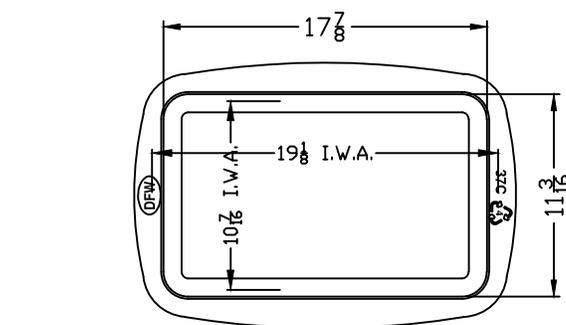
This product is designed to withstand loading in non-deliberate and incidental traffic. Not to be installed in roadway. Meter box shall be BLACK and constructed out of modified polyethylene material for maximum durability and corrosion resistance. The BLACK material is for maximum UV protection. The BLACK material shall be uniform throughout the meter box for maximum longevity and not have a foaming agent that creates air pockets within the polymer wall.

Vertical and Lateral Load Rating:

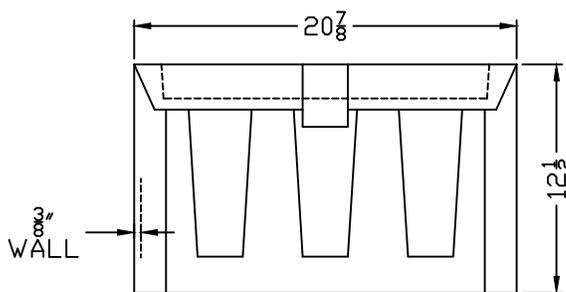
- Compliant with AASHTO, Design Load of H-10; ASTM C 857-16, Design Load of A-8, 8,000 lbs. transferred through a 10" x 10" steel plate centered in the cover and body.
 - Compliant with AASHTO, Design Load of H-20; ASTM C 857-16, Design Load of A-16, 16,000 lbs. transferred through a 10" x 20" steel plate centered on the cover and body.
 - This product is designed to withstand H-10 and H-20 loading in non-deliberate or incidental traffic areas.
- NOT INTENDED TO BE INSTALLED IN ROADWAYS.**

Polymer Body

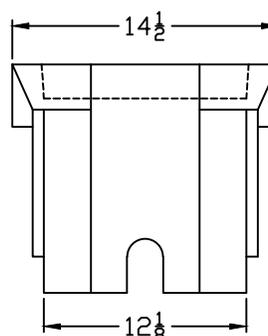
- The polymer body shall be BLACK and have a **Minimum** of 3/8" wall thickness - *as illustrated*.
- The polymer body shall have **Minimum** inside working room of (19 1/8" x 10 7/16") - *as illustrated*.
- The polymer body shall have crush resistant ribbing along the outside of the box.
- The polymer body shall have a flange around the lid opening to help prevent settling and aide in the adjustment to grade.
- The polymer body shall have one pipe slot molded on each end of the body that measures (3" x 4").
- The polymer body shall have a molded recycled emblem with a minimum of 35% Post Industrial/ Pre Consumer Recycled Content - Verified with a **Leed Product Documentation**.
- The polymer body shall be DFW Plastics Inc., **MADE IN USA**. - Domestic Only.



DFW37C-12-3MKF AZLE



DFW37C-12-BODY

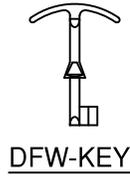
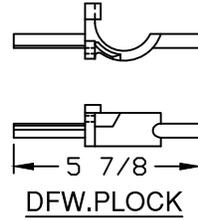
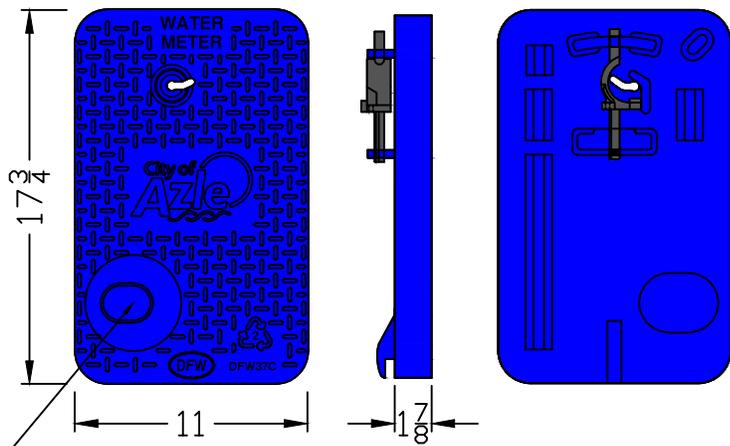


Meter Box shall be C Series by DFW Plastics, Inc. or an approved equal. All Specs are subject to change without notice.

Part No.	Series	Size	Height	Width	Length
DFW37C-12-BODY	37C	21" x 14"	12"	Top - 14-1/2"	Top- 20-7/8"
DFW37C-12-3MKF AZLE	37C	21" x 14"	12"	Base - 12-1/8"	Base- 20-7/8"
DFW37C-3MKF AZLE-LID	37C	21" x 14"	1-7/8"	11"	17-3/4"

Single Service Box for 3/8", 1/2", & 1" Meters
 File: Submittal - DFW37C-12-3MKF AZLE
 Rev. A January 2017

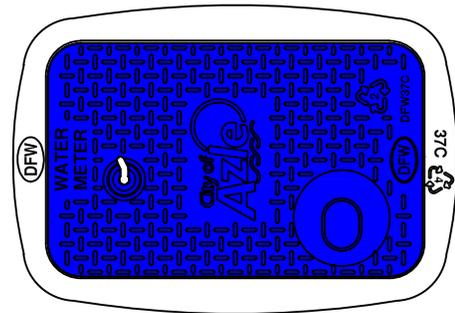
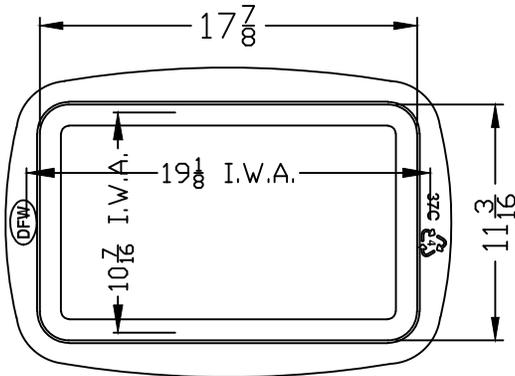
Submitted by:



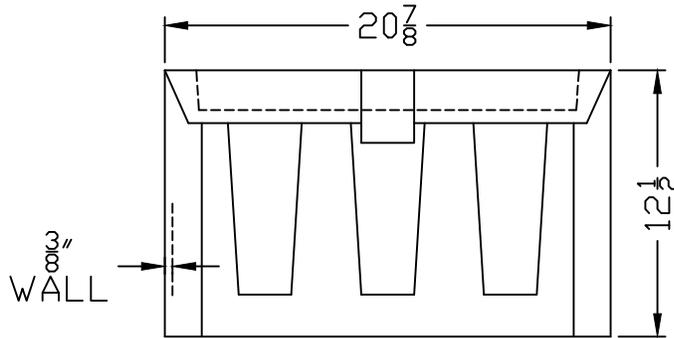
∅ 5/8 x 1/4 DEEP
RECESS FOR AMR PAD
W/ ∅1.88 x 2.50 SLOT
KNOCKOUT FOR AMR

DFW37C-3MKF AZLE-LID

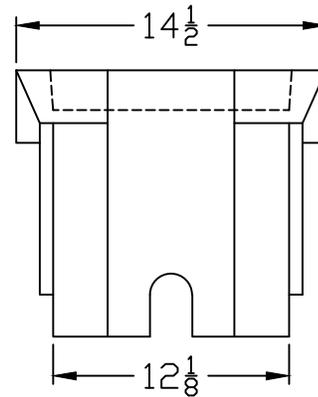
LID KEY	
3	BLUE COLOR
M	MAGNET
K	PLASTIC KEY LOCK
F	KNOCKOUT
AZLE	AZLE ENGRAVING



DFW37C-12-3MKF AZLE



DFW37C-12-BODY



NOTES

- 1) DIM'S ± 1/8" U.N.O.
- 2) LID MATERIAL: HDPE
- 3) BODY MATERIAL: LLDPE
- 4) WALL THICKNESS: 3/8" MINIMUM
- 5) I.W.A. = INSIDE WORK AREA

DFW PLASTICS, INC. ENGAGES IN ONGOING RESEARCH AND DEVELOPMENT TO IMPROVE AND ENHANCE ITS PRODUCTS. THEREFORE, DFW PLASTICS, INC. RESERVES THE RIGHT TO CHANGE PRODUCT OR SYSTEM SPECIFICATIONS WITHOUT NOTICE.



DFW PLASTICS, INC.
PO BOX 648
BEDFORD, TEXAS 76095
(817) 439-3600
(817) 439-3700 (f)
www.dfwplasticsinc.com

CITY OF AZLE

DFW37C-12-3MKF AZLE

CREATED: 01/08/2017

UPDATED: 01/08/2017

ACCEPTED: JMc

DRAWN BY: RMc

PLOT SCALE: 1:10



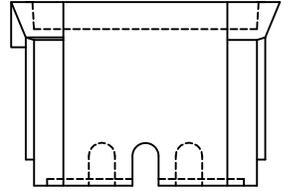
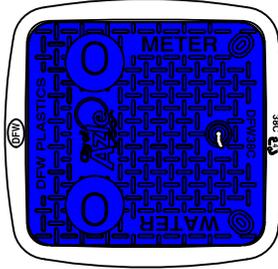
DFW PLASTICS, INC.

PO Box 648
Bedford, Texas 76095

Tel: 817.439.3600

Fax: 817.439.3700

www.dfwplasticsinc.com



DFW38C-14-3MKF AZLE

18x17x14 Black Polymer Box w/
Blue Polymer AMR Lid w/ Plastic Lock & Knockouts

Page 1 of 2

This product is designed to withstand loading in non-deliberate and incidental traffic. Not to be installed in roadway. Meter box lid shall be BLUE and constructed out of modified polyethylene material for maximum durability and corrosion resistance. The BLUE material is for maximum UV protection. The BLUE material shall be uniform throughout the meter box lid for maximum longevity and **not have** a foaming agent that creates air pockets within the polymer lid.

Vertical and Lateral Load Rating:

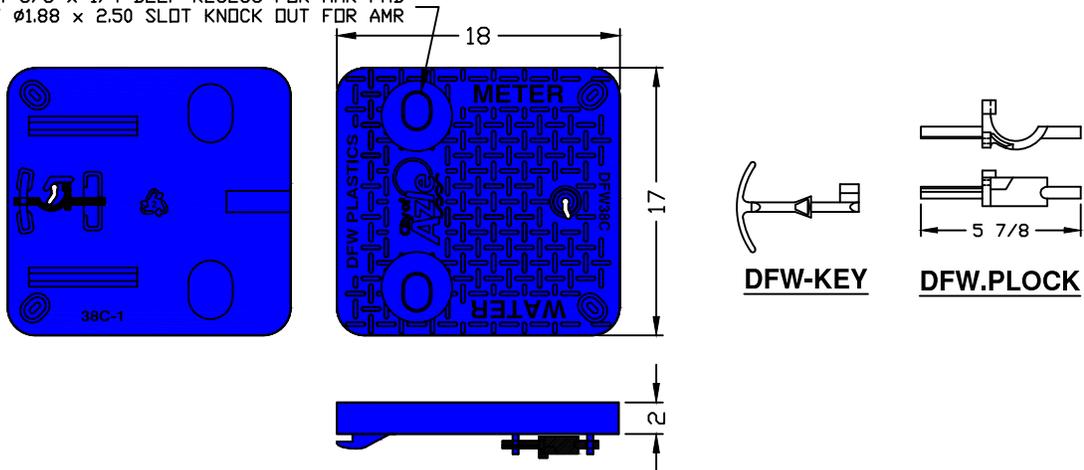
- Compliant with AASHTO, Design Load of H-10; ASTM C 857-16, Design Load of A-8, 8,000 lbs. transferred through a 10" x 10" steel plate centered in the cover and body.
- Compliant with AASHTO, Design Load of H-20; ASTM C 857-16, Design Load of A-16, 16,000 lbs. transferred through a 10" x 20" steel plate centered on the cover and body.
- This product is designed to withstand H-10 and H-20 loading in non-deliberate or incidental traffic areas.

NOT INTENDED TO BE INSTALLED IN ROADWAYS.

Polymer Lid

- The polymer lid shall have a molded key hole and plastic lock underneath lid (DFW.PLOCK) - *as illustrated*.
- The polymer lid shall have one (1) MOLDED knockout plug (1.88" x 2.50"), recessed ($4 \frac{5}{8}" \times \frac{1}{4}"$) deep - *as illustrated*.
- The polymer lid shall have a magnet molded within the lid.
- The polymer lid shall have "CITY OF AZLE" logo molded into the lid - *as illustrated*.
- The polymer lid shall seat securely and evenly inside the meter box and shall not overlap the top edge of the meter box.
- The polymer lid shall have molded **tread-pattern** for skid resistance - **tread dimensions shall be 0.188" x 0.938" x 0.150" deep**.
- The polymer lid shall have "WATER METER" molded into the lid - Font shall be Std Fadal CNC Font with 1" characters x 0.150" deep.
- The polymer lid shall retrofit existing meter boxes with similar dimensions and be able to adjust in the field.
- The polymer lid shall be BLUE and have a molded recycled emblem with a minimum of 50% Post Consumer Recycled and 50% Post Industrial/ Pre Consumer Recycled Content- Verified with a **Leed Product Documentation**.
- The polymer lid shall be DFW Plastics Inc, **MADE IN USA**. - Domestic Only.

Ø4 5/8 x 1/4 DEEP RECESS FOR AMR PAD
w/ Ø1.88 x 2.50 SLOT KNOCK OUT FOR AMR



DFW38C-3MKF AZLE-LID

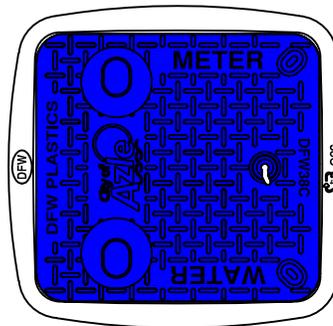
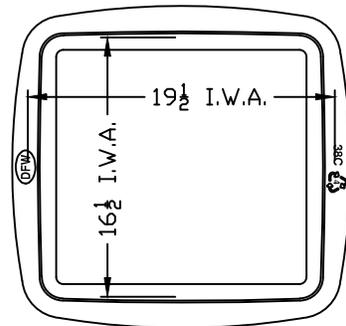
This product is designed to withstand loading in non-deliberate and incidental traffic. Not to be installed in roadway. Meter box shall be BLACK and constructed out of modified polyethylene material for maximum durability and corrosion resistance. The BLACK material is for maximum UV protection. The BLACK material shall be uniform throughout the meter box for maximum longevity and not have a foaming agent that creates air pockets within the polymer wall.

Vertical and Lateral Load Rating:

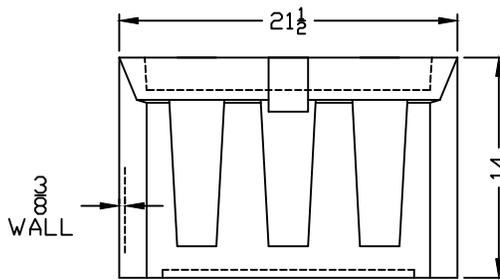
- Compliant with AASHTO, Design Load of H-10; ASTM C857-16, Design Load of A-8, 8,000 lbs, transferred through a 10" x 10" steel plate centered in the cover and body.
 - Compliant with AASHTO, Design Load of H-20; ASTM C857-16, Design Load of A-16, 16,000 lbs, transferred through a 10" x 20" steel plate centered on the cover and body.
 - This product is designed to withstand H-10 and H-20 loading in non-deliberate or incidental traffic areas.
- NOT INTENDED TO BE INSTALLED IN ROADWAYS.**

Polymer Body

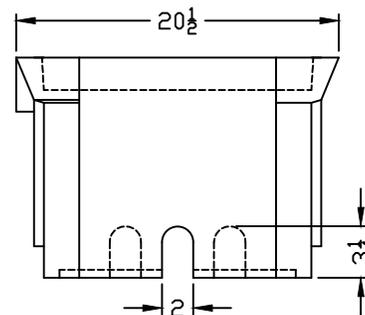
- The polymer body shall be BLACK and have a **minimum** of 3/8" wall thickness - *as illustrated.*
- The polymer body shall have **minimum inside** working room of (19-1/2" x 16-1/2") - *as illustrated.*
- The polymer body shall have crush resistant ribbing along the outside of the box.
- The polymer body shall have a flange around the lid opening to help prevent settling and aid in the adjustment to grade.
- The polymer body shall have a molded recycled emblem with a minimum of 35% Post Industrial/ Pre Consumer Recycled Content - Verified with a **Leed Product Documentation.**
- The polymer body shall be DFW Plastics Inc., **MADE IN USA.** - Domestic Only.



DFW38C-14-3MKF AZLE



DFW38C-14-BODY



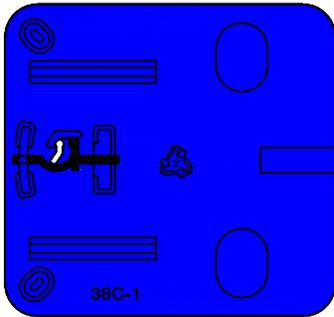
Meter Box shall be C Series by DFW Plastics, Inc. or an approved equal. All Specs are subject to change without notice.

Part No.	Series	Size	Height	Width	Length
DFW38C-14-BODY	38C	18x17x14	14"	Top - 20-1/2"	Top - 21-1/2"
DFW38C-14-3MKF AZLE	38C	18x17x14	14"	Base - 17-1/2"	Base - 21-1/2"
DFW38C-3MKF AZLE-LID	38C	18x17	2"	17"	18"

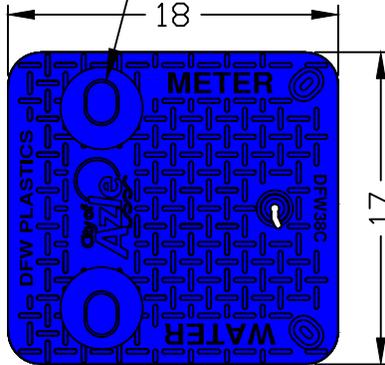
Dual Services Box for 5/8" x 3/4" Meter
 File: Submittal - DFW38C-14-3MKF AZLE
 Rev. A January 2017

Submitted by:

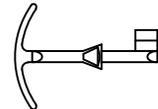
Ø4 5/8 x 1/4 DEEP RECESS FOR AMR PAD
W/ Ø1.88 x 2.50 SLOT KNOCK OUT FOR AMR



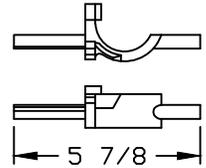
DFW38C-3MKF AZLE-LID



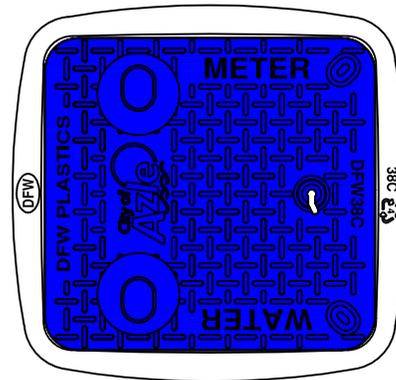
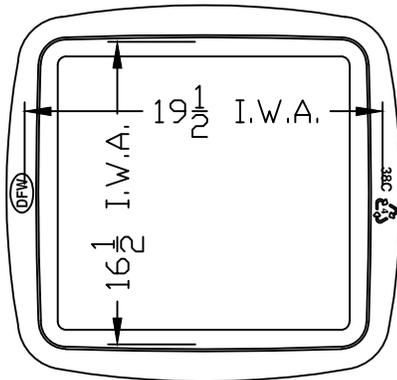
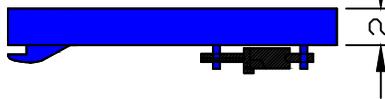
LID KEY	
3	BLUE COLOR
M	MAGNET
K	PLASTIC KEY LOCK
F	KNOCKOUT
AZLE	AZLE ENGRAVING



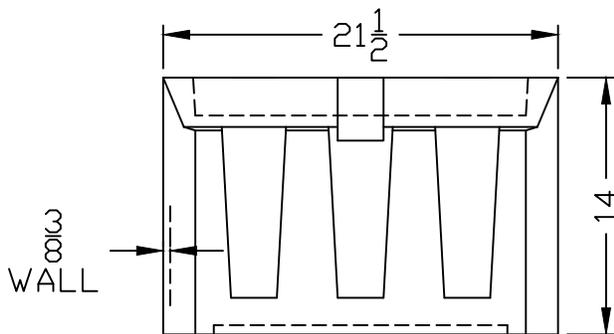
DFW-KEY



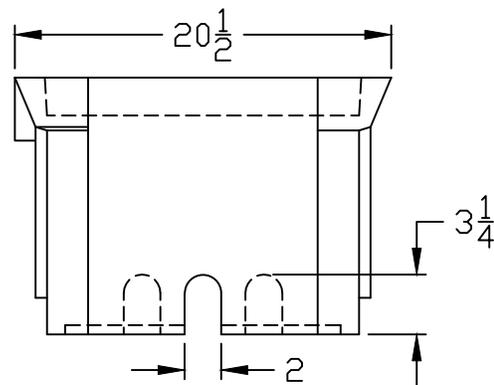
DFW.PLOCK



DFW38C-14-3MKF AZLE



DFW38C-14-BODY



NOTES

- 1) DIM'S ± 1/8" U.N.O.
- 2) LID MATERIAL: HDPE
- 3) BODY MATERIAL: LLDPE
- 4) WALL THICKNESS: 3/8" MINIMUM
- 5) I.W.A. = INSIDE WORK AREA

DFW PLASTICS, INC. ENGAGES IN ONGOING RESEARCH AND DEVELOPMENT TO IMPROVE AND ENHANCE ITS PRODUCTS. THEREFORE, DFW PLASTICS, INC. RESERVES THE RIGHT TO CHANGE PRODUCT OR SYSTEM SPECIFICATIONS WITHOUT NOTICE.



DFW PLASTICS, INC.
PO BOX 648
BEDFORD, TEXAS 76095
(817) 439-3600
(817) 439-3700 (f)
www.dfwplasticsinc.com

CITY OF AZLE

DFW38C-14-3MKF AZLE

CREATED: 07/07/2016

UPDATED: 07/07/2016

ACCEPTED: JMc

DRAWN BY: RMc

PLOT SCALE: 1:10



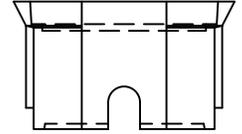
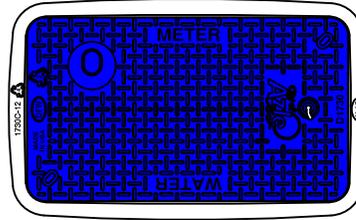
DFW PLASTICS, INC.

PO Box 648
Bedford, Texas 76095

Tel: 817.439.3600

Fax: 817.439.3700

www.dfwplasticsinc.com



DFW1730C-12-3MKF AZLE

17x30x12 Black Polymer Box w/
Blue Polymer AMR Lid w/ Plastic Lock & Knockout

Page 1 of 2

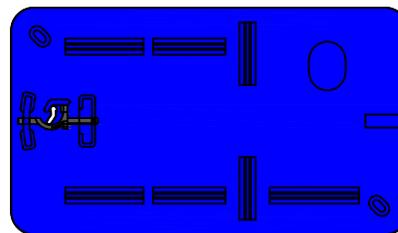
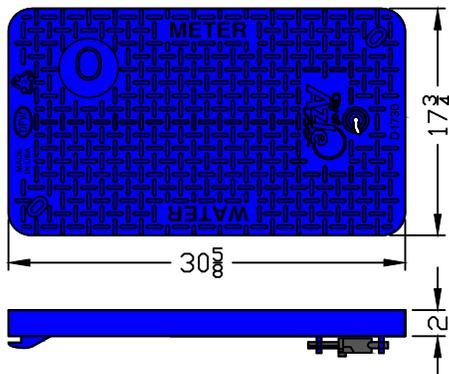
This product is designed to withstand loading in non-deliberate and incidental traffic. Not to be installed in roadway. Meter box lid shall be BLUE and constructed out of modified polyethylene material for maximum durability and corrosion resistance. The BLUE material is for maximum UV protection. The BLUE material shall be uniform throughout the meter box lid for maximum longevity and **not have** a foaming agent that creates air pockets within the polymer lid.

Vertical and Lateral Load Rating:

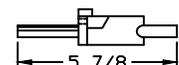
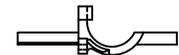
- Compliant with AASHTO, Design Load of H-10; ASTM C 857-16, Design Load of A-8, 8,000 lbs. transferred through a 10" x 10" steel plate centered in the cover and body.
- Compliant with AASHTO, Design Load of H-20; ASTM C 857-16, Design Load of A-16, 16,000 lbs. transferred through a 10" x 20" steel plate centered on the cover and body.
- This product is designed to withstand H-10 and H-20 loading in non-deliberate or incidental traffic areas.
NOT INTENDED TO BE INSTALLED IN ROADWAYS.

Polymer Lid

- The polymer lid shall have a molded key hole and plastic lock underneath lid (DFW.PLOCK) - *as illustrated*.
- The polymer lid shall have one (1) MOLDED knockout plug (1.88" x 2.50"), recessed ($4\frac{5}{8}" \times \frac{1}{4}"$) deep - *as illustrated*.
- The polymer lid shall have a magnet molded within the lid.
- The polymer lid shall have "CITY OF AZLE" logo molded into the lid - *as illustrated*.
- The polymer lid shall seat securely and evenly inside the meter box and shall not overlap the top edge of the meter box.
- The polymer lid shall have molded **tread-pattern** for skid resistance - **tread dimensions shall be 0.188" x 0.938" x 0.150" deep**.
- The polymer lid shall have "WATER METER" molded into the lid - Font shall be Std Fadal CNC Font with 1" characters x 0.150" deep.
- The polymer lid shall retrofit existing meter boxes with similar dimensions and be able to adjust in the field.
- The polymer lid shall be BLUE and have a molded recycled emblem with a minimum of 50% Post Consumer Recycled and 50% Post Industrial/ Pre Consumer Recycled Content- Verified with a **Leed Product Documentation**.
- The polymer lid shall be DFW Plastics Inc, **MADE IN USA.** - Domestic Only.



DFW1730C-3MKF AZLE-LID



DFW.PLOCK



DFW-KEY

This product is designed to withstand loading in non-deliberate and incidental traffic. Not to be installed in roadway.

Meter box shall be BLACK and constructed out of modified polyethylene material for maximum durability and corrosion resistance. The BLACK material is for maximum UV protection. The BLACK material shall be uniform throughout the meter box for maximum longevity and not have a foaming agent that creates air pockets within the polymer wall.

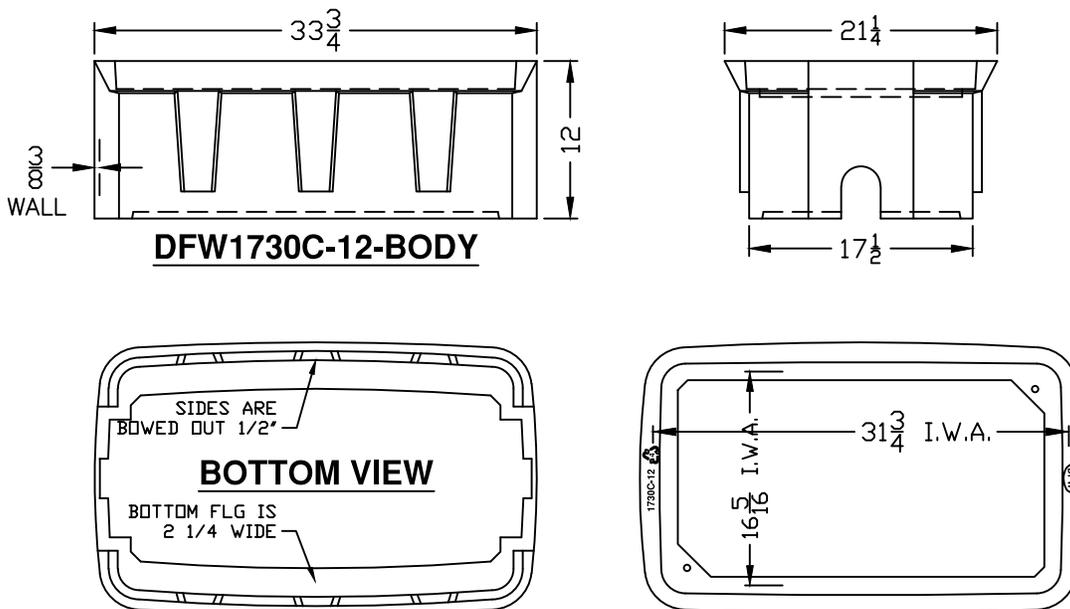
Vertical and Lateral Load Rating:

- Compliant with AASHTO, Design Load of H-10; ASTM C 857-16, Design Load of A-8, 8,000 lbs. transferred through a 10" x 10" steel plate centered in the cover and body.
- Compliant with AASHTO, Design Load of H-20; ASTM C 857-16, Design Load of A-16, 16,000 lbs. transferred through a 10" x 20" steel plate centered on the cover and body.
- This product is designed to withstand H-10 and H-20 loading in non-deliberate or incidental traffic areas.

NOT INTENDED TO BE INSTALLED IN ROADWAYS.

Polymer Body

- The polymer body shall be BLACK and have a **minimum** of 3/8" wall thickness - *as illustrated*.
- The polymer body shall have **minimum** inside working room of (31 3/4" x 16 5/16") - *as illustrated*.
- The polymer body shall have crush resistant ribbing along the outside of the box.
- The polymer body shall have a flange around the lid opening to help prevent settling and aide in the adjustment to grade.
- The polymer body shall have one pipe slot molded on each end of the body that measures (3" x 4").
- The polymer body shall have a 1/2" bow centered on side wall to resist backfilling.
- The polymer body shall have molded lift structures to aid in adjustment - *as illustrated in Section A-A*.
- The polymer body shall have a molded recycled emblem with a minimum of 35% Post Industrial/Pre-Consumer Recycled Content - Verified with a **Leed Product Documentation**.
- The polymer body shall be DFW Plastics Inc., **MADE IN USA**. - Domestic Only.

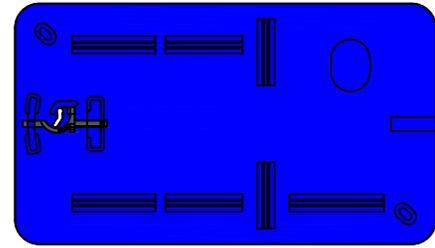
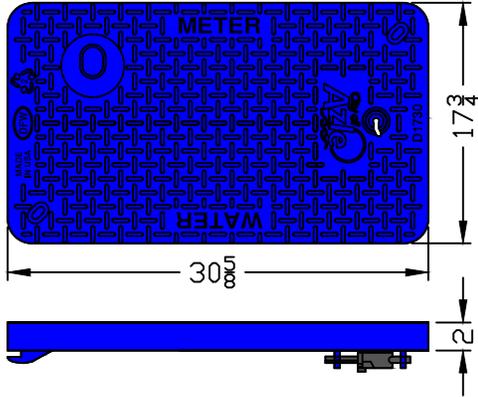


Meter Box shall be C Series by DFW Plastics, Inc. or an approved equal. All Specs are subject to change without notice.

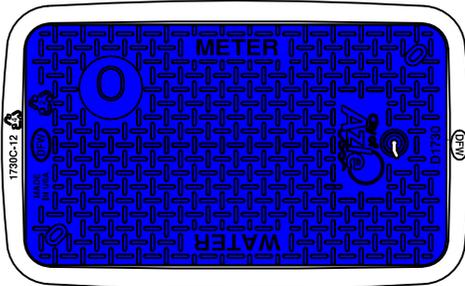
Part No.	Series	Size	Height	Width	Length
DFW1730C-12-BODY	1730C	17" x 30"	12"	Top - 21-1/4"	Top- 34-1/8"
DFW1730C-12-3MKF AZLE	1730C	17" x 30"	12"	Base - 17-1/2"	Base- 34-1/8"
DFW1730C-3MKF AZLE-LID	1730C	17" x 30"	2"	17-3/4"	30-5/8"

Single Service Box for 2" & 3" Meters
 File: Submittal - DFW1730C-12-3MKF AZLE
 Rev. A January 2017

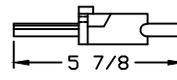
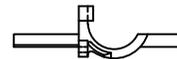
Submitted by:



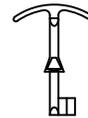
DFW1730C-3MKF AZLE-LID



DFW1730C-12-3MKF AZLE

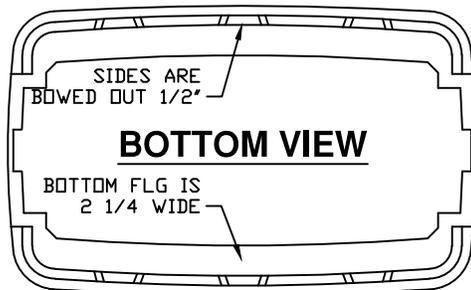
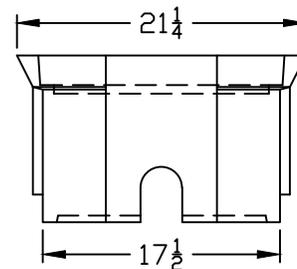
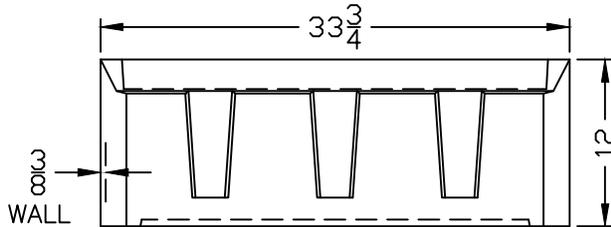


DFW.PLOCK

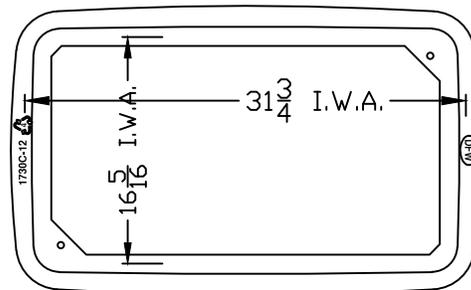


DFW-KEY

LID KEY	
3	BLUE COLOR
M	MAGNET
K	PLASTIC KEY LOCK
F	KNOCKOUT
AZLE	AZLE ENGRAVING



DFW1730C-12-BODY



NOTES

- 1) DIM'S ± 1/8" U.N.O.
- 2) LID MATERIAL: HDPE
- 3) BODY MATERIAL: LLDPE
- 4) WALL THICKNESS: 3/8" MINIMUM
- 5) I.W.A. = INSIDE WORK AREA

DFW PLASTICS, INC. ENGAGES IN ONGOING RESEARCH AND DEVELOPMENT TO IMPROVE AND ENHANCE ITS PRODUCTS. THEREFORE, DFW PLASTICS, INC. RESERVES THE RIGHT TO CHANGE PRODUCT OR SYSTEM SPECIFICATIONS WITHOUT NOTICE.



DFW PLASTICS, INC.
PO BOX 648
BEDFORD, TEXAS 76095
(817) 439-3600
(817) 439-3700 (f)
www.dfwplasticsinc.com

CITY OF AZLE

DFW1730C-12-3MKF AZLE

CREATED: 01/08/2017

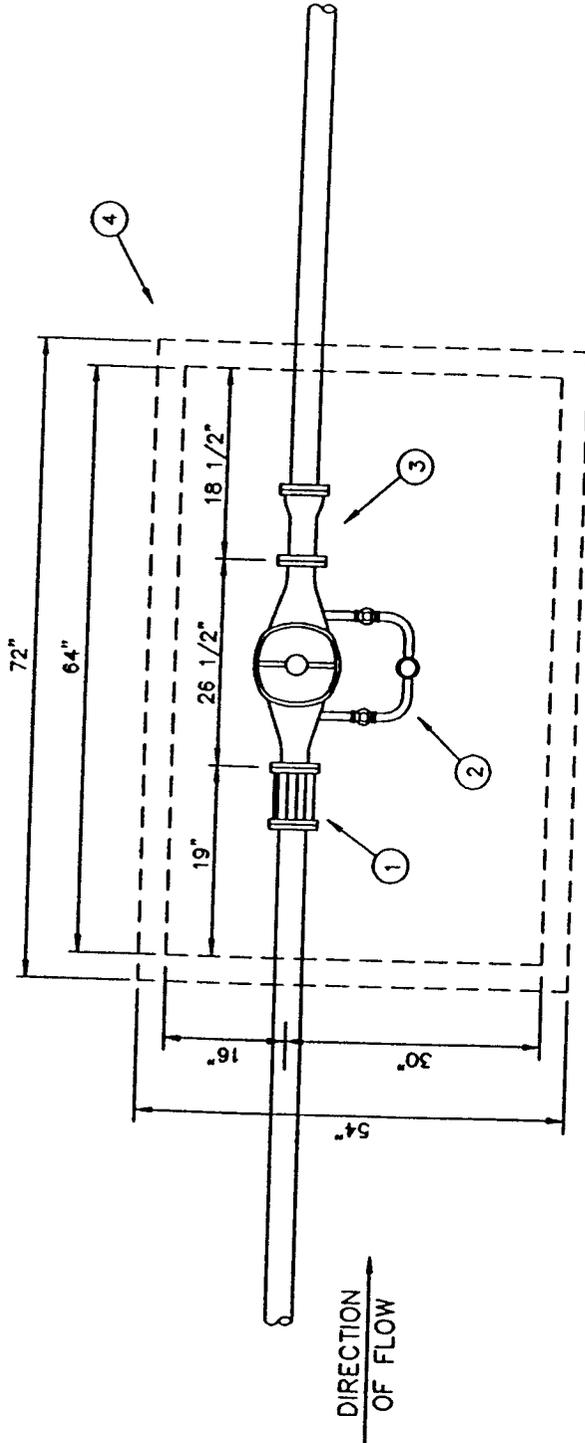
UPDATED: 01/08/2017

ACCEPTED: JMc

DRAWN BY: RMc

PLOT SCALE: 1:12

MATERIALS LIST	
PART NO.	DESCRIPTION
①	8" FLANGED COUPLING METER ADAPTER
②	8" DETECTOR CHECK VALVE WITH 5/8" BY-PASS METER
③	8" X 12" O.I. NIPPLE M.J. X F.
④	PRECAST METER VAULT VAULT FLOOR (NOT SHOWN) 36" X 48" ACCESS HATCH (NOT SHOWN)



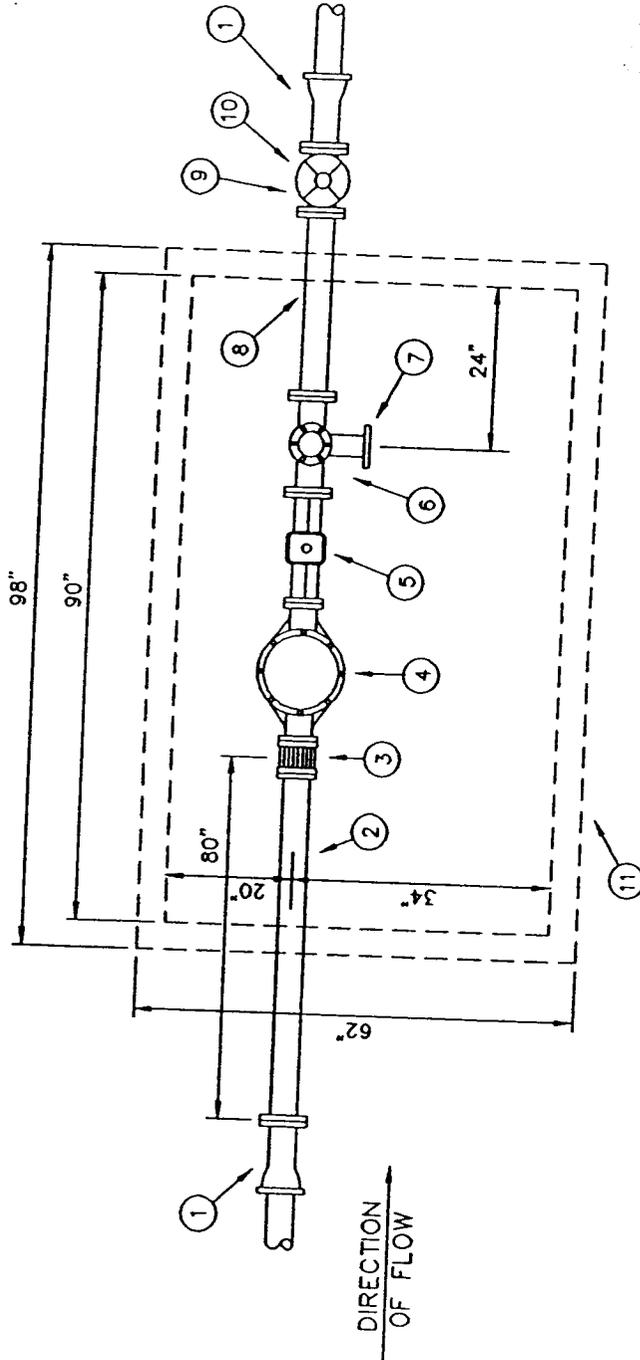
8" DETECTOR CHECK
SERVICE WITH 8" METER

STANDARD SPECIFICATION REFERENCE	6.7.
DATE	NOV. '96
STANDARD DRAWING NO.	4160

STANDARD DRAWING NO.
4160

MATERIALS LIST	
PART NO.	DESCRIPTION
①	2 EA. 8" X 12" D.I. NIPPLE M.J. X F.
②	1 EA. 8" X 36" D.I. NIPPLE F. X SLEEVE
③	1 EA. 8" FLANGED COUPLING ADAPTER
④	8" U.L. APPROVED (FOR TURBINE)
⑤	8" TURBINE METER
⑥	8" X 4" D.I. TEE F. X F. (TEST PT)
⑦	8" BLIND FLG F. X F.

MATERIALS LIST	
PART NO.	DESCRIPTION
⑧	1 EA. 8" X 24" D.I. NIPPLE F X F.
⑨	1 EA. 8" GATE VALVE F. X F.
⑩	VALVE STACK RISER COVER & LID
⑪	PRECAST METER VAULT VAULT FLOOR (NOT SHOWN) ACCESS HATCH (NOT SHOWN)



8" FIRE LINE STANDPIPE
SERVICE WITH 8" METER

STANDARD DRAWING NO.
4170

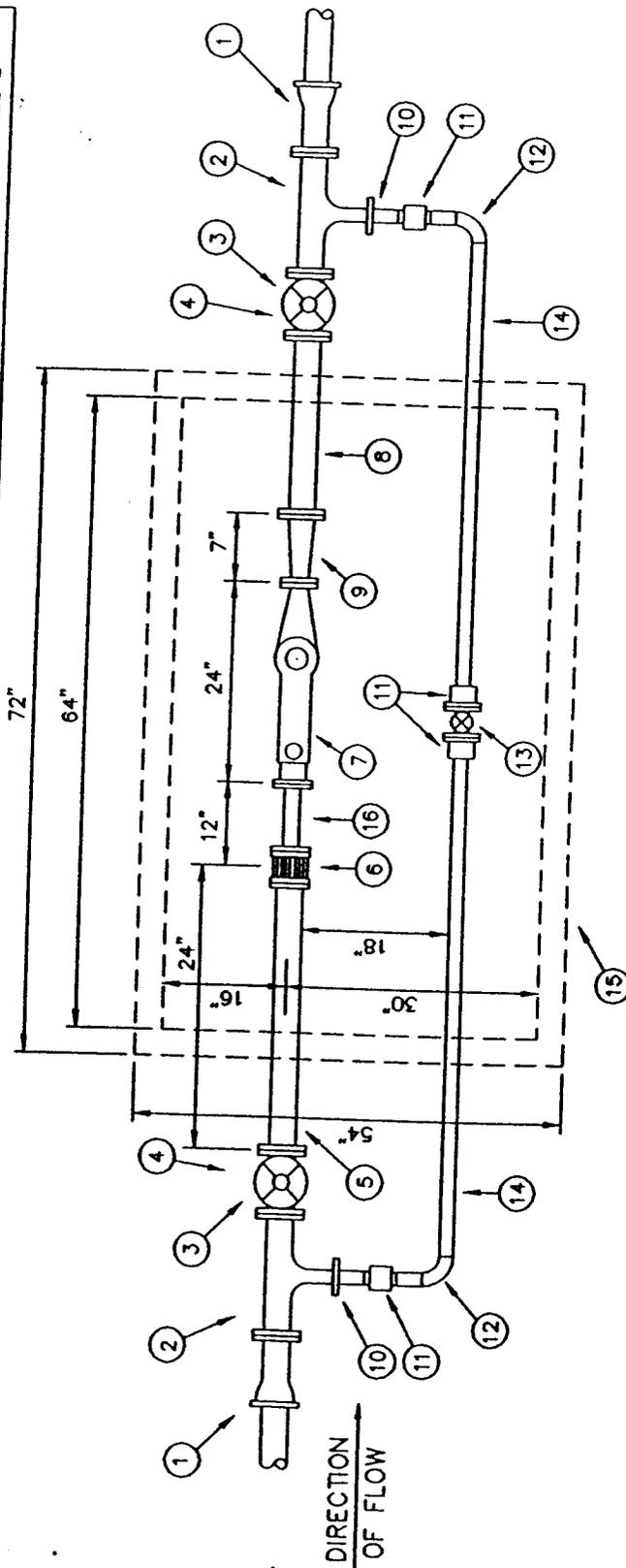
STANDARD SPECIFICATION REFERENCE
6.7.
DATE
NOV. '96
STANDARD DRAWING NO.
4170

MATERIALS LIST

PART NO.	QUANTITY	DESCRIPTION
①	2 EA.	4" X 12" D.I. NIPPLE M.J. X F.
②	2 EA.	4" X 2" D.I. TEE F. X F.
③	2 EA.	4" GATE VALVE F. X F.
④	2 EA.	VALVE STACK RISER COVER & LID
⑤	1 EA.	4" X 24" D.I. NIPPLE F. X SLEEVE
⑥	1 EA.	4" X 3" FLANGED RED. COUPLING ADAPTER
⑦	1 EA.	3" METER AS SPECIFIED (TYPE C.T. SHOWN)
⑧	1 EA.	4" X 18" D.I. NIPPLE F. X F.
⑨	1 EA.	4" X 3" D.I. REDUCER F. X F.

MATERIALS LIST

PART NO.	QUANTITY	DESCRIPTION
⑩	2 EA.	2" COMPANION FLANGE
⑪	4 EA.	2" SOL. X OSIP UNION
⑫	2 EA.	2" SOL. 90° ELL
⑬	1 EA.	2" BALL VALVE
⑭	2 EA.	2" COPPER PIPE, APPROX. 5'
⑮	1 EA.	PRECAST METER VAULT
⑯	1 EA.	VAULT FLOOR (NOT SHOWN)
⑰	1 EA.	ACCESS HATCH (NOT SHOWN)
⑱	1 EA.	3" X 12" D.I. NIPPLE F. X SLEEVE



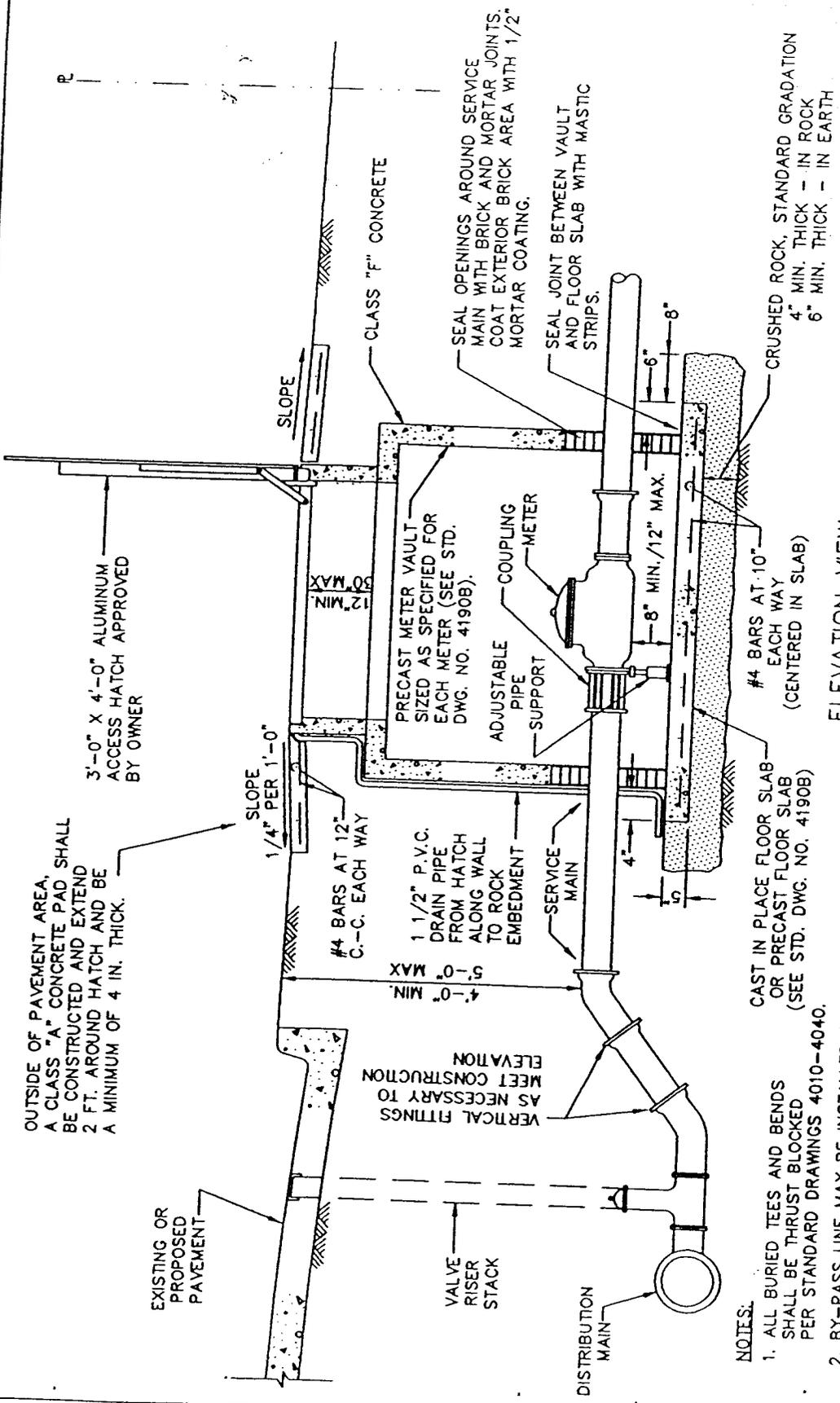
4" DOMESTIC SERVICE
WITH 3" METER

STANDARD SPECIFICATION REFERENCE
6.7.

DATE
NOV. '96

STANDARD DRAWING NO.
4180

STANDARD DRAWING NO.
4180



ELEVATION VIEW
(D.C. METER SHOWN) N.T.S.

NOTES:

1. ALL BURIED TEES AND BENDS SHALL BE THRUST BLOCKED PER STANDARD DRAWINGS 4010-4040.
2. BY-PASS LINE MAY BE INSTALLED ON LEFT SIDE OF METER VAULT TO FACILITATE LIMITED WORKING AREA CONDITIONS BY PERMISSION OF OWNER.
3. ALL BURIED D.I. PIPE AND C.I. FITTINGS SHALL BE POLY-WRAPPED AS SPECIFIED FOR THE ADJACENT DISTRIBUTION MAIN.

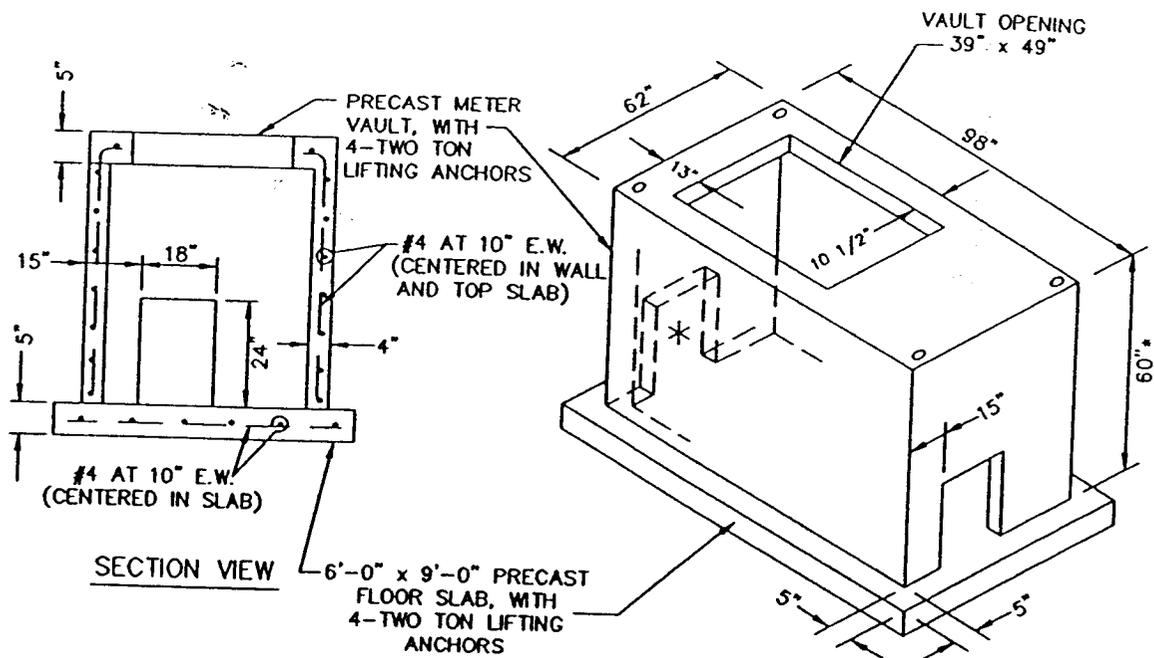
STANDARD DRAWING NO.
4190A

LARGE SERVICE METER VAULT INSTALLATION

STANDARD SPECIFICATION REFERENCE
6.7.

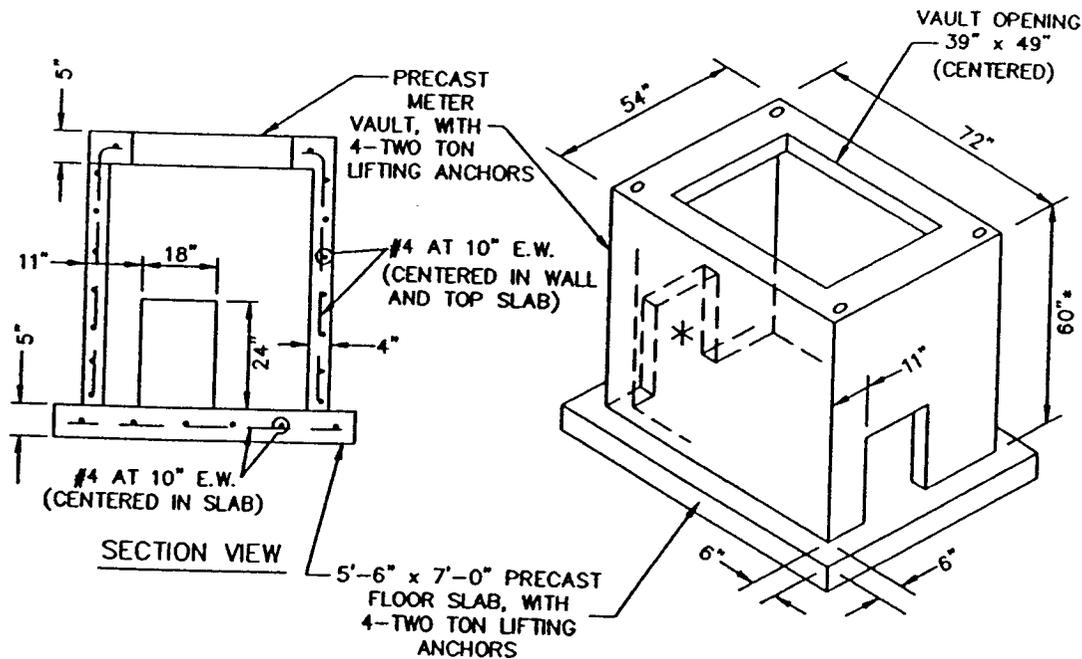
DATE
NOV. '96

STANDARD DRAWING NO.
4190A



F.M. METER VAULT
N.T.S.

* AVAILABLE HEIGHTS:
36", 48", 60"
USE OF WHICH IS
SPECIFIED BY OWNER



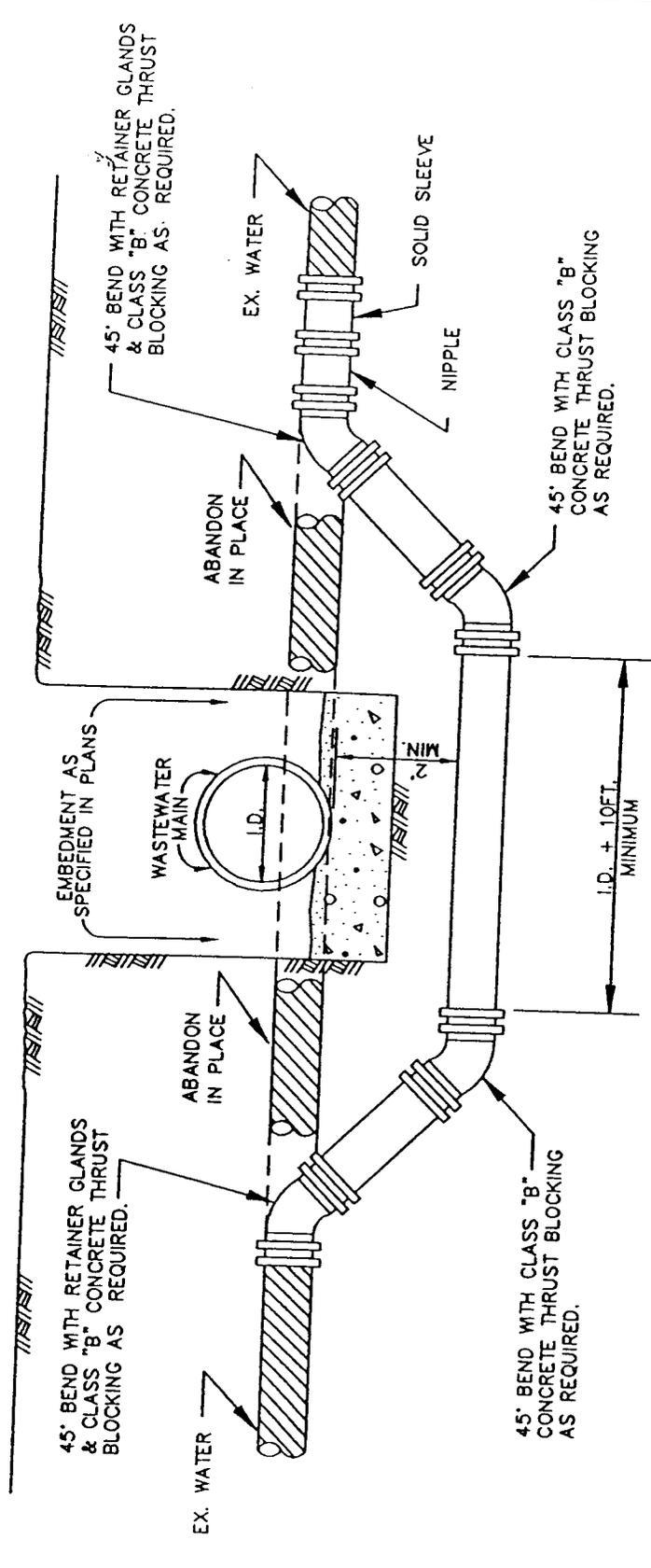
D.C. METER VAULT
N.T.S.

* AVAILABLE HEIGHTS:
36", 48", 60"
USE OF WHICH IS
SPECIFIED BY OWNER

LARGE SERVICE METER
PRECAST VAULT

STANDARD SPECIFICATION REFERENCE
6.7.

DATE NOV. '96 STANDARD DRAWING NO. 4190B



WATER MAIN LOWERING
 BELOW WASTEWATER MAIN

STANDARD SPECIFICATION REFERENCE
 6.7.

DATE
 NOV. '96

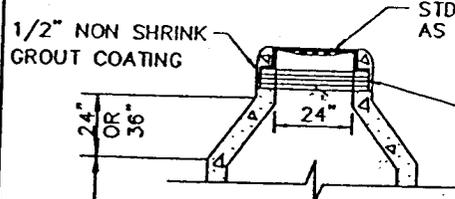
STANDARD DRAWING NO.
 4200

STANDARD DRAWING NO.
 4200

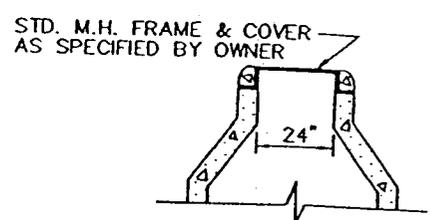
ADJUSTABLE FRAME

← ROOF OPTIONS →
N.T.S.

FRAME CAST IN CONC.

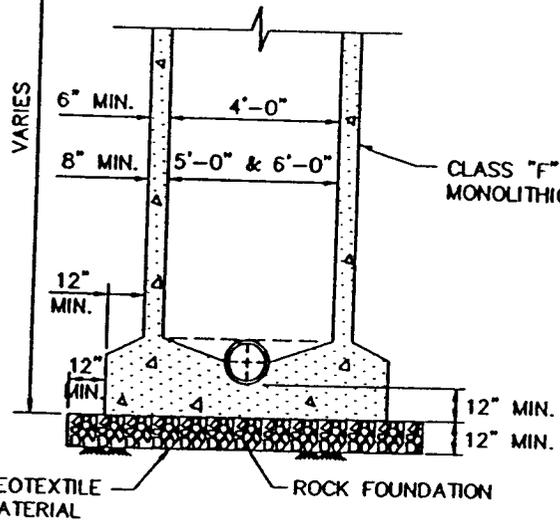


STD. M.H. FRAME & COVER AS SPECIFIED BY OWNER

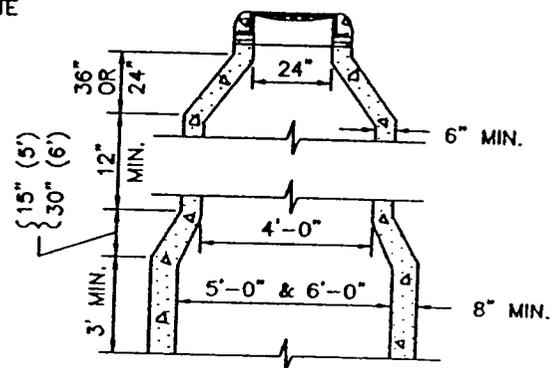


USE PRECAST CONCRETE GRADE RINGS & NON SHRINK GROUT AS REQUIRED TO RAISE TO GRADE. (MIN. 4 COURSES)

FOR 5' & 6' DIA. M.H.'S SEE TRANSITION DETAIL



CLASS "F" CONCRETE MONOLITHIC POUR



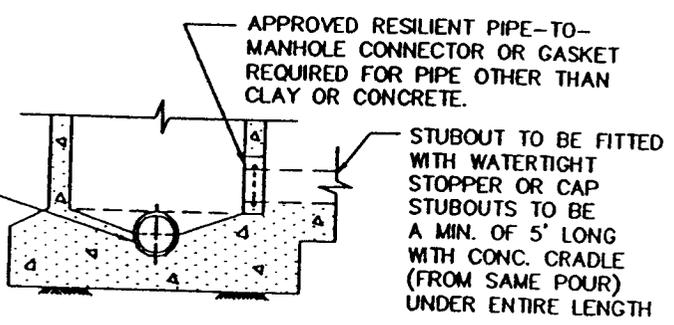
TRANSITION DETAIL FOR 5' & 6' DIA. M.H.'S

N.T.S.

NOTES

1. WHERE M.H.'S ARE IN "PROPOSED" PAVING, FRAME & COVER SHALL BE SET 23" BELOW THE PROPOSED PAVEMENT GRADE.
2. IF FALSE M.H. BOTTOMS ARE REQUIRED THEY SHALL BE CONSTRUCTED, INSTALLED AND REMOVED. PER STD. DWG. NO. 5100.

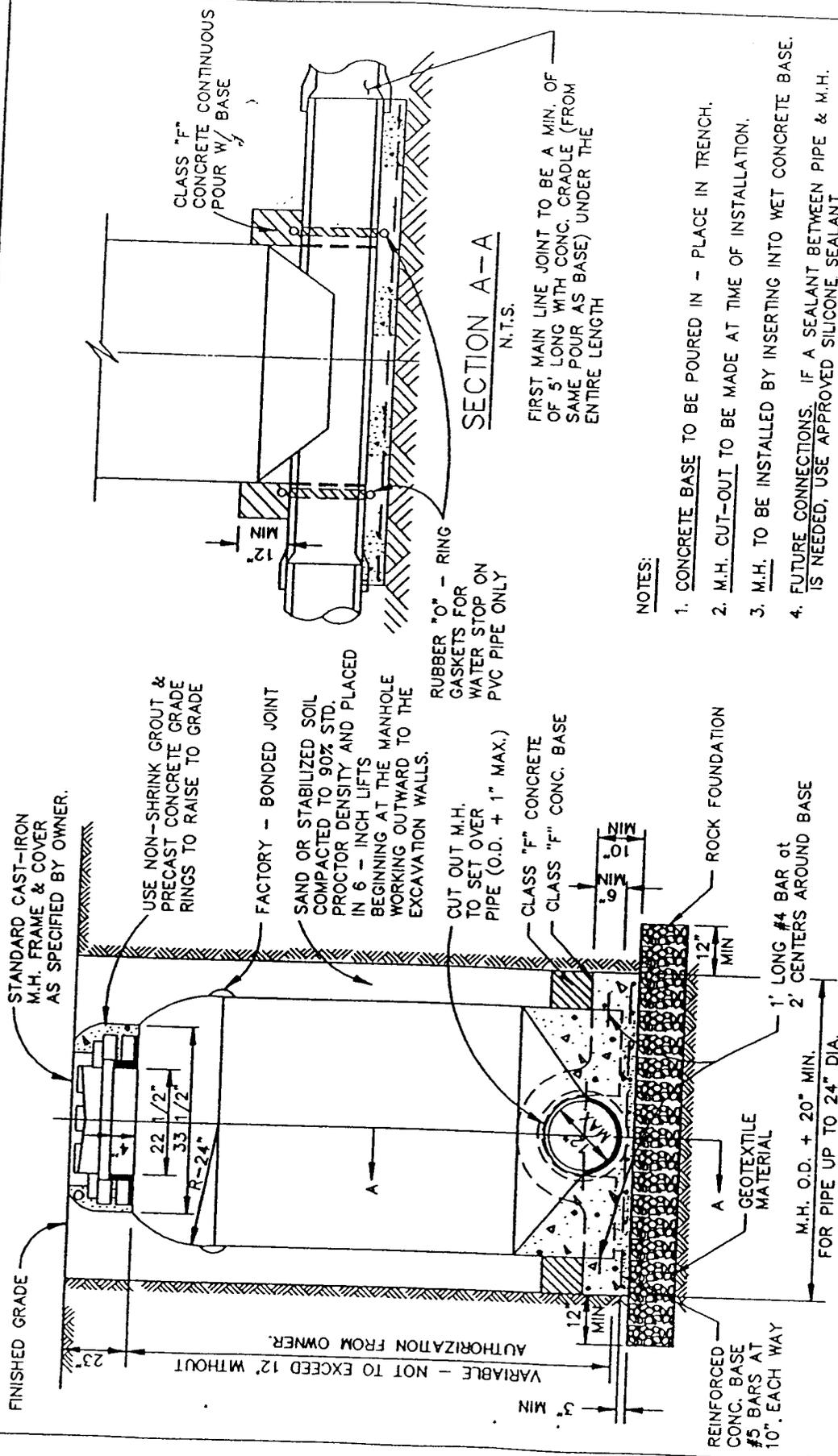
FIRST MAIN LINE JOINT TO BE A MIN. OF 5' LONG WITH CONC. CRADLE (FROM SAME POUR AS BASE) UNDER ENTIRE LENGTH.



STUBOUT CONNECTION
N.T.S.

WASTEWATER MANHOLE
CAST-IN-PLACE

STANDARD SPECIFICATION REFERENCE	
6.7.	
DATE	STANDARD DRAWING NO.
NOV. '96	5030



SECTION A-A
N.T.S.

FIRST MAIN LINE JOINT TO BE A MIN. OF 5' LONG WITH CONC. CRADLE (FROM SAME POUR AS BASE) UNDER THE ENTIRE LENGTH

NOTES:

1. CONCRETE BASE TO BE POURED IN - PLACE IN TRENCH.
2. M.H. CUT-OUT TO BE MADE AT TIME OF INSTALLATION.
3. M.H. TO BE INSTALLED BY INSERTING INTO WET CONCRETE BASE.
4. FUTURE CONNECTIONS, IF A SEALANT BETWEEN PIPE & M.H. IS NEEDED, USE APPROVED SILICONE SEALANT.

WASTEWATER MANHOLE
FIBERGLASS

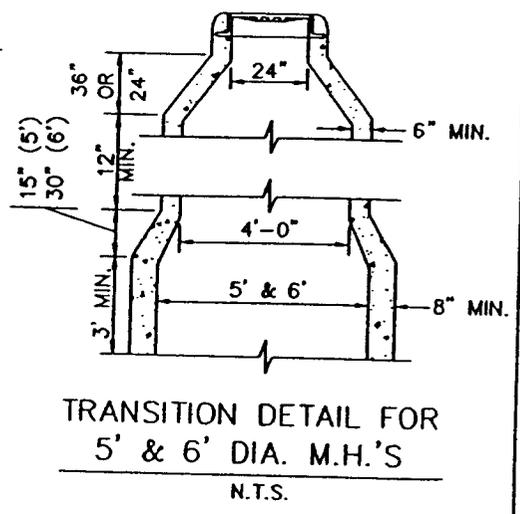
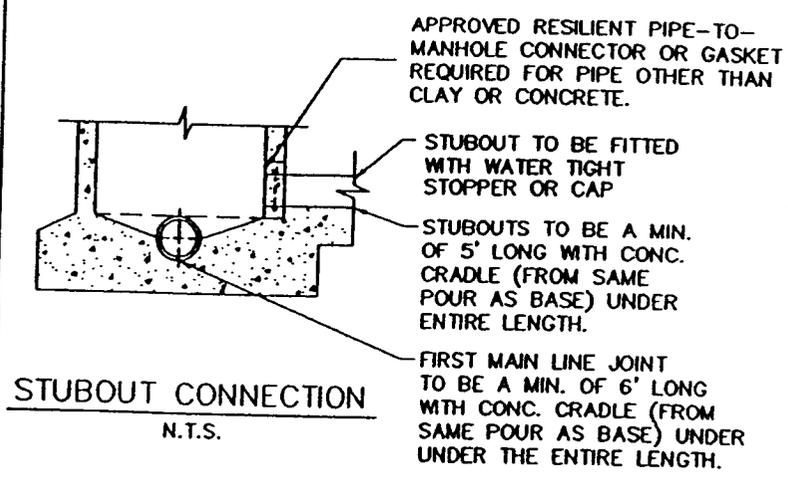
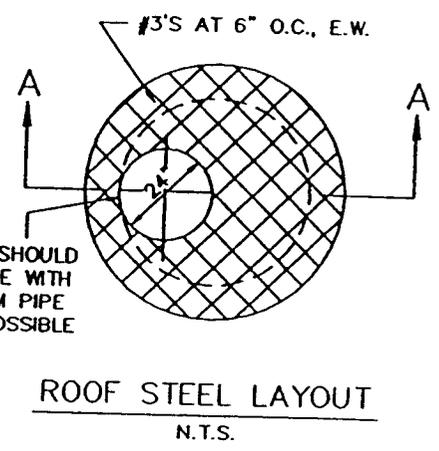
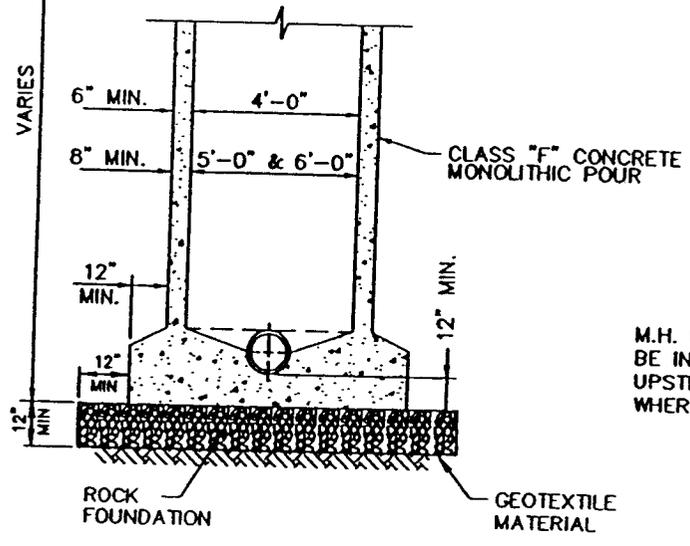
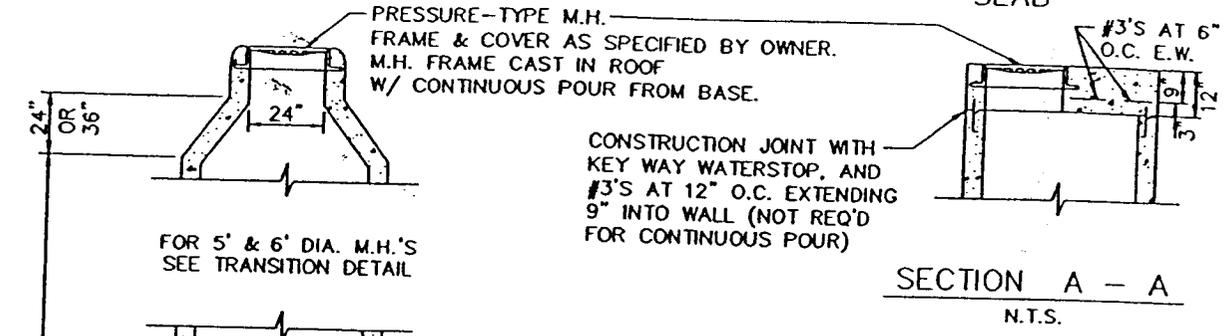
STANDARD SPECIFICATION REFERENCE
6.7.

DATE
NOV. '96

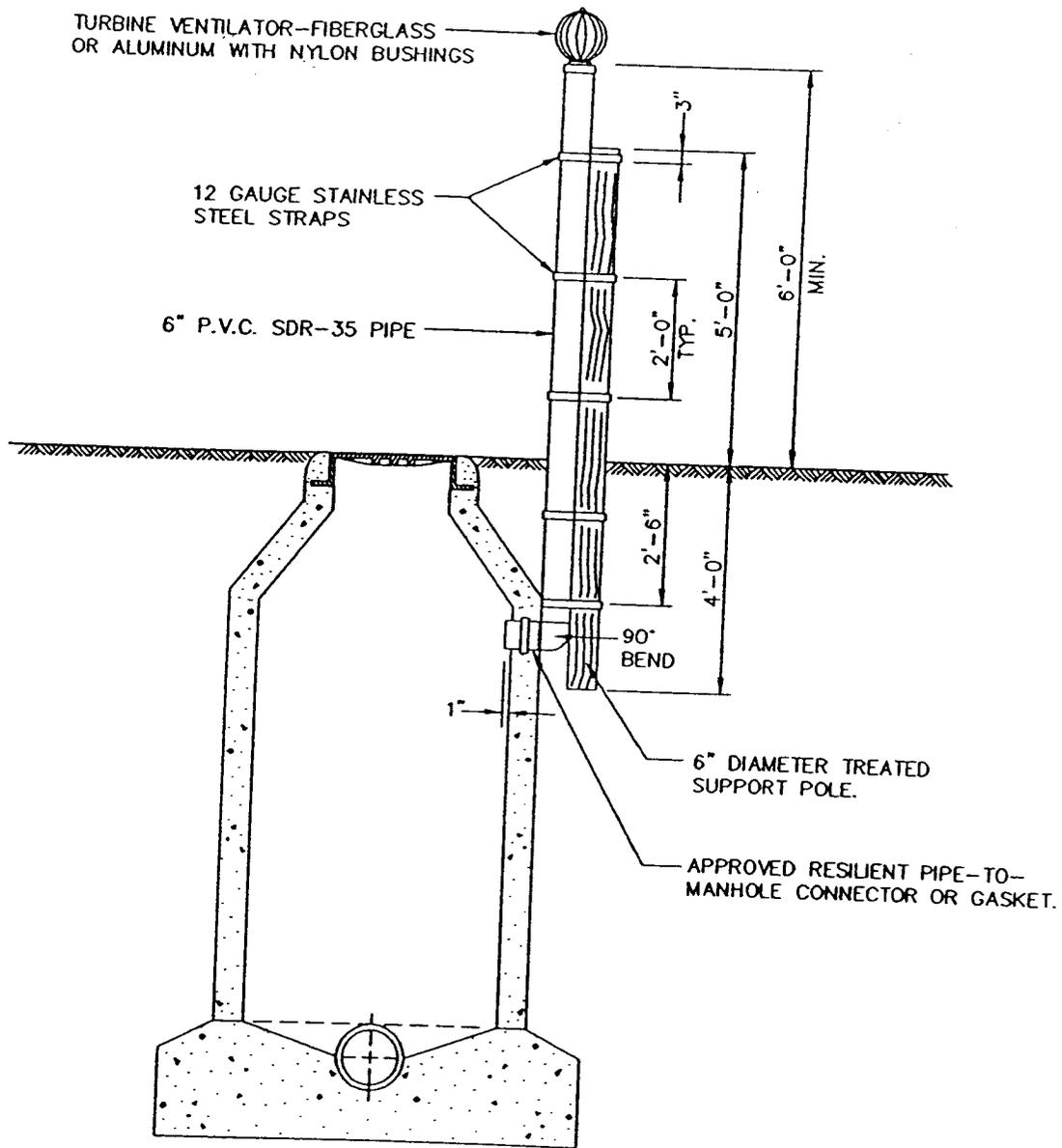
STANDARD DRAWING NO.
5040

STANDARD DRAWING NO.
5040

CONCRETE CONE ← ROOF OPTIONS → REINFORCED CONCRETE SLAB
 N.T.S.



WASTEWATER MANHOLE PRESSURE-TYPE		STANDARD SPECIFICATION REFERENCE 6.7.
		DATE NOV: '96



WASTEWATER MANHOLE
VENTED

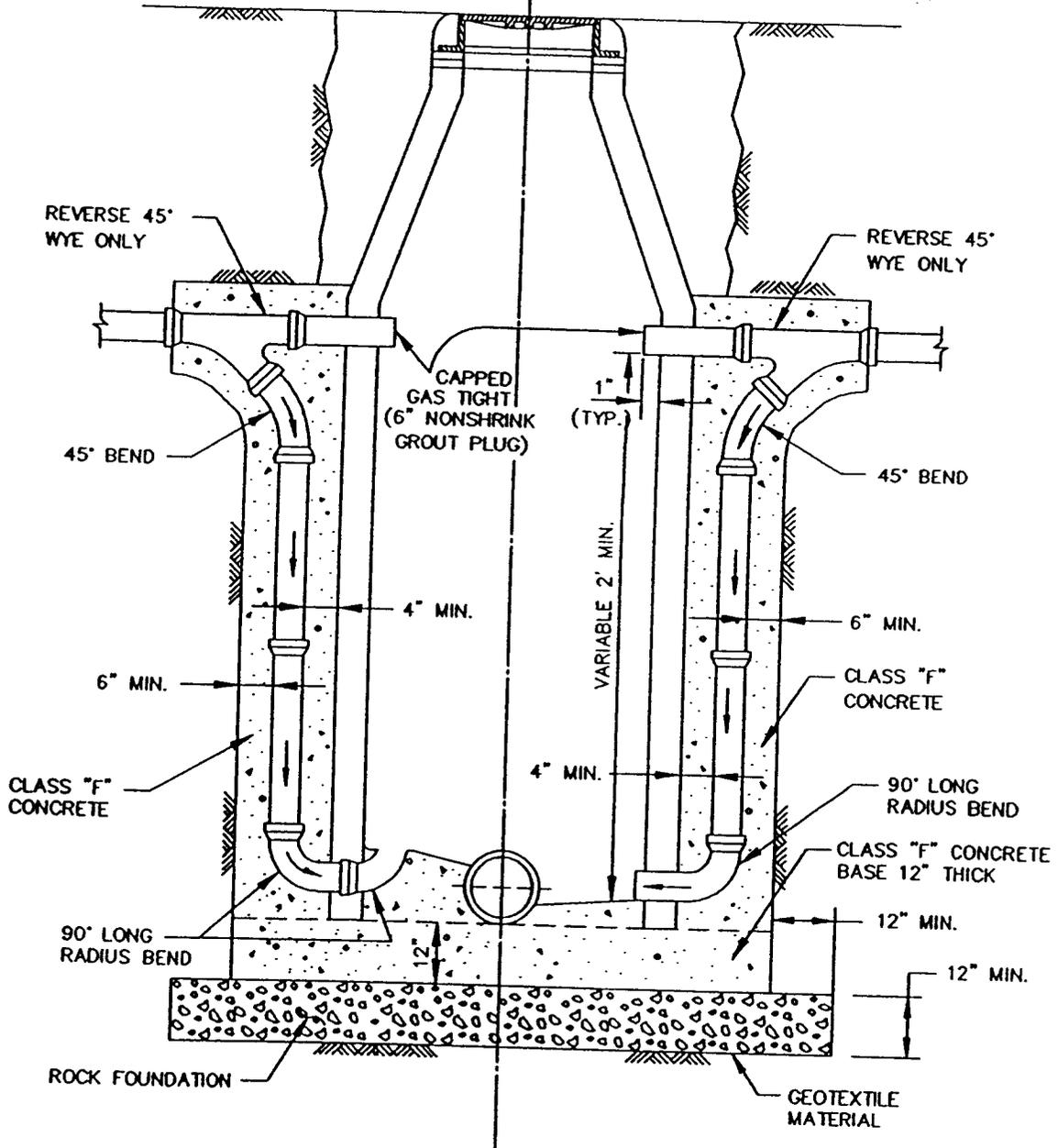
STANDARD SPECIFICATION REFERENCE
6.7.

DATE
NOV. '96

STANDARD DRAWING NO.
5060

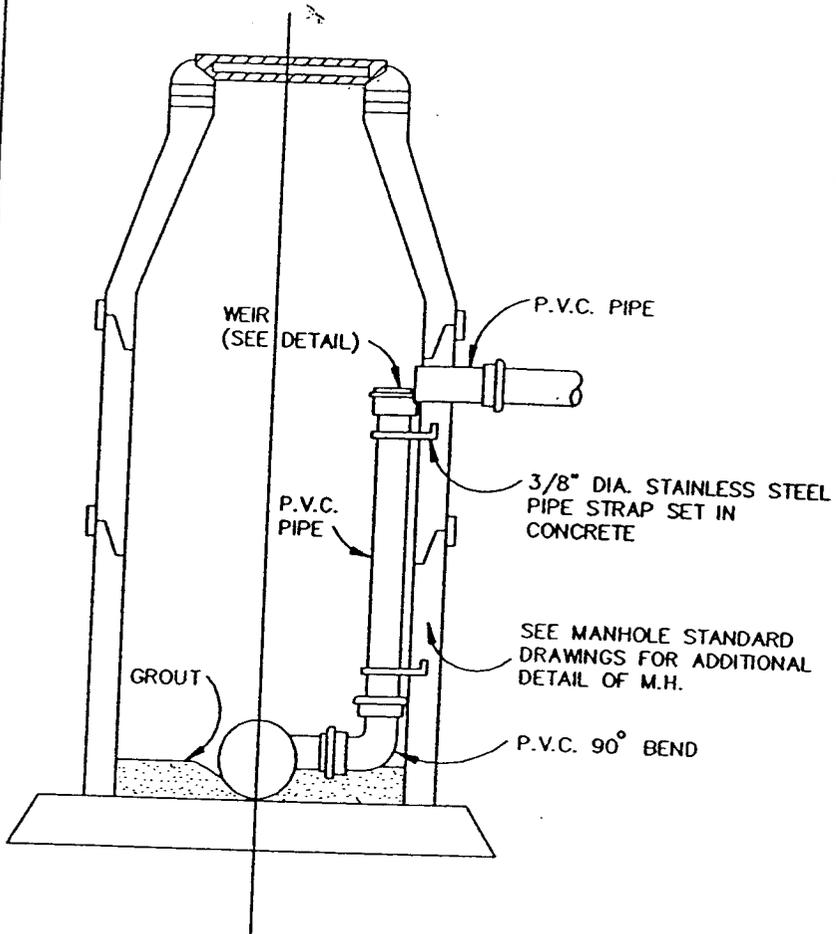
GAS SEALED
DROP CONNECTION
N.T.S.

STANDARD
DROP CONNECTION
N.T.S.

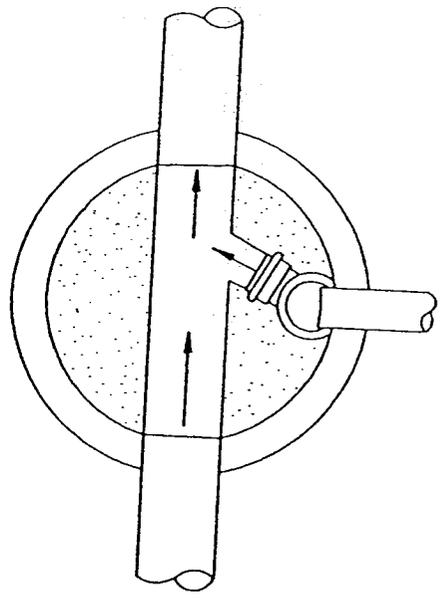


WASTEWATER MANHOLE
OUTSIDE DROP CONNECTIONS

STANDARD SPECIFICATION REFERENCE 6.7.	
DATE NOV. '96	STANDARD DRAWING NO. 5070

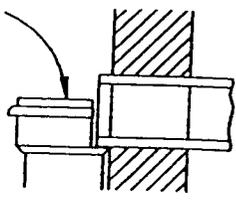


ELEVATION
N.T.S.



PLAN
N.T.S.

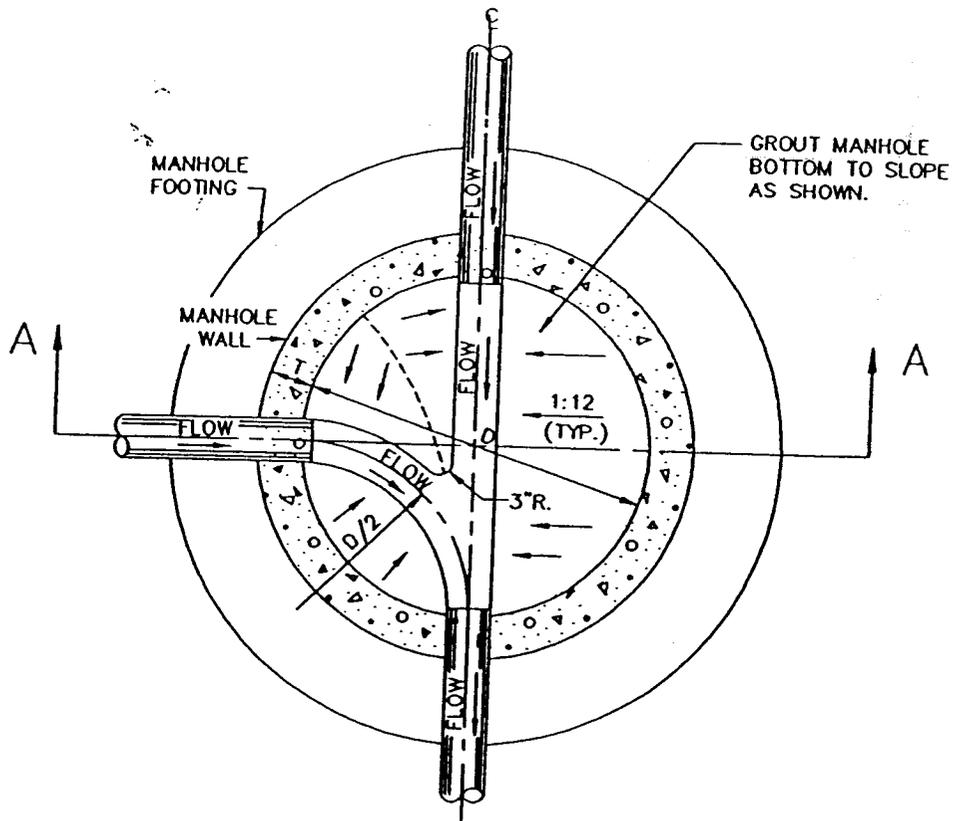
REMOVE PORTION OF DROP PIPE TO CONNECT AS SHOWN



WEIR DETAIL
N.T.S.

NOTE:
FLOW LINE OF SURCHARGE LINE
NORMALLY PLACED AT TOP OF
EXISTING WASTEWATER LINE
UNLESS NOTED OTHERWISE ON
PLANS.

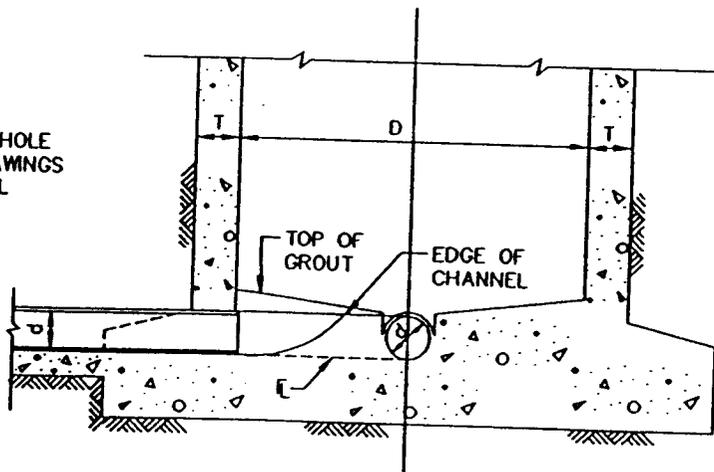
WASTEWATER MANHOLE INSIDE DROP CONNECTION	STANDARD SPECIFICATION REFERENCE 6.7.	
	DATE NOV. '96	STANDARD DRAWING NO. 5080



PLAN
N.T.S.

T = WALL THICKNESS
D = MANHOLE DIAMETER
d = PIPE DIAMETER

NOTE:
REFER TO MANHOLE
STANDARD DRAWINGS
FOR ADDITIONAL
DETAIL OF M.H.



SECTION A-A
N.T.S.

WASTEWATER MANHOLE
LINE INTERSECTION

STANDARD SPECIFICATION REFERENCE
6.7.

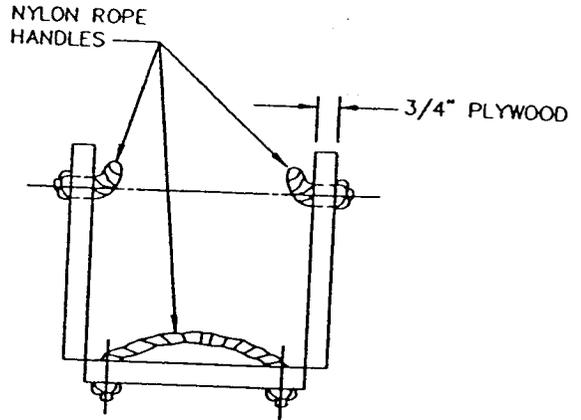
DATE NOV. '96 STANDARD DRAWING NO. 5090

INSTALLATION

FALSE MANHOLE BOTTOM SHALL BE FURNISHED AND INSTALLED IN ALL MANHOLES CONSTRUCTED IN ADVANCE OF PAVING. THESE FALSE MANHOLE BOTTOMS WILL BE INSTALLED AT A TIME DIRECTED BY THE ENGINEER BUT WILL USUALLY BE AFTER ALL WORK IS COMPLETED ON THE WASTEWATER SYSTEM INCLUDING THE AIR TEST, BUT PRIOR TO THE FINAL INSPECTION.

REMOVAL

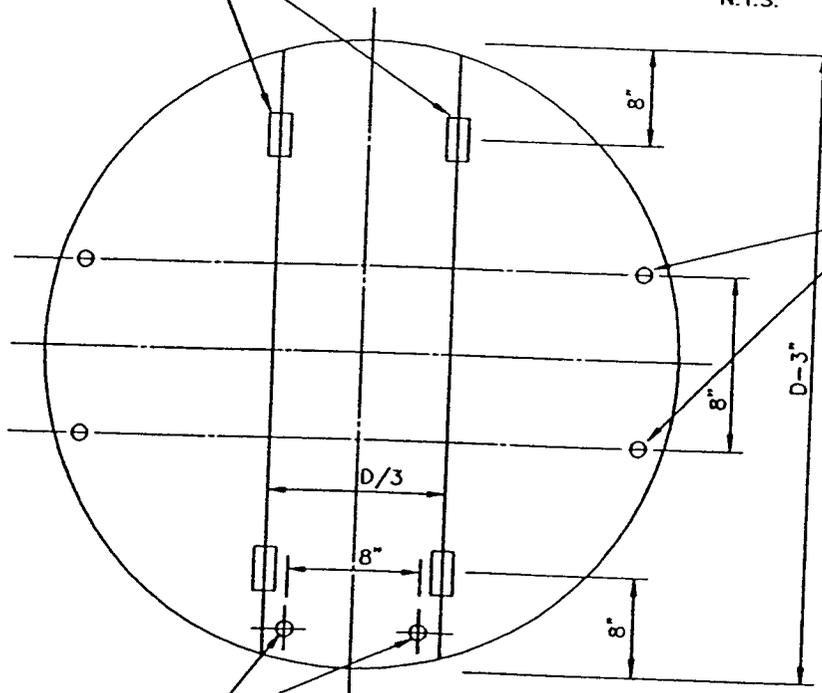
FALSE MANHOLE BOTTOM SHALL BE REMOVED AFTER THE FINAL APPURTENANCE ADJUSTMENT INSPECTION. THE PAVING CONTRACTOR AND OWNER'S REPRESENTATIVE WILL COORDINATE THE REMOVAL OF THE FALSE MANHOLE BOTTOMS.



INSTALLATION AND REMOVAL POSITION

N.T.S.

METAL STRAP HINGES
(MIN. 3" LONG) W/BOLTS



5/8" HOLES FOR
1/2" NYLON ROPE
HANDLES

5/8" HOLE FOR 1/2"
NYLON ROPE HANDLES

PLAN VIEW

N.T.S.

D = INSIDE DIAMETER
OF MANHOLE

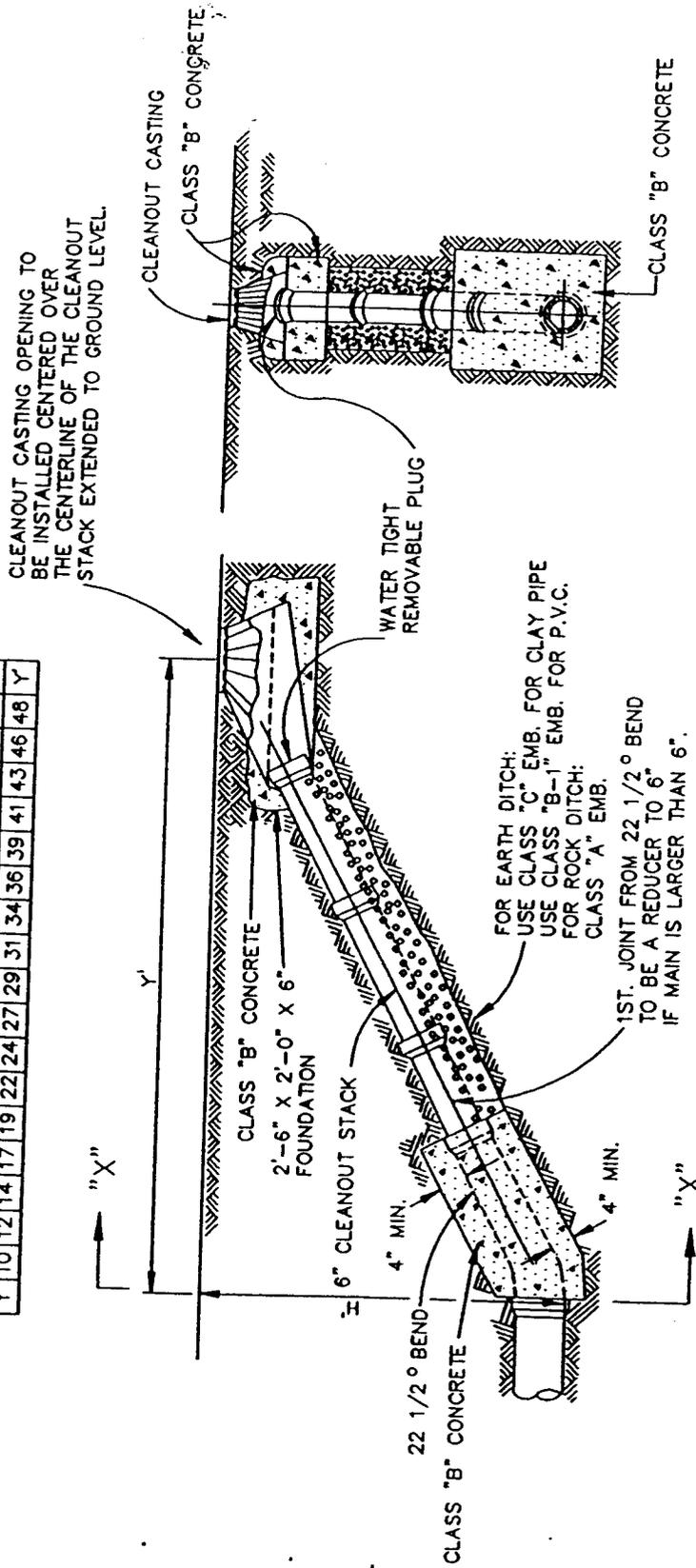
WASTEWATER MANHOLE
FALSE BOTTOM

STANDARD SPECIFICATION REFERENCE

DATE
NOV. '96

STANDARD DRAWING NO.
5100

H'	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	H'
Y'	10	12	14	17	19	22	24	27	29	31	34	36	39	41	43	46	48	Y'



SECTION "X - X"
N.T.S.

PROFILE VIEW
N.T.S.

NOTE:
IF CLEANOUT IS PLACED IN ADVANCE OF PAVEMENT PLACE SAND AROUND CLEANOUT CASTING IN LIEU OF CLASS "B" CONCRETE.

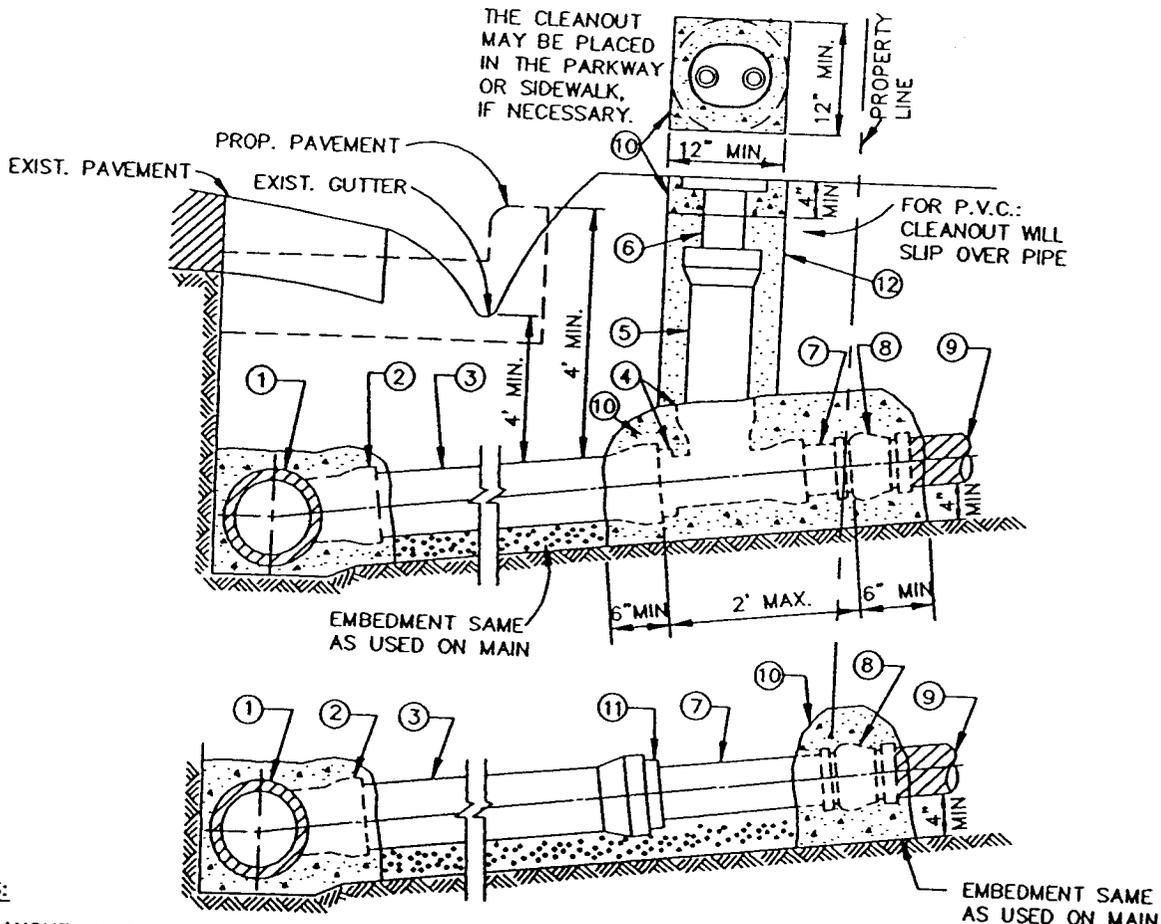
STANDARD SPECIFICATION REFERENCE	6.7.
DATE	NOV. '96
STANDARD DRAWING NO.	5110

WASTEWATER MAIN
CLEANOUT

STANDARD DRAWING NO.
5110

KEY:

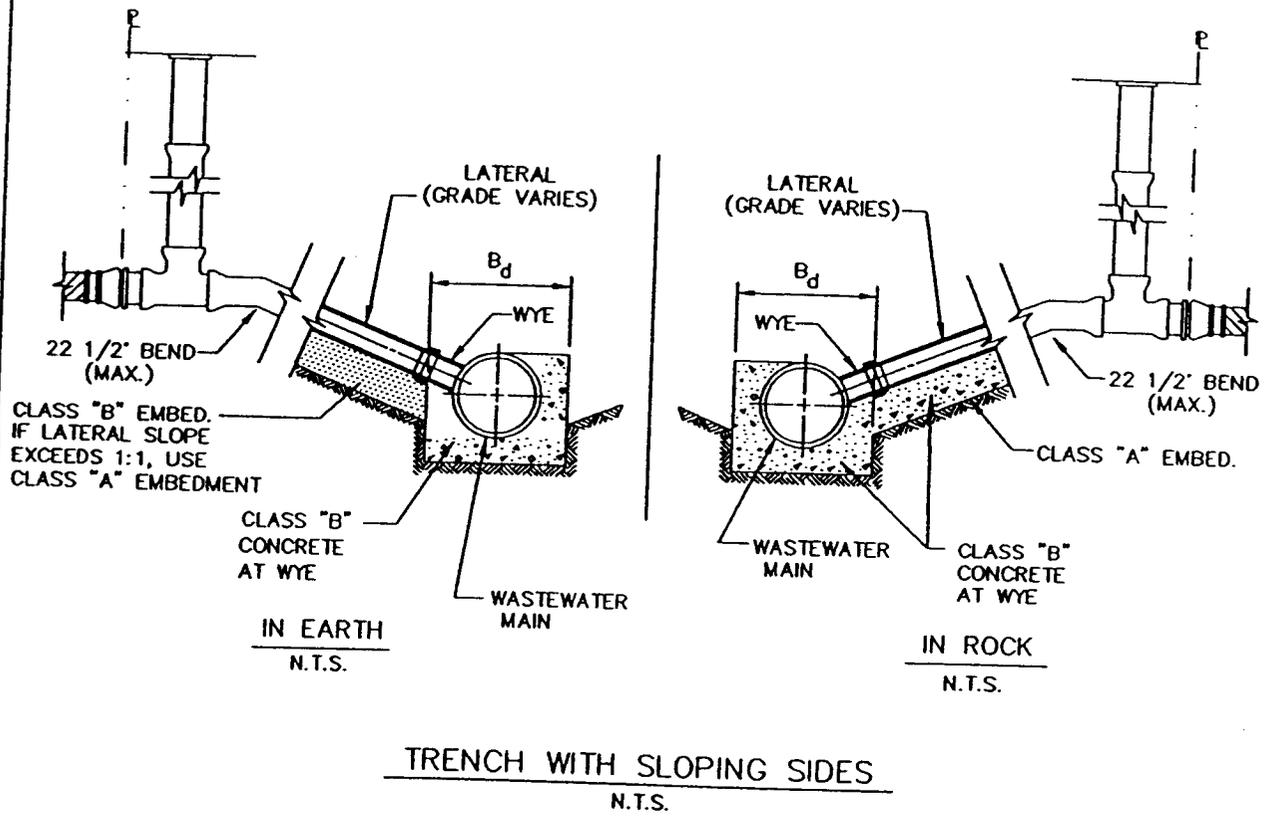
- ① WASTERWATER MAIN
- ② 6" WYE
- ③ 6" WASTEWATER LAT. (LENGTH VARIES)
- ④ 6" X 4" RED. AND 4" X 4" TEE OR WYE, OR 6" X 4" TEE OR WYE, AS REQ'D. BY OWNER.
- ⑤ 4" STACK (LENGTH VARIES)
- ⑥ 4" WASTEWATER LAT. CLEANOUT CASTING
- ⑦ 4" WASTEWATER PIPE (LENGTH VARIES)
- ⑧ ADAPTOR
- ⑨ BUILDING SEWER LAT.
- ⑩ CLASS "B" CONCRETE
- ⑪ 6" X 4" REDUCER
- ⑫ COMPACTED AS SPECIFIED, OR INUNDATED SAND



NOTES:

1. CLEANOUT CASTING TO BE FURNISHED AND PLACED PER SPECIAL CONDITIONS. IN VEHICLE TRAFFIC AREAS AND FOR COMMERCIAL MAINLINE LATERALS, WASTEWATER CLEANOUT SHALL BE OF CAST IRON.
2. SLOPE OF LATERAL TO BE 1% MIN., 2% MAX. UNLESS INSTRUCTED OTHERWISE BY OWNER.
3. THE WASTEWATER LATERAL SHALL BE CONNECTED TO BUILDING LATERAL AND CONSTRUCTED IN SUCH MANNER AS TO CLEAR EXISTING UTILITES AND PROPOSED FACILITIES SUCH AS STORM SEWER MAINS, PAVING, SIDEWALKS, RETAINING WALLS, ETC. VERTICAL BENDS (22.5° MAX.) MAY BE USED IF APPROVED BY OWNER.
4. THE MAINLINE LATERAL CONNECTION TO THE PRIVATE BUILDING LATERAL SHALL BE AS CLOSE TO THE PROPERTY LINE AS POSSIBLE.
5. INSTALL 4" STOPPER OR CAP AT PROPERTY LINE IF BUILDING LATERAL DOES NOT EXIST.
6. SUBSTITUE 4" FOR 6" FITTINGS IF PLANS OR SPEC. COND. CALL FOR 4" LATERALS.
7. THE CLEANOUT STACK & CASTING MAY BE PLACED IN THE PARKWAY, VEHICLE TRAFFIC AREAS, OR SIDEWALK, IF NECESSARY.

<p>WASTEWATER LATERALS WITH & WITHOUT CLEANOUT</p>	<p>STANDARD SPECIFICATION REFERENCE</p> <p>6.7.</p>
	<p>DATE</p> <p>NOV. '96</p>
	<p>STANDARD DRAWING NO.</p> <p>5120</p>



NOTES:

1. WYE SHALL BE SUPPORTED AS SHOWN FOR WYE CONNECTION SUPPORT.
2. LATERALS ARE TO CLEAR ALL EXISTING UTILITIES. 11 1/4" OR 22 1/2" BEND, ONLY, MAY BE REQUIRED.

WASTEWATER LATERAL CONNECTIONS

IN EARTH & IN ROCK

STANDARD SPECIFICATION REFERENCE

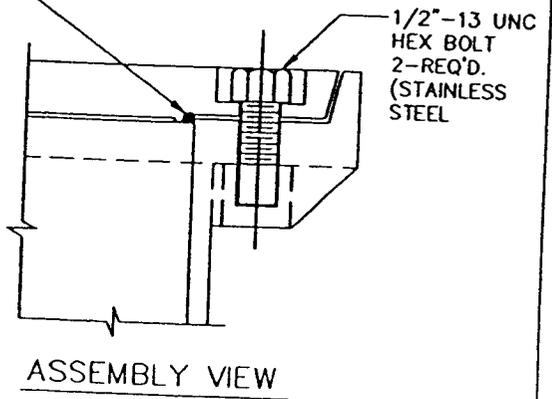
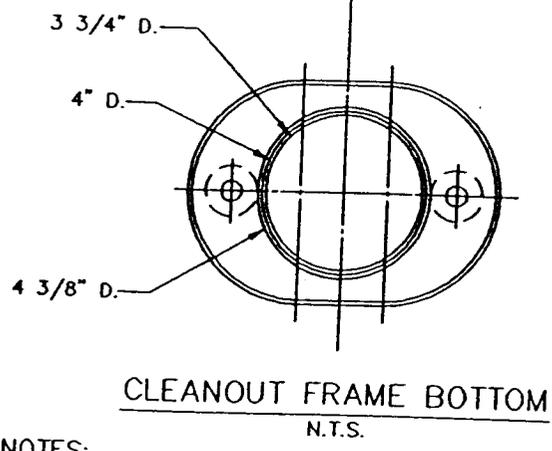
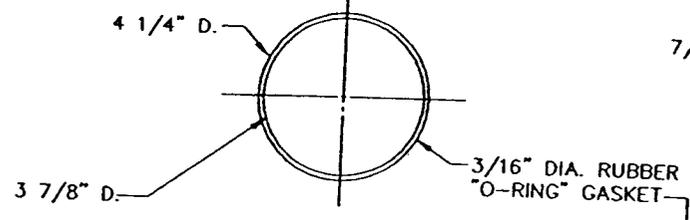
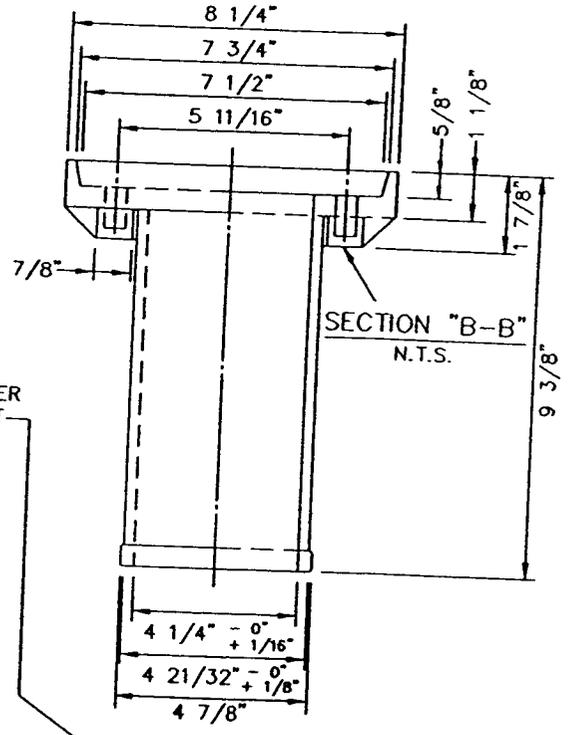
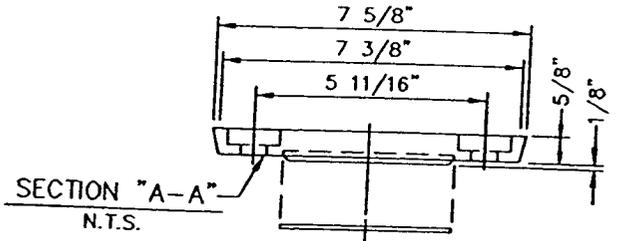
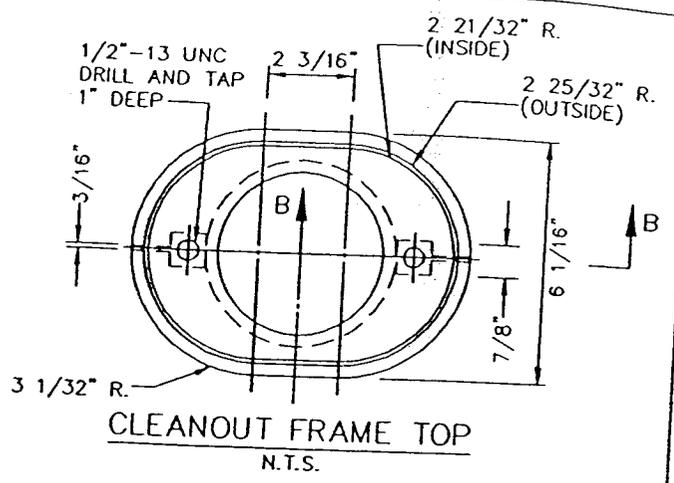
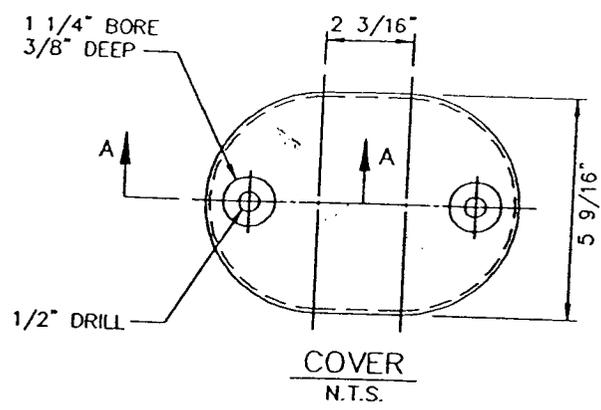
6.7.

DATE

NOV. '96

STANDARD DRAWING NO.

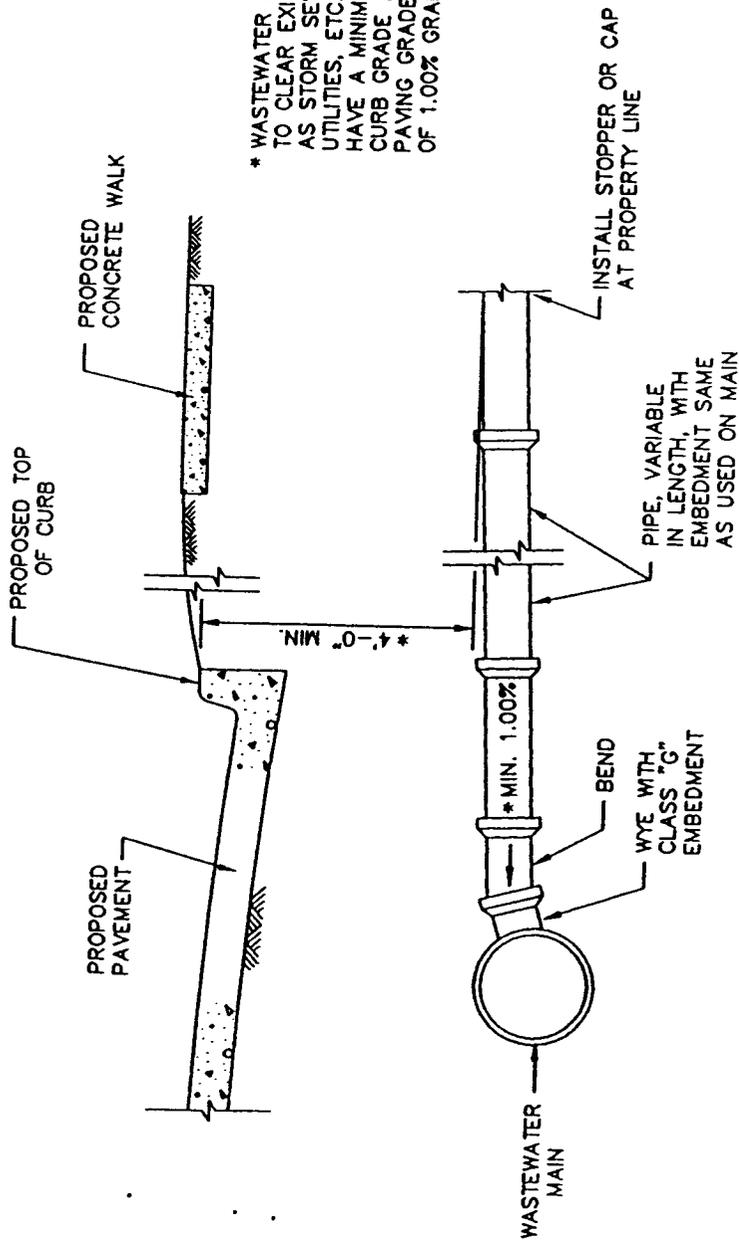
5130



NOTES:

1. THE WORDS "WASTEWATER LATERAL CLEANOUT" SHALL BE CAST INTO TOP OF COVER.
2. MATERIALS TO BE CAST IRON, P.V.C. OR ABS PLASTIC.

WASTEWATER LATERAL CLEANOUT FRAME & COVER	STANDARD SPECIFICATION REFERENCE 6.7.
	DATE NOV. '96

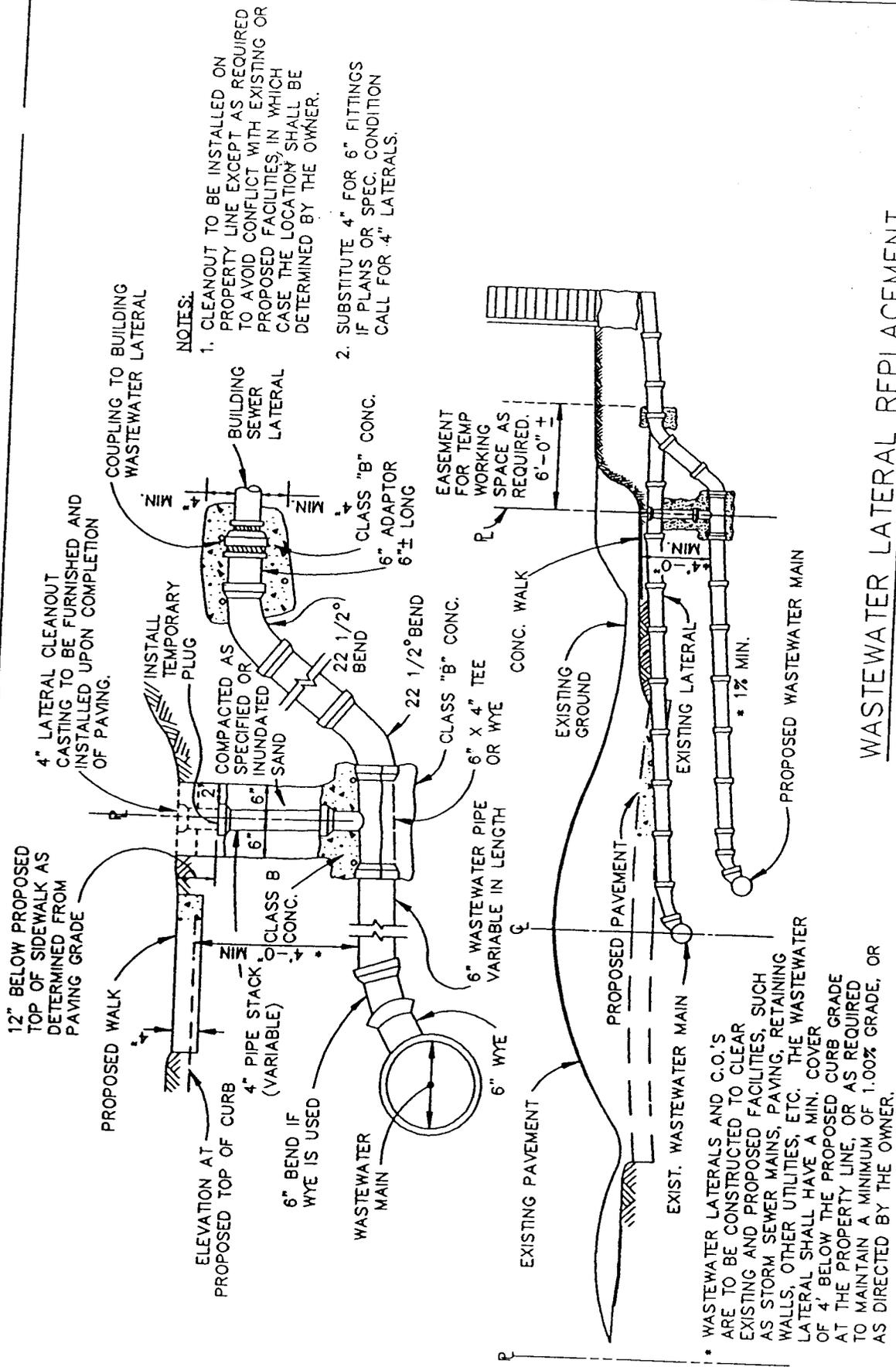


* WASTEWATER LATERALS ARE TO BE CONSTRUCTED TO CLEAR EXISTING AND PROPOSED FACILITIES, SUCH AS STORM SEWER MAINS, RETAINING WALLS, OTHER UTILITIES, ETC. THE WASTEWATER LATERAL SHALL HAVE A MINIMUM COVER OF 4'-0" BELOW THE PROPOSED CURB GRADE AT THE PROPERTY LINE, DETERMINED FROM PAVING GRADE, OR AS REQUIRED TO MAINTAIN A MINIMUM OF 1.00% GRADE, OR AS DIRECTED BY THE OWNER.

WASTEWATER LATERAL STUBOUT
 (FOR FUTURE CONNECTION, 4" OR 6" AS SPECIFIED)
 N.T.S.

**WASTEWATER LATERAL STUBOUT
 IN ADVANCE OF PAVING**

STANDARD SPECIFICATION REFERENCE	6.7.
DATE	NOV. '96
STANDARD DRAWING NO.	5150

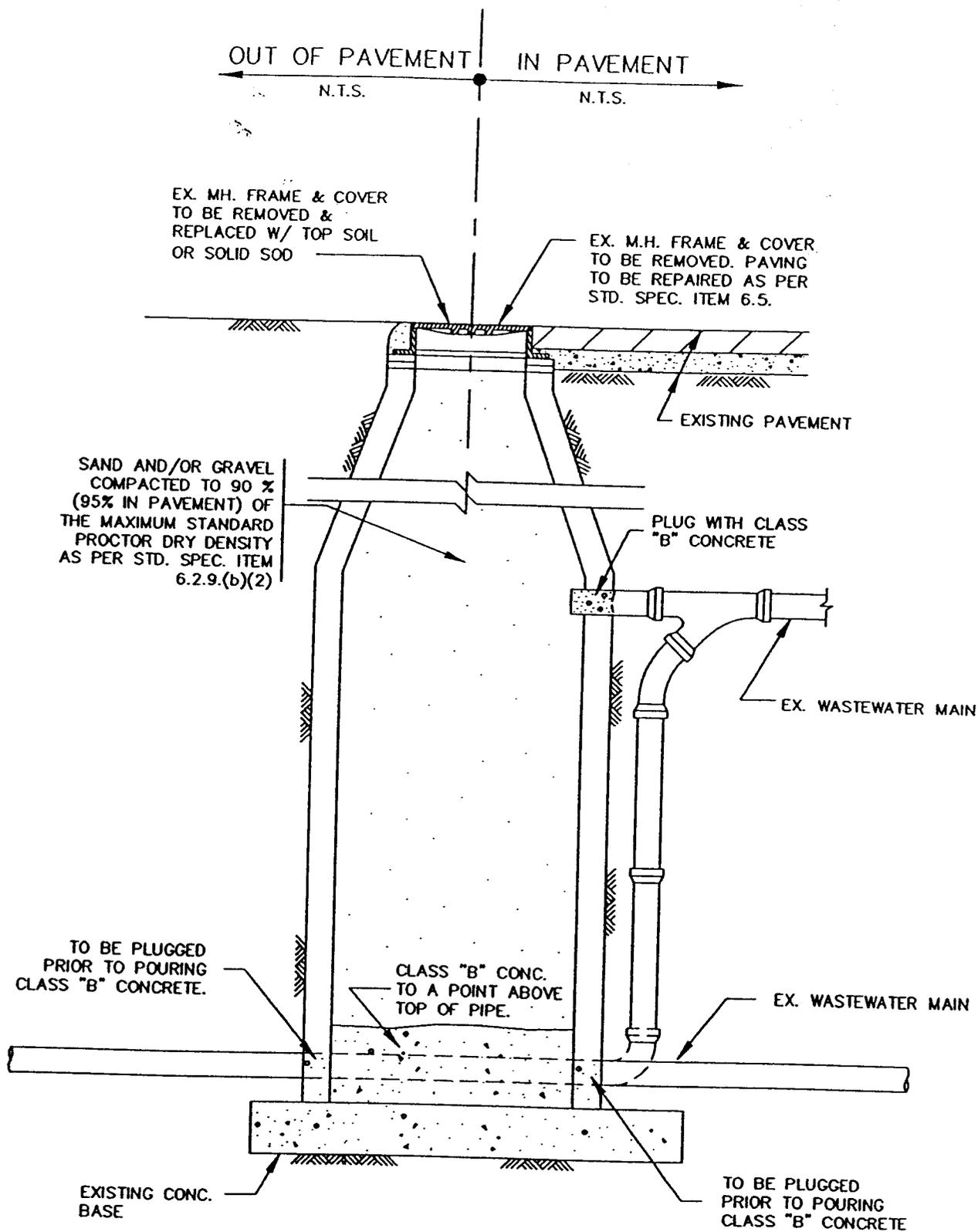


WASTEWATER LATERAL REPLACEMENT

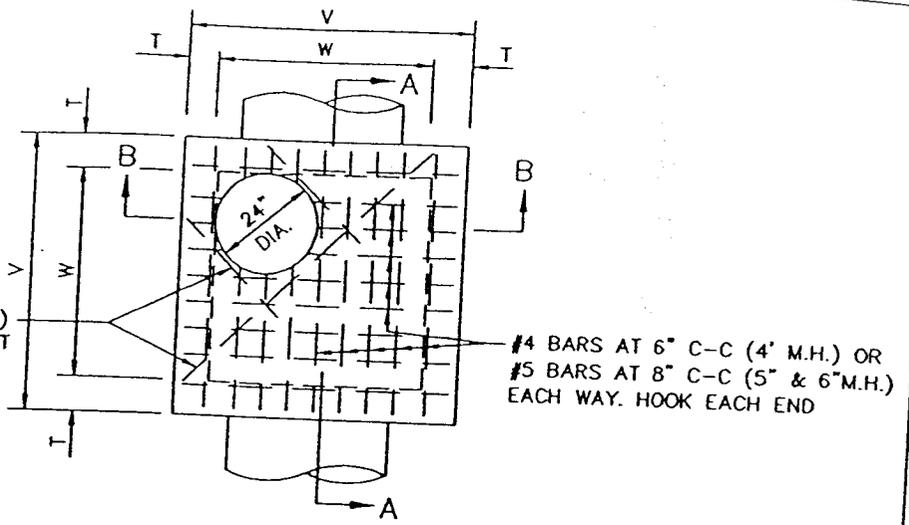
N.T.S.

WASTEWATER LATERAL REPLACEMENT
IN ADVANCE OF PAVING

STANDARD SPECIFICATION REFERENCE	6.7.
DATE	NOV. '96
STANDARD DRAWING NO.	5160



ABANDONMENT OF MANHOLE IN OR OUT OF PAVEMENT	STANDARD SPECIFICATION REFERENCE	6.7.
	DATE	NOV. '96
	STANDARD DRAWING NO.	5170



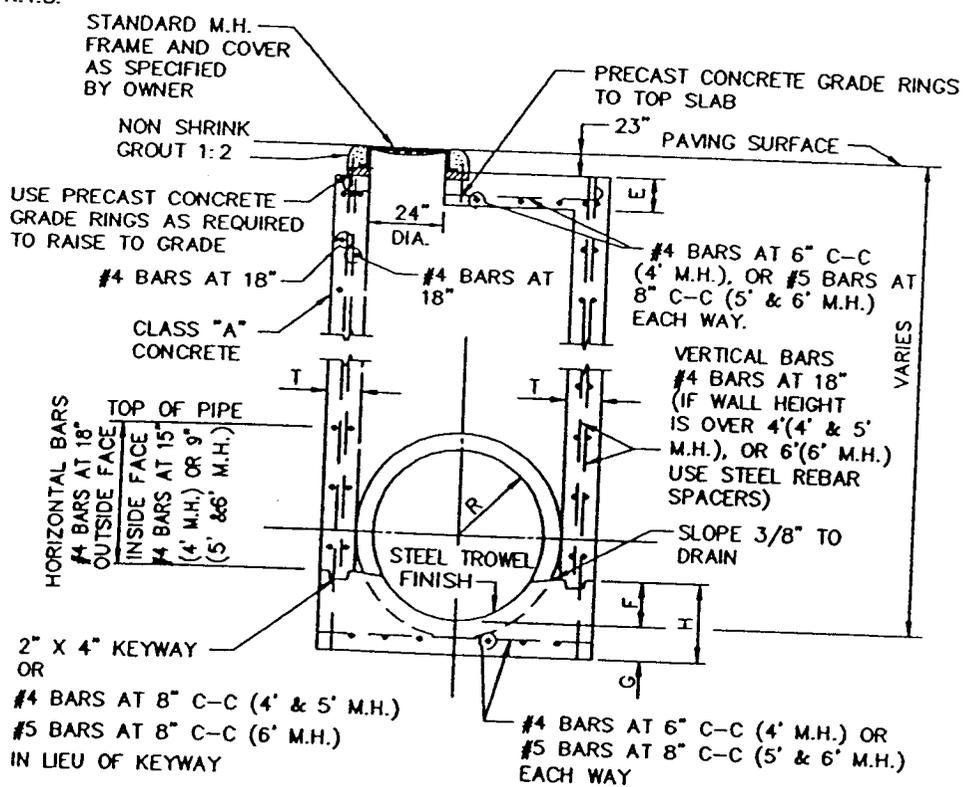
3-#4 BARS (4' & 5' M.H.)
OR #5 BARS (6' M.H.) AT
OPENING AS SHOWN.

#4 BARS AT 6" C-C (4' M.H.) OR
#5 BARS AT 8" C-C (5' & 6' M.H.)
EACH WAY. HOOK EACH END

PLAN
N.T.S.

M.H. SIZE(W)	V	T	E	F	G	H
4'	5'-4"	8"	6"	9"	6"	1'-3"
5'	6'-4"	8"	6"	12"	8"	1'-8"
6'	7'-6"	9"	9"	16"	10"	2'-2"

TABLE OF DIMENSIONS
N.T.S.



SECTION B-B
N.T.S.

STORMWATER MANHOLE 4', 5', OR 6' SQUARE	STANDARD SPECIFICATION REFERENCE 6.7.
	DATE NOV. '96 STANDARD DRAWING NO. 6010A

#4 BARS AT 6" C-C (4' M.H.), OR
 #5 BARS AT 8" C-C (5' & 6' M.H.)
 EACH WAY HOOKED
 EACH END

#4 BARS
 AT 18"
 OUTSIDE FACE

#4 BARS
 AT 18" INSIDE FACE

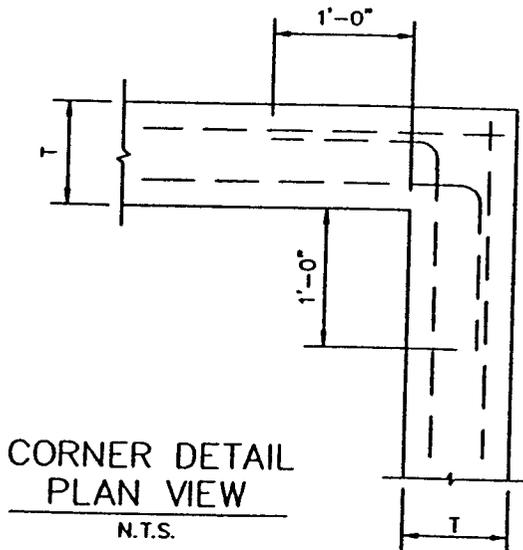
#4 BARS
 AT 18"
 OUTSIDE FACE

#4 BARS AT 15"
 (4' M.H.) OR 9" (5'
 & 6' M.H.) INSIDE FACE.

#4 DOWELS AT 18"
 ALL AROUND EXCEPT
 IN WAY OF PIPE

#4 BARS AT 6" C-C
 (4' M.H.), OR #5 BARS AT
 8" C-C (5' & 6' M.H.)
 EACH WAY

SECTION A-A
 N.T.S.



NOTES:

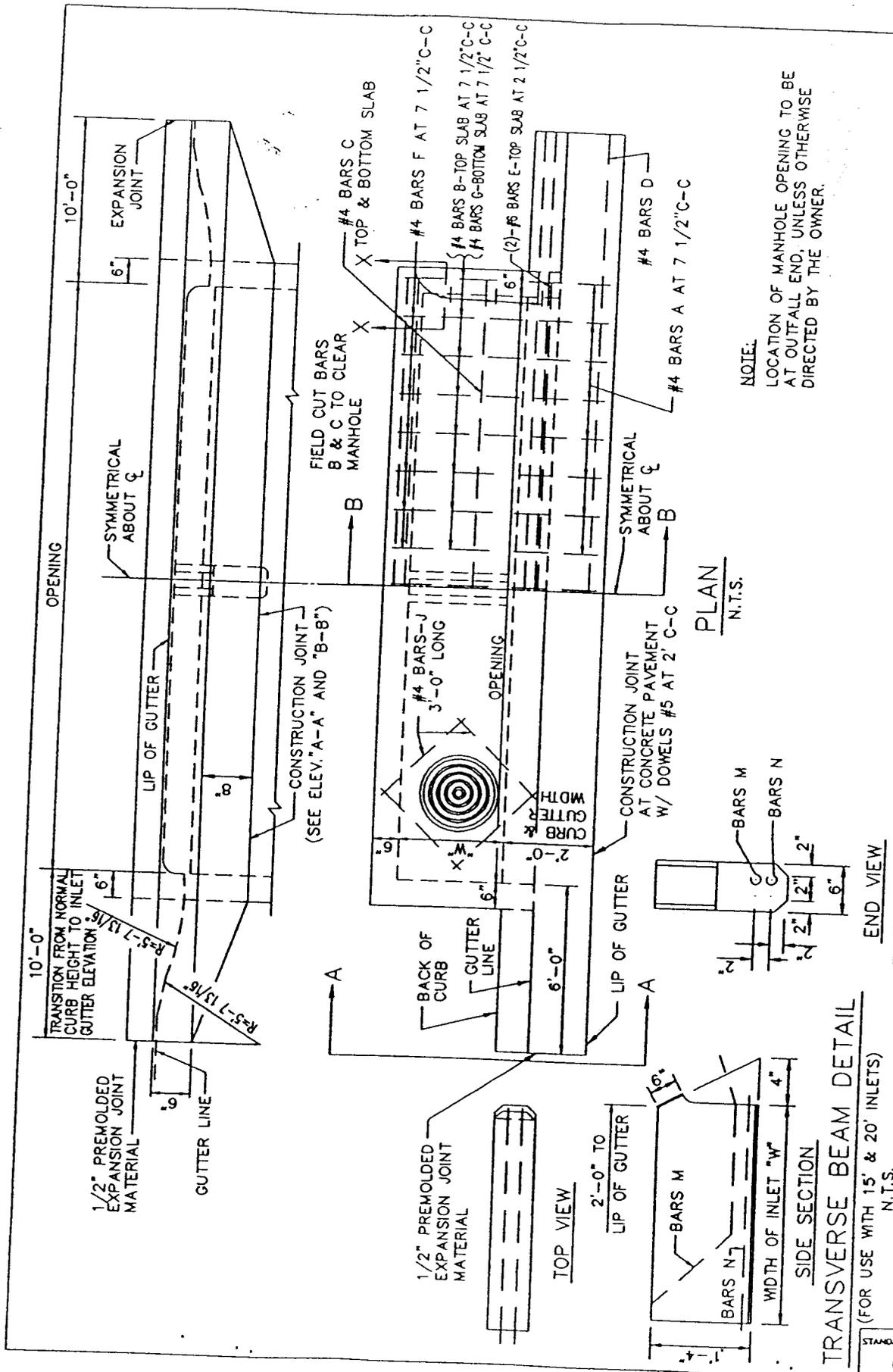
1. SLOPE INVERT OF MANHOLE AS INDICATED ON PLAN-PROFILE SHEET.
2. LAYERS OF REINFORCING STEEL NEAREST THE INTERIOR AND EXTERIOR SURFACE SHALL HAVE A COVER OF 2" TO THE CENTER OF BARS, UNLESS OTHERWISE NOTED.
3. CONCRETE SHALL BE CLASS "A".

STORMWATER MANHOLE
 4', 5', OR 6' SQUARE

STANDARD SPECIFICATION REFERENCE
 6.7.

DATE
 NOV. '96

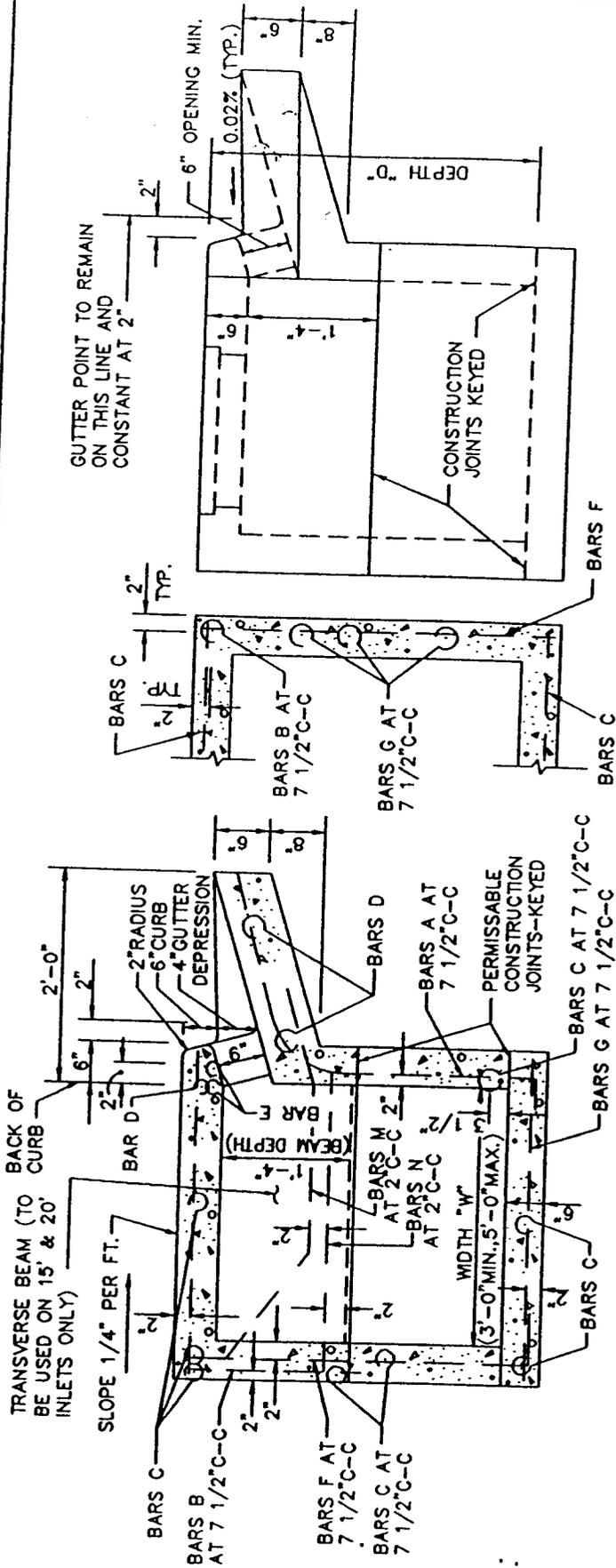
STANDARD DRAWING NO.
 6010B



NOTE:
 LOCATION OF MANHOLE OPENING TO BE AT OUTFALL END, UNLESS OTHERWISE DIRECTED BY THE OWNER.

STANDARD SPECIFICATION REFERENCE	7.6.
DATE	NOV. '96
STANDARD DRAWING NO.	6020A
CURB INLET	
5', 10', 15' OR 20' OPENING	

STANDARD DRAWING NO. 6020A



SECTION "B-B"
N.T.S.

SECTION "X-X"
N.T.S.

SECTION "A-A"
N.T.S.

GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS "A" CONCRETE.
2. REINFORCING BARS SHALL BE STANDARD GRADE STEEL, DEFORMED REINFORCING BARS OF A DIAMETER AND LENGTH AS SHOWN.
3. CHAMFER ALL EXPOSED CORNERS 3/4" EXCEPT WHERE OTHERWISE NOTED.
4. DIMENSIONS RELATING TO REINFORCING STEEL ARE TO CENTERS OF BARS.
5. FIELD CUT AND BEND BARS AS NECESSARY TO ACCOMMODATE STORM SEWER PIPE.
6. RING AND COVER SHALL BE APPROVED BY THE OWNER AND INSTALLED BY THE CONTRACTOR.

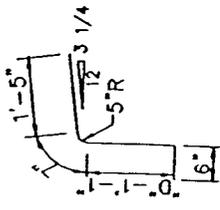
STANDARD DRAWING NO.
6020B

CURB INLET
CROSS SECTION & INLET THROAT

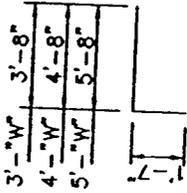
STANDARD SPECIFICATION REFERENCE
7.6.

DATE
NOV. '96

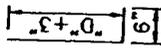
STANDARD DRAWING NO.
6020B



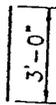
#4 BARS A
N.T.S.



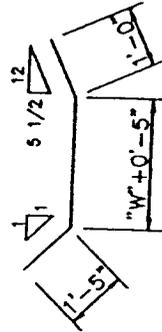
#4 BARS B
N.T.S.



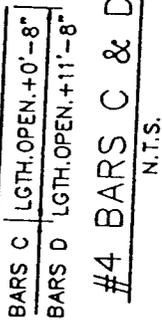
#4 BARS F
N.T.S.



#4 BARS J
N.T.S.



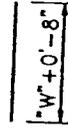
#3 BARS M
N.T.S.



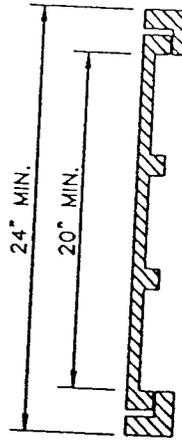
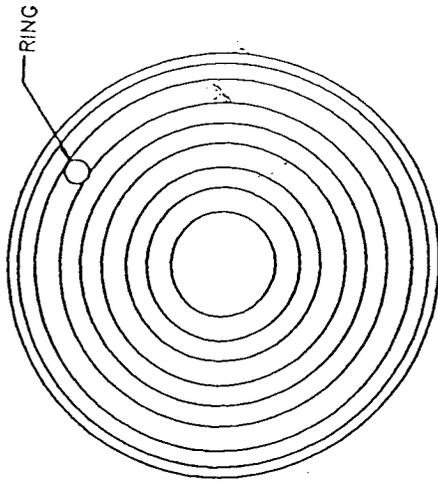
#4 BARS C & D
N.T.S.



#4 BARS G
N.T.S.



#5 BARS N
N.T.S.



CAST IRON
FRAME AND COVER
N.T.S.

CURB INLET
REBAR & M.H. FRAME & COVER

STANDARD SPECIFICATION REFERENCE
7.6.

DATE
NOV. '96

STANDARD DRAWING NO.
6020C

STANDARD DRAWING NO.
6020C

BILL OF REINFORCING STEEL

DEPTH "D"	ALL WIDTHS AND LENGTHS		"L" = 5ft						"L" = 10ft						"L" = 15 ft						"L" = 20 ft											
	OPENING LENGTH		"W"		"W"		"W"		"W"		"W"		"W"		"W"		"W"		"W"		"W"		"W"		"W"		"W"					
	BARS	BARS	3ft	4ft	5ft	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS	BARS			
3'-6"	C	D	E	J	F	F	A	B	G	F	F	F	A	B	G	F	F	F	A	B	G	M	N	F	F	F	A	B	G	M	N	
3'-9"	17	3	2	4	20	24	28	10	10	20	28	32	36	18	18	28	36	40	44	26	26	36	2	2	44	48	52	34	34	44	2	2
4'-0"	18	"	"	"	"	"	"	"	20	"	"	"	"	"	28	"	"	"	"	"	36	"	"	"	"	"	"	"	"	44	"	"
4'-3"	19	"	"	"	"	"	"	"	24	"	"	"	"	"	32	"	"	"	"	"	40	"	"	"	"	"	"	"	"	48	"	"
4'-6"	21	"	"	"	"	"	"	"	24	"	"	"	"	"	32	"	"	"	"	"	40	"	"	"	"	"	"	"	"	48	"	"
4'-9"	21	"	"	"	"	"	"	"	26	"	"	"	"	"	34	"	"	"	"	"	42	"	"	"	"	"	"	"	"	50	"	"
5'-0"	21	"	"	"	"	"	"	"	26	"	"	"	"	"	34	"	"	"	"	"	42	"	"	"	"	"	"	"	"	50	"	"
5'-3"	23	"	"	"	"	"	"	"	28	"	"	"	"	"	36	"	"	"	"	"	44	"	"	"	"	"	"	"	"	50	"	"
5'-6"	23	"	"	"	"	"	"	"	28	"	"	"	"	"	36	"	"	"	"	"	44	"	"	"	"	"	"	"	"	50	"	"
5'-9"	25	"	"	"	"	"	"	"	30	"	"	"	"	"	38	"	"	"	"	"	46	"	"	"	"	"	"	"	"	52	"	"
6'-0"	25	"	"	"	"	"	"	"	30	"	"	"	"	"	38	"	"	"	"	"	46	"	"	"	"	"	"	"	"	52	"	"
6'-3"	26	"	"	"	"	"	"	"	30	"	"	"	"	"	38	"	"	"	"	"	46	"	"	"	"	"	"	"	"	54	"	"
6'-6"	27	"	"	"	"	"	"	"	30	"	"	"	"	"	38	"	"	"	"	"	46	"	"	"	"	"	"	"	"	54	"	"
6'-9"	27	"	"	"	"	"	"	"	32	"	"	"	"	"	40	"	"	"	"	"	48	"	"	"	"	"	"	"	"	56	"	"
7'-0"	29	"	"	"	"	"	"	"	32	"	"	"	"	"	40	"	"	"	"	"	48	"	"	"	"	"	"	"	"	56	"	"
7'-3"	29	"	"	"	"	"	"	"	34	"	"	"	"	"	42	"	"	"	"	"	50	"	"	"	"	"	"	"	"	58	"	"
7'-6"	30	"	"	"	"	"	"	"	34	"	"	"	"	"	42	"	"	"	"	"	50	"	"	"	"	"	"	"	"	58	"	"
7'-9"	31	"	"	"	"	"	"	"	34	"	"	"	"	"	42	"	"	"	"	"	50	"	"	"	"	"	"	"	"	58	"	"
8'-0"	31	"	"	"	"	"	"	"	36	"	"	"	"	"	44	"	"	"	"	"	52	"	"	"	"	"	"	"	"	60	"	"
8'-3"	32	"	"	"	"	"	"	"	36	"	"	"	"	"	44	"	"	"	"	"	52	"	"	"	"	"	"	"	"	60	"	"
8'-6"	33	"	"	"	"	"	"	"	36	"	"	"	"	"	44	"	"	"	"	"	52	"	"	"	"	"	"	"	"	60	"	"
8'-9"	34	"	"	"	"	"	"	"	38	"	"	"	"	"	46	"	"	"	"	"	54	"	"	"	"	"	"	"	"	62	"	"
9'-0"	35	"	"	"	"	"	"	"	38	"	"	"	"	"	46	"	"	"	"	"	54	"	"	"	"	"	"	"	"	62	"	"
9'-3"	36	"	"	"	"	"	"	"	40	"	"	"	"	"	48	"	"	"	"	"	56	"	"	"	"	"	"	"	"	64	"	"
9'-6"	37	"	"	"	"	"	"	"	40	"	"	"	"	"	48	"	"	"	"	"	56	"	"	"	"	"	"	"	"	64	"	"
10'-0"	38	"	"	"	"	"	"	"	42	"	"	"	"	"	50	"	"	"	"	"	58	"	"	"	"	"	"	"	"	66	"	"

NOTE:

FOR CONVENIENCE, DEPTHS OF INLETS SHOWN IN ABOVE TABLES ARE IN INCREMENTS OF 3 INCHES BUT ANY DEPTHS OTHER THAN THOSE SHOWN ABOVE MAY BE USED WHEREVER DEEMED NECESSARY. QUANTITIES FOR OTHER DEPTHS FALLING WITHIN THE LIMITS OF THE TABLE MAY BE FOUND BY INTERPOLATION.

STANDARD DRAWING NO. 60200

CURB INLET
BILL OF REINFORCING STEEL

STANDARD SPECIFICATION REFERENCE 7.6.
DATE NOV. '96
STANDARD DRAWING NO. 60200

SUMMARY OF QUANTITIES FOR CURB INLETS

DEPTH "D"	5'-0" OPENING						10'-0" OPENING						15'-0" OPENING						20'-0" OPENING					
	WIDTH 3'-0"		WIDTH 4'-0"		WIDTH 5'-0"		WIDTH 3'-0"		WIDTH 4'-0"		WIDTH 5'-0"		WIDTH 3'-0"		WIDTH 4'-0"		WIDTH 5'-0"		WIDTH 3'-0"		WIDTH 4'-0"		WIDTH 5'-0"	
	CONC C.Y.	STEEL LBS.	CONC C.Y.	STEEL LBS.	CONC C.Y.	STEEL LBS.	CONC C.Y.	STEEL LBS.	CONC C.Y.	STEEL LBS.	CONC C.Y.	STEEL LBS.	CONC C.Y.	STEEL LBS.	CONC C.Y.	STEEL LBS.	CONC C.Y.	STEEL LBS.	CONC C.Y.	STEEL LBS.	CONC C.Y.	STEEL LBS.	CONC C.Y.	STEEL LBS.
3'-6"	2.62	306	2.95	332	3.28	373	4.12	479	4.64	521	5.20	564	5.69	667	6.40	721	7.10	775	7.20	846	8.11	909	9.03	976
3'-9"	2.70	309	3.04	341	3.39	373	4.25	494	4.78	536	5.34	579	5.87	687	6.58	741	7.30	796	7.42	874	8.34	937	9.27	1010
4'-0"	2.78	328	3.14	364	3.49	399	4.38	518	4.92	565	5.49	610	6.05	718	6.77	776	7.49	835	7.64	909	8.58	976	9.51	1046
4'-3"	2.87	334	3.23	370	3.59	406	4.51	526	5.06	573	5.64	619	6.22	729	6.95	787	7.69	847	7.87	922	8.81	990	9.75	1061
4'-6"	2.95	356	3.32	394	3.69	431	4.64	558	5.20	607	5.79	656	6.40	770	7.14	830	7.88	891	8.09	973	9.04	1043	9.99	1115
4'-9"	3.03	361	3.41	410	3.79	438	4.77	566	5.34	616	5.94	665	6.57	780	7.32	841	8.07	903	8.31	986	9.27	1056	10.23	1129
5'-0"	3.12	367	3.51	416	3.90	445	4.90	574	5.47	624	6.09	674	6.75	791	7.51	853	8.27	915	8.53	999	9.50	1070	10.47	1144
5'-3"	3.20	383	3.60	424	4.00	465	5.03	600	5.61	652	6.23	704	6.93	827	7.69	890	8.46	955	8.76	1044	9.73	1118	10.71	1194
5'-6"	3.28	389	3.69	430	4.10	472	5.16	608	5.75	661	6.38	713	7.11	837	7.88	901	8.66	967	8.98	1057	9.97	1131	10.95	1208
5'-9"	3.37	405	3.78	451	4.20	495	5.29	635	5.89	690	6.53	744	7.28	874	8.07	940	8.85	1007	9.20	1102	10.20	1178	11.19	1258
6'-0"	3.45	415	3.88	460	4.30	504	5.42	646	6.03	702	6.68	757	7.45	888	8.25	954	9.05	1022	9.42	1119	10.43	1196	11.43	1276
6'-3"	3.53	425	3.97	470	4.41	515	5.55	661	6.17	718	6.83	773	7.63	908	8.44	975	9.24	1044	9.64	1147	10.66	1223	11.67	1305
6'-6"	3.62	437	4.06	486	4.51	532	5.68	681	6.31	739	6.97	797	7.81	935	8.62	1005	9.43	1057	9.87	1178	10.89	1258	11.92	1340
6'-9"	3.70	441	4.15	490	4.61	537	5.81	688	6.45	747	7.12	806	7.98	945	8.81	1015	9.63	1066	10.09	1191	11.12	1272	12.15	1355
7'-0"	3.78	460	4.25	510	4.71	560	5.94	716	6.59	777	7.27	837	8.16	981	8.99	1053	9.82	1126	10.31	1237	11.35	1319	12.40	1404
7'-3"	3.86	465	4.34	516	4.81	567	6.07	724	6.72	785	7.42	846	8.33	992	9.18	1065	10.02	1138	10.53	1249	11.59	1333	12.64	1418
7'-6"	3.95	477	4.43	529	4.91	570	6.20	742	6.86	804	7.57	866	8.51	1016	9.36	1089	10.21	1163	10.75	1290	11.82	1365	12.88	1451
7'-9"	4.03	491	4.53	544	5.02	597	6.33	762	7.00	826	7.71	890	8.67	1040	9.55	1116	10.41	1193	10.98	1313	12.05	1399	13.12	1498
8'-0"	4.12	496	4.62	550	5.12	604	6.46	770	7.14	834	7.86	899	8.86	1051	9.73	1129	10.60	1205	11.20	1325	12.28	1412	13.36	1510
8'-3"	4.20	504	4.71	559	5.22	613	6.59	784	7.28	849	8.01	915	9.04	1069	9.92	1149	10.80	1228	11.42	1353	12.51	1440	13.60	1529
8'-6"	4.28	519	4.80	576	5.32	632	6.71	804	7.42	871	8.16	938	9.21	1107	10.10	1176	10.99	1257	11.64	1385	12.74	1474	13.84	1565
8'-9"	4.37	528	4.90	586	5.42	643	6.84	819	7.56	886	8.31	954	9.39	1119	10.29	1199	11.18	1280	11.87	1410	12.97	1500	14.08	1592
9'-0"	4.45	545	4.99	605	5.53	664	6.97	842	7.70	912	8.46	982	9.56	1148	10.47	1231	11.38	1313	12.09	1447	13.21	1539	14.32	1631
9'-3"	4.53	554	5.08	614	5.63	674	7.10	858	7.84	929	8.60	999	9.74	1169	10.66	1252	11.57	1335	12.31	1474	13.44	1563	14.56	1660
9'-6"	4.62	568	5.17	630	5.73	692	7.23	878	7.97	950	8.75	1022	9.92	1195	10.84	1280	11.77	1365	12.53	1505	13.67	1600	14.80	1696
10'-0"	4.78	582	5.36	645	5.93	708	7.49	900	8.11	974	9.05	1048	10.27	1227	11.21	1312	12.16	1399	12.98	1546	14.13	1642	15.29	1739

NOTE:

FOR CONVENIENCE, DEPTHS OF INLETS SHOWN IN ABOVE TABLES ARE IN INCREMENTS OF 3 INCHES BUT ANY DEPTHS OTHER THAN THOSE SHOWN ABOVE MAY BE USED WHEREVER DEEMED NECESSARY. QUANTITIES FOR OTHER DEPTHS FALLING WITHIN THE LIMITS OF THE TABLE MAY BE FOUND BY INTERPOLATION.

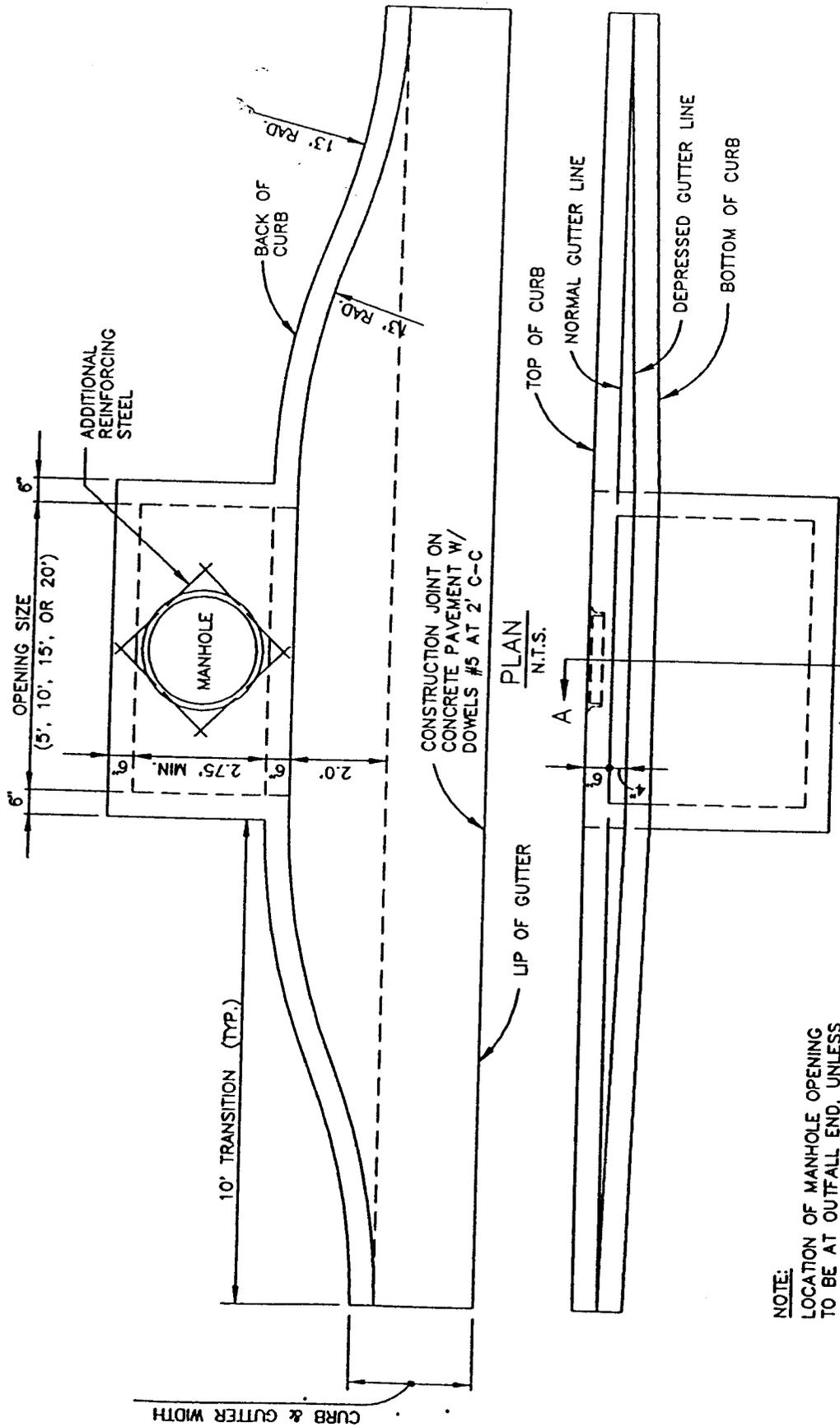
CURB INLET
SUMMARY OF QUANTITIES

STANDARD SPECIFICATION REFERENCE
7.6.

DATE
NOV. '96

STANDARD DRAWING NO.
6020E

STANDARD DRAWING NO.
6020E



PLAN
N.T.S.

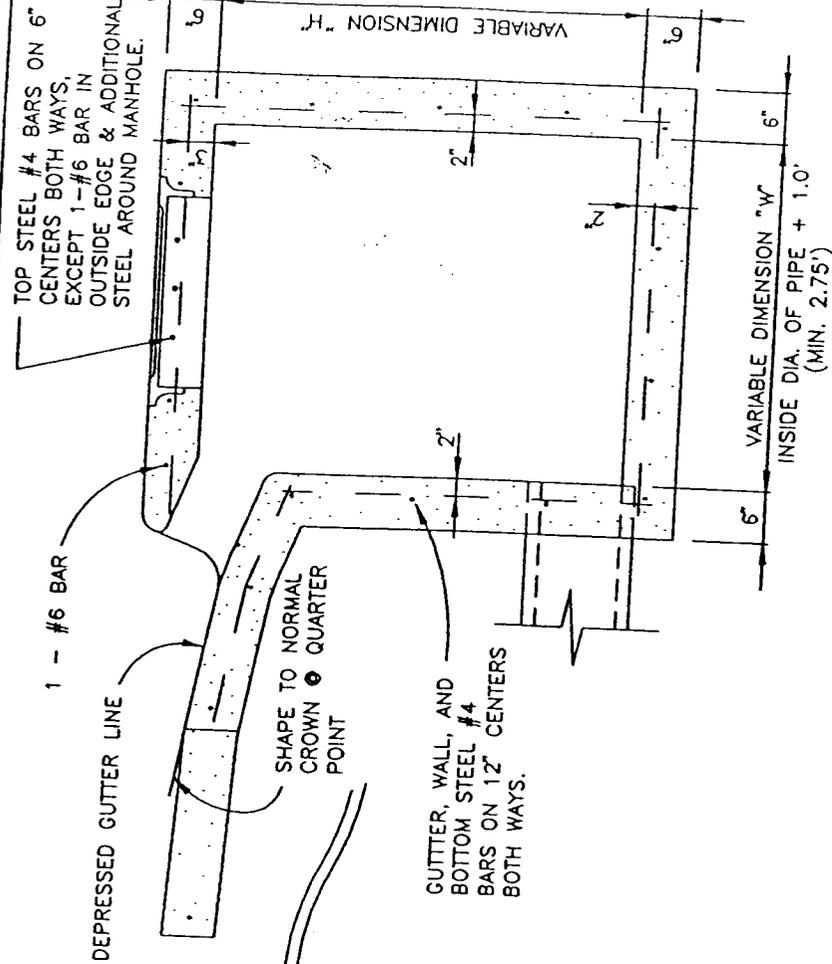
ELEVATION
N.T.S.

NOTE:
LOCATION OF MANHOLE OPENING
TO BE AT OUTFALL END, UNLESS
OTHERWISE DIRECTED BY THE
OWNER.

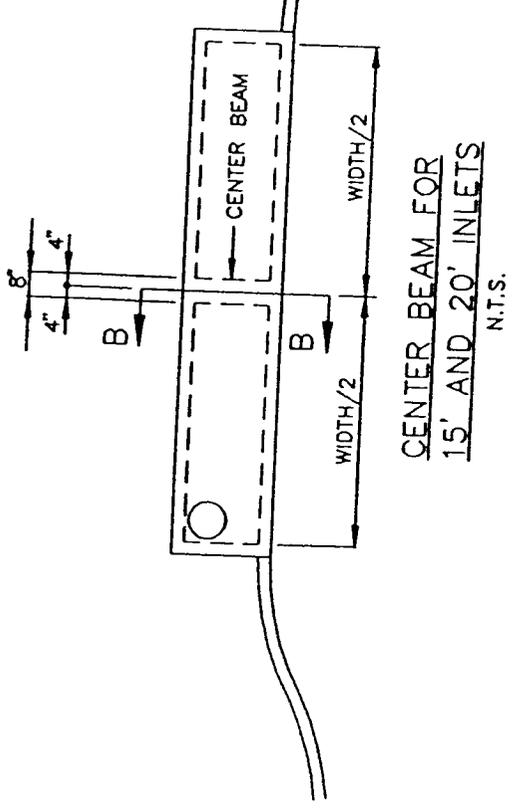
CURB INLET RECESSED
5', 10', 15' OR 20' OPENING

STANDARD SPECIFICATION REFERENCE	7.6.
DATE	NOV. '96
STANDARD DRAWING NO.	6030A

STANDARD DRAWING NO.
6030A



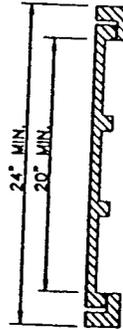
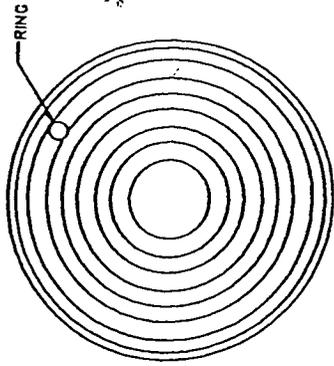
SECTION A-A
N.T.S.



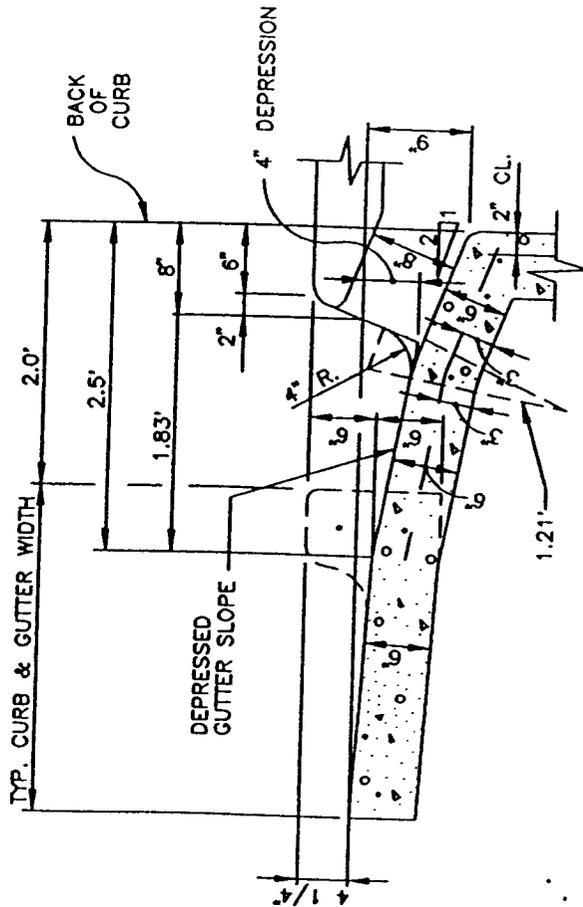
SECTION B-B
N.T.S.

CURB INLET RECESSED
CROSS SECTION & CENTER BEAM

STANDARD SPECIFICATION REFERENCE	7.6.
DATE	NOV. '96
STANDARD DRAWING NO.	6030B



MANHOLE FRAME & COVER
N.T.S.



INLET THROAT
N.T.S.

CURB INLET RECESSED
INLET THROAT & M.H. FRAME & COVER

STANDARD SPECIFICATION REFERENCE
7.6

DATE
NOV. '96

STANDARD DRAWING NO.
6030C

STANDARD DRAWING NO.
6030C

GENERAL NOTES:

1. IN GENERAL, REINFORCING STEEL SHALL BE #4 BARS ON 12" CENTERS BOTH WAYS FOR GUTTER, BOTTOM SLAB ENDS, FRONT AND BACK WALLS, AND #4 BARS ON 6" CENTERS BOTH WAYS FOR TOP SLAB. AN ADDITIONAL #6 BAR SHALL BE PLACED IN THE FRONT EDGE OF THE TOP SLAB IN THE INLETS AND ADDITIONAL REINFORCING STEEL SHALL BE PLACED AROUND MANHOLES AS SHOWN.
2. ALL REINFORCING STEEL SHALL BE GRADE 60.
3. ALL CONCRETE SHALL BE CLASS "A". ALL EXPOSED CORNERS SHALL BE CHAMFERED 3/4".
4. ALL REINFORCING STEEL SHALL HAVE A MINIMUM COVER OF 2" TO THE CENTERS OF THE BARS.
5. 10'-0" OF EXISTING CURB AND GUTTER UPSTREAM AND 10'-0" OF EXISTING CURB AND GUTTER DOWNSTREAM SHALL BE REMOVED AND REPOURED INTEGRALLY WITH EACH INLET.
6. ALL BACK FILLING SHALL BE PERFORMED BY MECHANICAL TAMPING TO 90% STANDARD PROCTOR DENSITY.

CURB INLET RECESSED

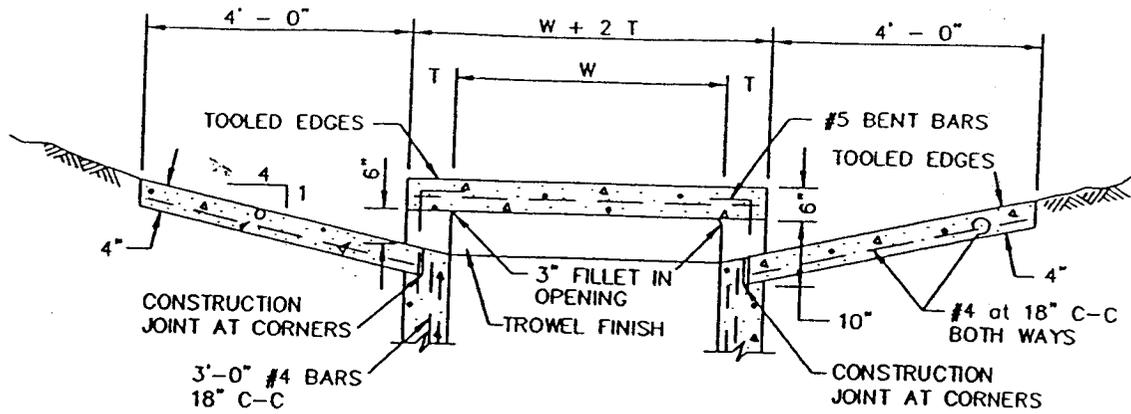
GENERAL NOTES

STANDARD SPECIFICATION REFERENCE
7.6.

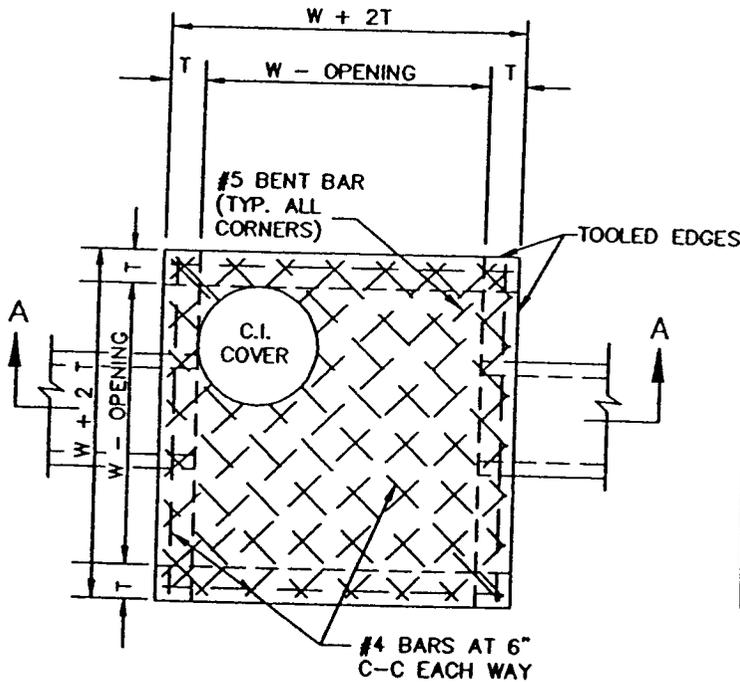
DATE
NOV. '96

STANDARD DRAWING NO.
6030D

STANDARD DRAWING NO.
6030D



SECTION "A-A"
N.T.S.



PLAN OF TOP SLAB
N.T.S.

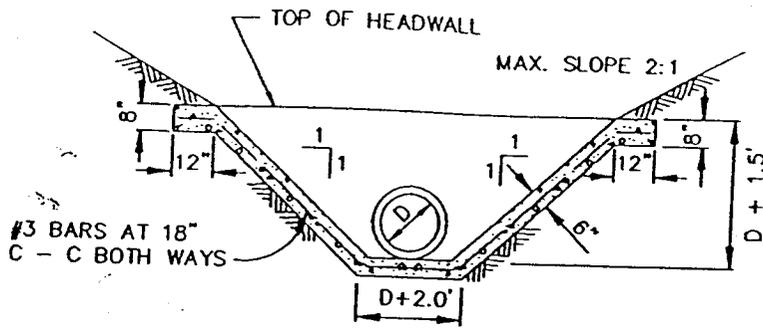
INLET SIZE	T	W
2' SQUARE	7"	2'-0"
4' SQUARE	7"	4'-0"
5' SQUARE	8"	5'-0"
6' SQUARE	9"	6'-0"

NOTES:

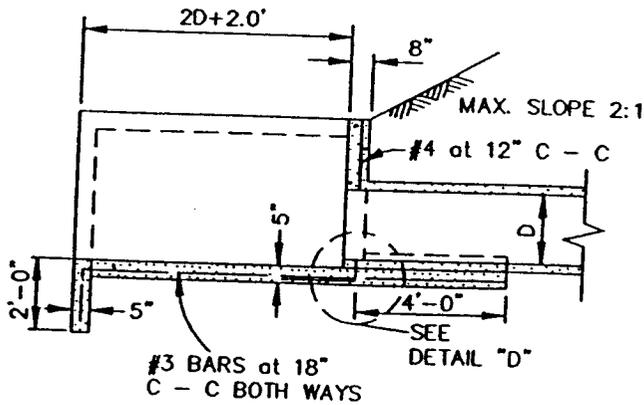
1. MATERIAL AND WORKMANSHIP SHALL CONFORM WITH THE REQUIREMENTS OF NCTCOG STANDARD SPECIFICATIONS FOR STANDARD CONCRETE MANHOLES. MINIMUM CLASS "A" CONCRETE.
2. LAYERS OF REINFORCING STEEL NEAREST THE INTERIOR AND EXTERIOR SURFACES SHALL HAVE A COVER OF 2" TO THE CENTER OF BARS, UNLESS OTHERWISE NOTED.
3. FOR DETAILS OF REINFORCING OF LOWER PORTIONS OF INLET SEE APPROPRIATE SQUARE MANHOLE DETAILS.
4. DEPTH OF DROP INLET FROM FINISHED GRADE TO FLOW LINE OF INLET IS VARIABLE. APPROXIMATE DEPTH WILL BE SHOWN ON PLANS AT LOCATION OF INLET.
5. ALL STANDARD DROP INLETS SHALL HAVE ONE OPENING ON EACH SIDE UNLESS OTHERWISE SHOWN ON PLANS.
6. DECK MAY BE REINFORCED SAME AS 4' SQUARE MANHOLE.

<p>DROP INLET</p> <p>2', 4', 5' OR 6' SQUARE</p>	STANDARD SPECIFICATION REFERENCE
	<p>DATE</p> <p>NOV. '96</p>

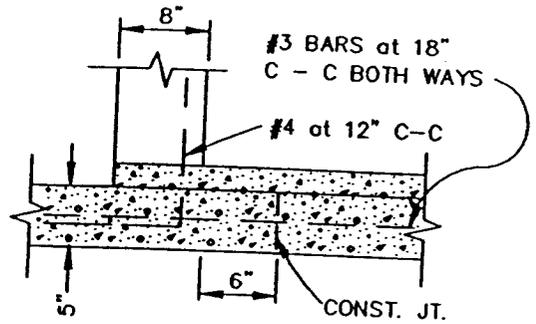
STANDARD DRAWING NO.
6040



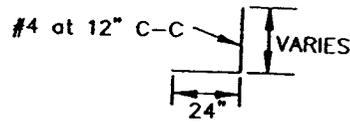
SECTION "B-B"
N.T.S.



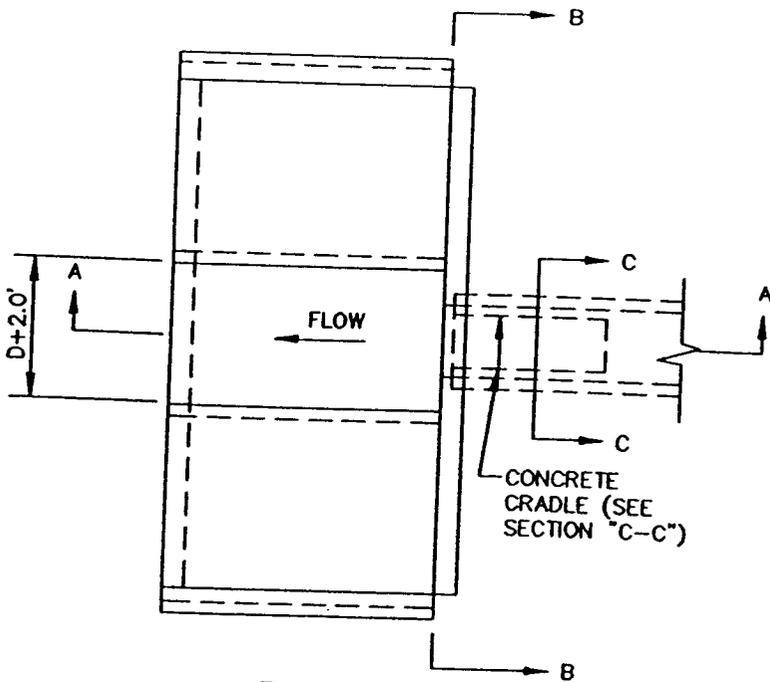
SECTION "A-A"
N.T.S.



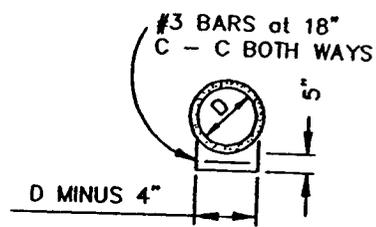
DETAIL "D"
N.T.S.



BAR DETAIL
N.T.S.



PLAN
N.T.S.



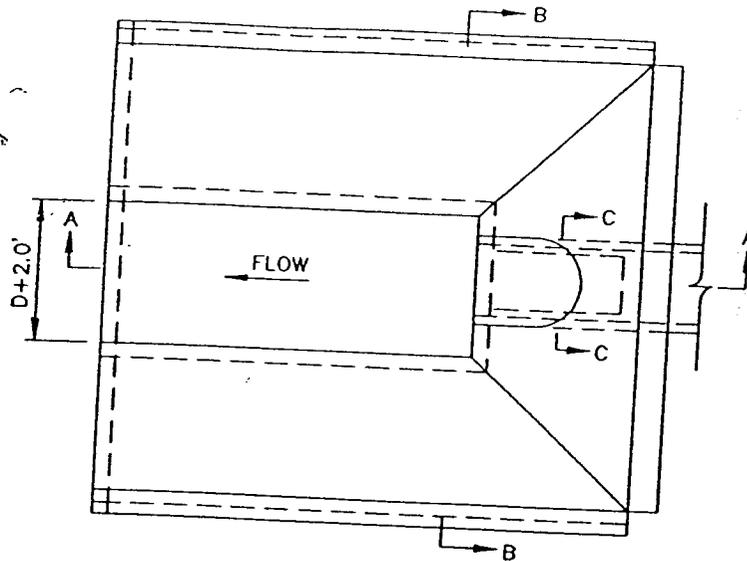
SECTION "C-C"
N.T.S.

NOTE:
CONCRETE SHALL BE CLASS "A"

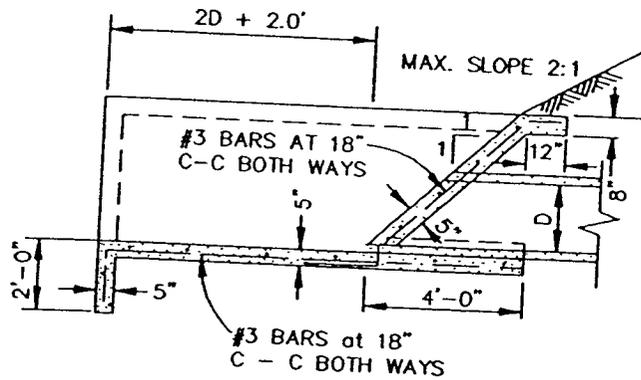
CONCRETE APRON
VERTICAL HEADWALL

STANDARD SPECIFICATION REFERENCE

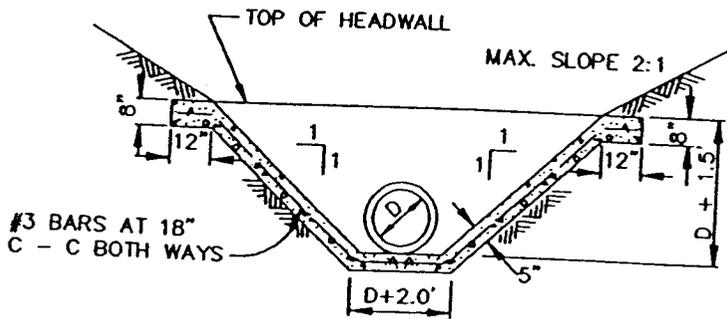
DATE NOV. '96 STANDARD DRAWING NO. 6060



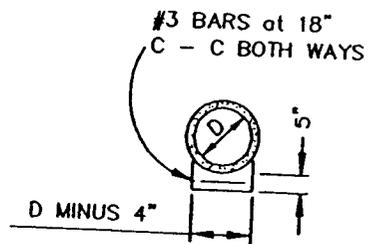
PLAN
N.T.S.



SECTION A-A
N.T.S.



SECTION B-B
N.T.S.



SECTION C-C
N.T.S.

NOTE:
CONCRETE SHALL BE CLASS "A".

CONCRETE APRON
SLOPING HEADWALL

STANDARD SPECIFICATION REFERENCE

DATE
NOV. '96

STANDARD DRAWING NO.
6070