CITY OF HEATH, TEXAS
ORDINANCE NO. 230822C

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF HEATH, TEXAS, REPEALING AND READOPTING TITLE XV, "LAND USAGE," CHAPTER 152, "CONSTRUCTION AND STANDARD DETAILS," SECTION 152.01, "ADOPTION OF STANDARDS" OF THE CITY OF HEATH CODE OF ORDINANCES; PROVIDING A PENALTY; PROVIDING FOR SAVINGS, REPEALING AND SEVERABILITY CLAUSES; FINDING AND DETERMINING THE MEETING AT WHICH THIS ORDINANCE IS ADOPTED TO BE OPEN TO THE PUBLIC AS REQUIRED BY LAW; AND PROVIDING FOR PUBLICATION AND AN EFFECTIVE DATE.

WHEREAS, the City of Heath (the "City") is a Home Rule Municipality acting under its Charter adopted by the electorate pursuant to Article XI, Section 5 of the Texas Constitution and Chapter 9 of the Texas Local Government Code; and

WHEREAS, the 2023 Legislature enacted HB 3699 establishing that a city council, by ordinance and after notice is published in a newspaper of general circulation in the city, may (a) adopt reasonable specifications relating to the construction of each street or road based on the amount and kind of travel over each street or road in a subdivision; and (b) adopt reasonable specifications to provide adequate drainage for each street or road in a subdivision in accordance with standard engineering practices; and

WHEREAS, HB 3699 was signed by the Governor on June 18, 2023, and takes effect on September 1, 2023; and

WHEREAS, the City Council of the City of Heath, Texas (the "City Council") on January 9, 1991 adopted Ordinance No. 910109A, "Engineering Standards of Design and Standard Details," later codified as Title XV, "Land Usage," Chapter 152, "Construction and Standard Details," Section 152.01, "Adoption of Standards" of the Code of Ordinances of the City, which sets forth minimum requirements for engineering design, which are attached as Exhibit "B" and incorporated herein by reference; and

WHEREAS, on September 28, 2021, the City Council voted to amend the "Engineering Standards of Design and Standard Details," adopted by Ordinance No. 910109A, a copy of those amendments are attached as Exhibit "C" and incorporated herein by reference; and

WHEREAS, the City Council has investigated and determined that to adhere to the publication requirements established by the enactment of HB 3699, the City Council must repeal and readopt in its entirety Section 152.01, "Adoption of Standards" of Title

XV, “Land Usage,” Chapter 152, “Construction and Standard Details,” of its Code of Ordinances and repeal in its entirety Ordinance No. 910109A; and

WHEREAS, a public notice was published in the Dallas Morning News on August 18, 2023; and

WHEREAS, the City Council hereby finds and determines that the adoption of this ordinance is in the best interests of the health, safety and general welfare of the citizens of Heath, Texas.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF HEATH, TEXAS:

SECTION 1: INCORPORATION OF PREMISES. That the above and foregoing premises are true and correct and are incorporated herein and made a part hereof for all purposes.

SECTION 2: Ordinance No. 910109A, “Engineering Standards of Design and Standard Details,” is hereby repealed in its entirety effective on the passage of this Ordinance.

SECTION 3: REPEAL AND READOPTION. Section 152.01, “Adoption of Standards” of Title XV, “Land Usage,” Chapter 152, “Construction and Standard Details,” of the Code of Ordinances of the City of Heath, is hereby repealed and readopted in its entirety as stated in **Exhibit A**, incorporated herein by reference and with all other provisions of Chapter 152 not herein amended to remain in full force and effect.

SECTION 4: SAVINGS/REPEALING CLAUSE. All provisions of any ordinance in conflict with this Ordinance are hereby repealed to the extent they are in conflict; but such repeal shall not abate any pending prosecution for violation of the repealed ordinance, nor shall the repeal prevent a prosecution from being commenced for any violation if occurring prior to the repeal of the ordinance. Any remaining portions of said ordinances shall remain in full force and effect.

SECTION 5: SEVERABILITY. Should any section, subsection, sentence, clause or phrase of this Ordinance be declared unconstitutional or invalid by a court of competent jurisdiction, it is expressly provided that any and all remaining portions of this Ordinance shall remain in full force and effect. Heath hereby declares that it would have passed this Ordinance, and each section, subsection, sentence, clause or phrase thereof irrespective of the fact that any one or more sections, subsections, sentences clauses and phrases be declared unconstitutional or invalid.

SECTION 6: PENALTY. Any person, firm, entity or corporation who violates any provision of this Ordinance shall be deemed guilty of a misdemeanor, and upon conviction therefore, shall be fined in accordance with Title I, Chapter 10, Section 10.99 of the Code of Ordinances. Each continuing day’s violation shall constitute a separate offense. The penal provisions imposed under this Ordinance shall not preclude Heath

from filing suit to enjoin the violation. Heath retains all legal rights and remedies available to it pursuant to local, state and federal law.

SECTION 7: PUBLICATION AND EFFECTIVE DATE. This Ordinance shall become effective immediately upon its adoption and its publication as required by law and City Charter.

SECTION 8: OPEN MEETINGS. That it is hereby found and determined that the meeting at which this Ordinance was passed was open to the public as required by law, and that public notice of the time, place, and purpose of said meeting was given, all as required by Section 551.041, Texas Government Code.

DULY PASSED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF HEATH, TEXAS on this the 22ND day of August 2023.

APPROVED:

Kelson Elam, Mayor

ATTEST:

Norma Duncan, City Secretary

CITY OF HEATH 19 59 STATE OF TEXAS

APPROVED AS TO FORM:

Marie N. Johnson, Assistant City Attorney

Exhibit "A"
Adopted Ordinance Language

§ 152.01 ADOPTION OF STANDARDS.

The City Council hereby adopts the standards of design, standard specifications for construction and standard details as minimum requirements for engineering design, as shown in Exhibit "B" "1991 Standards" and Exhibit "C" "2021 Amendments" to Ordinance No. 230822C, a copy of which is available in the City Secretary's office. To the extent there is a conflict between Exhibit "B" "1991 Standards" and Exhibit "C" "2021 Standards", Exhibit "C" "2021 Amendments" shall control.

Exhibit "B"
Engineering Standards of Design and Standard Details
1991 Standards

ENGINEERING
STANDARDS OF DESIGN
and
STANDARD DETAILS

FOR THE

CITY OF HEATH, TEXAS

JANUARY 1991

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1. GENERAL REQUIREMENTS

1.1 Introduction: The "Standards of Design" - are designed to implement the provisions of the Subdivision Ordinance and to provide for the orderly, safe, healthy and uniform development of the area within the corporate city limits and within the area surrounding the City, extraterritorial jurisdiction (ETJ).

The Standard Specifications for Construction and the Standard Details are supplemental and are made a part of these Standards of Design. These documents are to be considered as the minimum requirements of engineering design. The adherence to the requirements of these documents and/or the approval by the City of Heath and its agents in no way relieves the developer of the responsibility for adequacy of design, which may require more stringent standards than these, the completeness of plans and specifications or the suitability of the completed facilities. In unusual circumstances, the City of Heath may determine that designs other than those of the Standards are necessary and will inform the developer of such requirements before final engineering review.

The developer shall notify the City of Heath, in writing, of any deviations from the requirements set forth in the Standards of Design, Standard Specifications for Construction or Standard Details.

1.2 Standards of Design: The Standards of Design, as adopted by the City of Heath, are set forth herein. These standards shall be considered as the minimum requirements, and it shall be the responsibility of the developer to determine if more stringent requirements are necessary for a particular development. It is not intended that the Standards of Design cover all aspects of a development. For those elements omitted, the developer will be expected to provide designs and facilities in accordance with good engineering practice and to cause to be constructed facilities utilizing first class workmanship and materials.

1.3 Standard Specifications for Construction: Standard specifications for construction as adopted by the City of Heath shall be in accordance with the "Standard Specifications for Public Works Construction" as published by the North Central Texas Council of Governments (copies obtained from N.C.T.C.O.G. offices) and the City of Heath Addendum to the N.C.T.C.O.G. specification bound in this document. These specifications shall be considered as minimum requirements, and such additional requirements as the City or the developer may consider appropriate should be added as supplements.

1.4 Standard Details: In an effort to have uniformity and to facilitate maintenance, the City has adopted standard design features for certain facilities such as manholes, street sections, sidewalks,

water, sanitary and storm sewer, curb inlets, ramps for the handicapped, etc. These requirements are shown as Standard Details located in Appendix C.

1.5 Inspection of Construction by City Personnel: All inspection of construction and verification of compliance to the plans and specifications shall be conducted by the City of Heath staff under the direction of the City Engineer. The facilities included in this inspection requirement are streets, sidewalks, parking lots, alleys, storm drainage facilities, water distribution systems, sewer collection systems, etc. The developer shall advise all of his construction contractors of this requirement. No development will be accepted by the City until all construction has been approved by the City of Heath's staff. The developer shall be responsible for any additional expense to the City, at a rate established by the City, at that time when inspection is done after normal business hours of the City, or when the improvements built will be privately owned. The developer will be responsible for furnishing to the City the original reproducible engineering drawings corrected to show "as-built" conditions before any utility improvements will be accepted. Building permits will not be issued until all public or required improvements are accepted by the City, unless in the opinion of the City Engineer, issuance of building permits prior to improvement completion will not be detrimental to the City.

1.6 Utilities to be Underground: All utilities within a residential development shall be placed underground. Utilities are defined for this purpose as water pipelines, sewer pipelines, storm sewer pipelines, natural gas pipelines, telephone wires, cable TV wires and electric wires. In case of special or unique circumstances, the City may grant variances or exceptions to this requirement. Any request for variance or exception should be submitted in writing to the City of Heath setting forth the justification for an exception. The granting of a variance or exception by the City will be in writing. No work will be accepted without written approval from the City Council.

Commercial developments may have overhead utilities as approved by the City.

1.7 Submittal to Utility Companies: The developer shall be responsible for submittal of information needed to design utilities for the development. This information shall be submitted to Texas Utilities, Southwestern Bell, Lone Star Gas and the cable TV franchise.

Written confirmation shall be submitted with the final engineering drawings, verifying that the affected utility companies have reviewed the final plat and easement description and agree that the easement locations and sizes are adequate and consistent with the design requirements of the utilities.

1.8 Requirements of the Final Engineering Drawings: The final engineering drawings shall conform with the established "Engineering Drawings Checklist" and these Standards of Design.

The final engineering drawings will consist of drawings showing all information necessary to completely review the engineering design of improvements proposed for or affected by the site. The "Engineering Drawings Checklist" will be used to determine whether the final engineering drawings are complete for review.

The Final Plat Checklist and Engineering Drawings Checklist are enclosed in Appendix "A" of this document for the convenience of the developer and his engineer. These checklists may be revised occasionally and do not necessarily constitute a complete listing of the engineering drawings which may be necessary for review. These listings enumerate the minimum information required for review.

After the utilities have been constructed, the developer shall be responsible for providing to the City "As-Built" mylars. The subdivision will not be accepted by the City until these utility mylars are submitted to the City Engineer.

All plans shall include the General Notes in Appendix "B" of this design standard.

2. STREET SYSTEM

2.1 General: The street system, including the street layout, shall be in accordance with generally accepted engineering practices and in compliance with the Comprehensive Plan, the latest Thoroughfare Plan, the Zoning Ordinances, the Subdivision Regulations and other applicable regulations. The drainage system, as incorporated into the street system, shall comply with Section 3 of this document. The plans and specifications, design computation, and other applicable data shall be submitted to the City for review. The subgrade materials will be tested in accordance to the Standard Specifications for Construction, unless otherwise approved by the City. In general, the soils testing will include the testing of Atterburg limits. Lime stabilization of the subgrade will be required if the plasticity index (P.I.) is 15 or above. Lime stabilization or concrete stabilization may be required for soils showing a P.I. of 15 or less. Construction shall not commence prior to approval of the plans and specifications by the City. All changes during construction shall be submitted to the City Engineer or for approval prior to any construction modifications.

2.2 Street Arrangement: Unless otherwise approved by the City, provisions shall be made for the extension of existing major arterials, collector streets and those residential streets which may

be necessary to provide circulation with adjacent areas. The street arrangements shall conform with the intent of the Thoroughfare Plan as adopted by the City. Adequate collector streets shall be provided for the circulation of traffic throughout the development. Residential streets shall be provided to accommodate local area use within the development.

Off-center street intersections will not be approved except under unusual circumstances. A minimum distance of 150 feet shall be provided for off-center street intersections unless approved by the City Engineer. On major arterial streets the City may require distances greater than 150 feet for off-street intersections. Curvilinear streets are permissible and encouraged in residential areas.

2.3 Horizontal Curve Limitations: The minimum radii at the centerline of the street shall be in accordance with Table 2.1.

Table 2.1

Minimum Radii Requirements at the Centerline of Streets

Type of Street	Minimum Radius in Feet
Major Arterial	1100
Collector Street	600
Residential Street	250

2.4 Block Lengths: In general, streets shall be provided at such intervals as to serve cross traffic adequately and to intersect with existing streets. Where no existing plats control, the blocks shall be not more than 1,600 feet in length or less than three hundred (300) feet in length except in unusual cases. Block arrangements must provide access to all lots; and in no case, shall a block interfere with traffic circulation.

2.5 Street Intersection: More than two streets intersecting at one point shall be avoided except where it is otherwise impractical to secure a proper street system. Where several streets converge at one point, setback lines, special rounding or cut-off of corners and/or a traffic circle may be required to insure safety and to facilitate traffic movement. When possible, arterial and collector streets shall intersect other arterial and collector streets at an angle of ninety (90) degrees. Arterial and collector street intersections shall have property line corner radii with a minimum tangent distance of thirty (30) feet. Residential streets shall have as the property line corner, the point of intersection of intersecting streets. In all cases the curb radii at intersections shall have a minimum radius of twenty (20) feet as well as a minimum tangent distance of twenty (20) feet measured from the face of the curb. In all cases of streets that intersect at angles other than ninety (90) degrees, the City may require radii that in the City's judgement best serve the situation.

2.6 Relation to Adjoining Streets: The system of streets designated for the development, except in unusual cases, must connect with streets already dedicated in adjacent developments. Where no adjacent connections are platted, the streets must be the reasonable projection of streets in the nearest subdivided tracts and must be continued to the boundaries of the tract development, so that other developments may eventually connect with the proposed development. Strips of land controlling access to or egress from other property or any street or alley or having the effect of restricting or damaging the adjoining property for development or subdivision purposes or which will not be taxable or accessible for special improvements shall not be permitted in any development unless such reserve strips are conveyed to the City on fee simple. When such access is needed to maintain permanent City owned utilities, the roadway will be an improved right-of-way. If the utilities are temporary, an improved easement may be approved.

2.7 Dead End Streets, Cul-de-Sacs and Courts: Courts or places may be permitted where the form or contour of the land or the shape of the property makes such street design appropriate. Such cul-de-sacs, courts or places shall provide proper access to all lots and shall generally not exceed six hundred (600) feet in length, and a cul-de-sac shall be provided at the closed end which has a minimum right-of-way radius of fifty (50) feet.

Dead end streets will not be allowed except on a temporary basis pending the development of adjacent property. Where dead end streets are utilized, a cul-de-sac must be provided unless an alternative design is specifically approved by the City. An easement shall be provided for that portion of the cul-de-sac that lies outside the limits of the normal street right-of-way and shall be submitted with the final plat. The easement may provide for termination upon the extension of the street. Temporary cul-de-sacs shall be constructed of HMAC or concrete material as approved by the City Engineer.

2.8 Street Right-of-Way Widths: A minimum right-of-way width for various classifications of streets shall conform to the adopted Thoroughfare Plan. Table 2.2 summarizes these right-of-way requirements as per the City's standard classification.

Table 2.2

Minimum Right-of-Way Requirements

By Street Classification

Type of Street	Minimum Right-of-Way in Feet
Major Thoroughfare	120*
Secondary Thoroughfare	100*
Major Collector	80*
Minor Collector	60
Residential	50
Cul-de-sacs	50**

*The required ROW for State Highways and Streets may exceed this minimum right-of-way standard.

**The right-of-way line in the cul-de-sac section shall be a minimum of fifty (50) feet.

2.9 Pavement Widths: Minimum widths of pavement for the various classifications of streets shall be as set forth in Appendix "C", Paving Sections.

2.9.1. Pavement Design Standards Summary: A summary of the paving design standards including design speeds has been outlined in Table 2.3.

2.10 Alleys and Alley Widths: Alleys may be required in all residential areas and shall be paved with concrete. The City Council may waive the residential alley requirement upon determination by the Council, if it is in the best interest of the City. Alleys may be required in commercial and industrial districts. The City may waive this requirement where other definite and assured provisions are made for service access such as off-street loading, unloading, and parking consistent with and adequate for the uses proposed. The minimum right-of-way width of an alley shall be twenty (20) feet. Dead-end alleys shall not be permitted. The city may waive this requirement where such dead-end alleys are unavoidable and where adequate turnaround facilities have been provided. Adequate provisions shall be made at all intersections in order that equipment, such as garbage collection vehicles and maintenance vehicles, can maneuver the corners. The interior edge of the pavement, at the corners, shall have a minimum radius of 30 feet. The right-of-way limits shall be expanded, if necessary, beyond the minimum requirement in order to include all of the paved section and utilities within the right-of-way of the alley. Alley turnouts shall be paved to the property line and shall be fifteen (15) feet wide at that point. All alleys shall have a minimum of twelve (12) feet of paved concrete roadway. All alleys shall be constructed from Class "C" concrete. The reinforced concrete shall have a minimum thickness of seven (7) inches on exterior

sections and five (5) inches on interior sections. The testing of the concrete paving shall be done by an approved testing lab and conform to the Standard Specifications for Construction.

2.11 Street Grades: Thoroughfare streets may have a maximum grade of five (5) percent, unless the natural topography is such as to require steeper grades, in which case a seven and one-half (7-1/2) percent grade may be used for a maximum continuous distance of two hundred (200) feet. Collector streets may have a maximum grade of seven and one-half (7-1/2) percent. Residential streets may have a maximum grade of ten (10) percent, unless otherwise approved by the City where the natural topography is such as to require steeper grades. All streets must have a minimum grade of at least five-tenths (0.5) of one (1) percent. Centerline grade changes with an algebraic difference of more than one (1) percent shall be connected with vertical curves in compliance with the minimum length requirements set forth in Table 2.3.

2.12 Pavement Design: Pavement design shall be in accordance with good engineering practice. All streets shall be constructed from Class "C" concrete. Pavement shall be reinforced with No. 3 bars at 24-inch centers in both directions. Minimum concrete thickness of pavement shall be six (6) inches for residential and minor collector streets which are not subject to heavy truck or equipment traffic.

Table 2.3

Minimum Length of Vertical Curves - In Feet

Crest Vertical Curves

Algebraic Difference In Grade - Percent	Design Speed 30 MPH	40 MPH	50 MPH
1.0	100	100	100
2.0	100	110	170
3.0	100	165	255
4.0	120	220	340
5.0	150	275	425
6.0	180	330	510
7.0	210	385	595
8.0	240	440	680
9.0	270	495	765
10.0	300	550	850
11	330		
12	360		
13	390		
14	420		

Sag Vertical Curves

Algebraic Difference In Grade - Percent	Design Speed 30 MPH	40 MPH	50 MPH
1.0	100	100	100
2.0	100	110	150
3.0	105	165	225
4.0	140	220	300
5.0	175	275	375
6.0	210	330	450
7.0	245	385	525
8.0	280	440	600
9.0	315	495	675
10.0	350	550	750

The design speed shall be in accordance with Table 2.4

Table 2.4

Maximum Design Speeds for Thoroughfares and Streets

Type of Street	Maximum Design Speed
Major Thoroughfares	55 Miles Per Hour
Collector Streets	40 Miles Per Hour
Residential Streets	30 Miles Per Hour

Major and arterial streets shall be constructed from Class "C" concrete and have a minimum of eight (8) inches in concrete thickness. All flexural strength tests shall be based on center point loading. Traffic projections may require additional thickness of paving on collector and arterial streets.

The subgrades shall be compacted and finished to a smooth uniform surface. Subgrades of native material which have a Plasticity Index (P.I.) of 15 or more shall be lime stabilized to a minimum depth of six (6) inches. The lime stabilization shall be used for the full width of the street, back of curb to back of curb, plus one (1) foot on each side. The minimum lime content shall be six (6) percent of the dry weight of the material.

2.13 Parkways, Grades and Sidewalks: All parkways shall be constructed to conform to top of curb grades with a standard transverse slope of one-quarter (1/4) inch per foot rise from top of curb to back-of-walk line.

Where the natural topography is such as to require steeper grades, transverse slopes up to one (1) inch per foot may be used with approval of the City of Heath.

"Sidewalks shall be provided for all residential streets in subdivisions zoned for one or two family dwellings and on all streets designated on the adopted Master Thoroughfare Plan. The City may

require sidewalks in other locations. Where provided, they shall not be less than four (4) feet in width when located one (1) foot off of the property line nor five (5) feet in width when located directly adjacent to the curb and shall be wholly located within the dedicated street or road right-of-way. This requirement may be waived by the City Council."

Sidewalks abutting commercial property shall have a minimum width of five (5) feet. Sidewalks shall be constructed from Class "A" concrete, air entrained with an air content of 3-5%. The concrete thickness shall be four (4) inches reinforced with No. 3 bars at 24-inch centers both ways.

2.14 Driveways: Residential driveways to serve single car garages, two car garages, carports and/or storage areas shall not be less than twelve (12) feet nor more than twenty-four (24) feet in width, measured at the property line. A driveway should not begin less than five (5) feet from the point of tangency of the corner radius of an intersection. Residential driveways shall not be constructed closer than (10) feet apart.

Multi-family, residential, and retail driveways should not exceed sixty-five (65) percent of the property frontage. Multi-family, residential and retail driveways shall be a minimum of twenty-four (24) feet and a maximum of forty-five (45) feet in width, measured at the property line, and shall not begin less than ten (10) feet from

the property corner. When the property frontage is less than seventy-five (75) feet, the driveway measured at the property line may begin a minimum of five (5) feet from the property corner, provided there is not an existing driveway within fifteen (15) feet of the property corner on the adjacent property. A minimum of twenty (20) feet, measured at the property line, should be maintained between driveways.

The radii of all residential driveway returns shall be a minimum of ten (10) feet. The radii of all retail commercial returns shall be a minimum of fifteen (15) feet. Larger radii driveway returns for multi-family, retail or industrial developments may be required.

2.15 Street Posts and Markers: The developer shall arrange for the installation of all regulatory, warning and guide signs, including posts, as shown on the plans or as directed by the City. Street name signs shall be installed at each intersection. Examples of regulatory, warning and guide signs are as follows:

A. Regulatory signs shall include, but are not limited to, STOP, 4-WAY, YIELD, KEEP RIGHT and speed limit signs.

B. Warning signs shall include, but are not limited to, DEAD END, NO OUTLET, DIVIDED ROAD, and PAVEMENT ENDS.

C. Guide signals shall include, but are not limited to, street name signs, DETOUR, direction arrow and advance arrow.

D. Traffic striping shall be provided by the developer and directed by the City.

The materials and fabrication of signs and posts shall be in accordance with the Standard Specifications for Construction. The developer shall be responsible for the expenses by the City for manufacture and installation of these signs.

Street names shall be painted on the curb at all intersections. House street numbers shall be placed on the curbs for each lot and shall comply with the requirements of the Standard Specifications for Construction.

2.16 Street Lighting: All developments shall be provided with street lights. Street lights shall be the equivalent of 175 high pressure sodium vapor fixtures on minor residential streets. All collector and thoroughfare, or commercial streets, shall have high pressure sodium vapor fixtures with a wattage of 250 to 400 watts as directed by the City. In some instances, greater wattage may be required by the City. The City reserves the right to inspect the street lighting construction.

2.17 Curb Ramps for Handicapped: Curb ramps for the handicapped shall be provided in all retail, multi-family and residential areas which have sidewalks. Ramps shall be located to provide adequate and reasonable access for the safe and convenient movement for physically handicapped persons, including those in wheel chairs, across curbs at all pedestrian crosswalks. Where sidewalks are not provided in a development, curb ramps shall not be constructed.

2.18 Off-Street Parking: All parking areas and spaces shall be designed and constructed in accordance with the following requirements:

A. All parking areas and spaces shall be designed and constructed so as to have free ingress and egress at all times.

B. No parking space or parking area shall be designed so as to require a vehicle to back into a public street or across a public sidewalk, except in the case of one and two-family dwelling units.

C. Minimum Dimensions for Off-Street Parking

1. Ninety-degree angle parking. Each parking space shall not be less than nine (9) feet in width and eighteen (18) in length. Maneuvering space shall be not less than twenty-four (24) feet. Designated

small car parking spaces shall not be less than 8' in width and 16' in length.

2. Sixty-degree angle parking. Each parking space shall be not less than nine (9) feet wide perpendicular to the parking angle nor less than twenty (20) feet in length when measured at right angles to the building or parking line. Maneuvering space shall be not less than sixteen (16) feet perpendicular to the building or parking line. Designated small car parking spaces shall not be less than 8' in width and 18' in length.

3. Forty-five-degree angle parking. Each parking space shall be not less than nine (9) feet wide perpendicular to the parking angle nor less than eighteen and one-half (18-1/2) feet in length when measured at right angles to the building or parking line. Maneuvering space shall be not less than twelve (12) feet perpendicular to the building or parking line. Designated small car parking spaces shall not be less than eight (8) feet in width and ten (10) feet in length.

4. When off-street parking facilities are located adjacent to a public alley, the width of said alley

may be utilized as a portion of the maneuvering space requirement, provided the alley is paved.

5. Twenty (20) percent of the total parking requirements may be used as small car parking with eighty (80) percent of that total being grouped and designated for that use.

6. When off-street parking facilities are provided in excess of minimum amounts herein specified, or when off-street parking facilities are provided, but not required by this chapter, said off-street parking facilities shall comply with the minimum requirements for parking and maneuvering space herein specified.

D. Pavement Standards: Unless otherwise approved by the City Council, all parking lots shall be paved with concrete material designed according to City standards and specifications. The parking lanes must be clearly marked by approved paint, buttons or other material. All driveway approaches shall be constructed of concrete and shall be curbed to City standards.

E. No parking area shall be designed or constructed which ends in a dead end, if more than three (3) parking spaces in depth, unless adequate turnaround space is provided.

F. All entrances or exits in a parking lot shall be a minimum of thirty (30) feet from the beginning point of any corner radius.

G. All entrances or exits in a parking lot shall be a minimum of twenty-four (24) feet and a maximum of forty-five (45) feet in width, unless one-way, in which case they shall both be a minimum of fifteen (15) feet, or as approved by the City Council.

H. The driveway approach angle to any parking area shall be ninety (90) degrees. One-way driveways may be designed to intersect a street at forty-five (45) degrees or otherwise approved by the City Engineer.

I. No parking areas or parking spaces shall be allowed to pave over or utilize public right-of-way with the exception of approved entrances and exits, unless an exception is granted by the Board of Adjustment.

J. Any lighting used to illuminate any off-street parking area shall be so designed and constructed as to direct the light to the property and away from any adjoining property or street.

K. All multi-family and retail parking areas and parking spaces shall be designed and constructed to protect adjacent residences from the direct glare of headlights of vehicles using the parking area.

L. All multi-family and retail parking areas and parking spaces shall be required to provide a fire lane with a minimum width of 20 feet and a maximum width of 25 feet and shall be approved by the City Fire Marshall.

M. The pavement within a designated loading area shall be designed and constructed to carry the additional loading of merchandise, goods, sanitation pick-up, etc., in order to prevent any unnecessary failure in the pavement itself. The pavement design shall be included in the engineering construction plans and specifications and submittal to the City Engineer for approval.

3. STORM DRAINAGE SYSTEM

3.1 General: Drainage facilities shall be designed and constructed at such locations and of such size and dimensions to adequately serve the development and the contributing drainage area above the development. The developer shall provide all the necessary easements and right-of-ways required for drainage structures including storm drains and open channels, lined or unlined. Easement widths for storm drain pipelines shall not be less than fifteen (15') feet, and easement widths for open channels shall be at least twenty-five (25') feet wider than the top width of the channel. In all cases, easements shall be of an adequate size to allow proper maintenance.

The design flows for the drainage system shall be calculated by the Rational Method in accordance with standard engienering practice and in accordance with the requirements set forth in this document. Curbs, inlets, manholes, etc., shall be designed and constructed in accordance with the Standard Details. Materials and construction procedures shall conform with the requirements of the Standard Specifications for Construction.

The developer shall provide plans and specifications and design calculations for all drainage structures. Underground drainage pipes shall be used to accommodate flows up to and including the equivalent capacity of a sixty (60") inch pipe. For flows in excess of the capacity of a 60-inch pipe, concrete lined, open channels may be used.

For flows in excess of the capacity of an eighty-four (84") inch pipe, unlined, open channels with a concrete pilot channel constructed in accordance with Section 3.2.8 may be used. All open channels which are not concrete lined shall be designed to prevent erosion. The type of methods used for prevention of erosion shall be specifically approved by the City.

The design, size, type and location of all storm drainage facilities shall be subject to the approval of the City. The requirements set forth herein are considered minimum requirements. The developer and his engineer shall bear the total responsiblity for the adequacy of design. The approval of the facilities by the City in no way relieves the developer of this responsibility.

The developer shall be responsible for the necessary facilities to provide drainage patterns and drainage controls such that properties within the drainage area, whether upstream or downstream of the development, are not adversely affected by storm drainage from facilities on the development. These are outlined in the Storm Drainage Management Plan Section 3.3.

The storm drainage management plan provided as part of the final engineering drawings shall address how storm water on the proposed development and affected adjoining properties will be controlled during phased development and completed development.

Storm drainage released from the site will be discharged to a natural water course of an adequate size to control the peak runoff expected after development.

3.2 Storm Drainage Design Criteria:

3.2.1. General: For all flood control systems controlling less than 1,000 acres, the rational method of computing runoff will be used. For contributing drainage areas greater than 1,000 acres, appropriate engineering methods, such as the unit hydrograph method, shall be used to determine the peak storm discharge quantities. The rational method is expressed by the following equation:

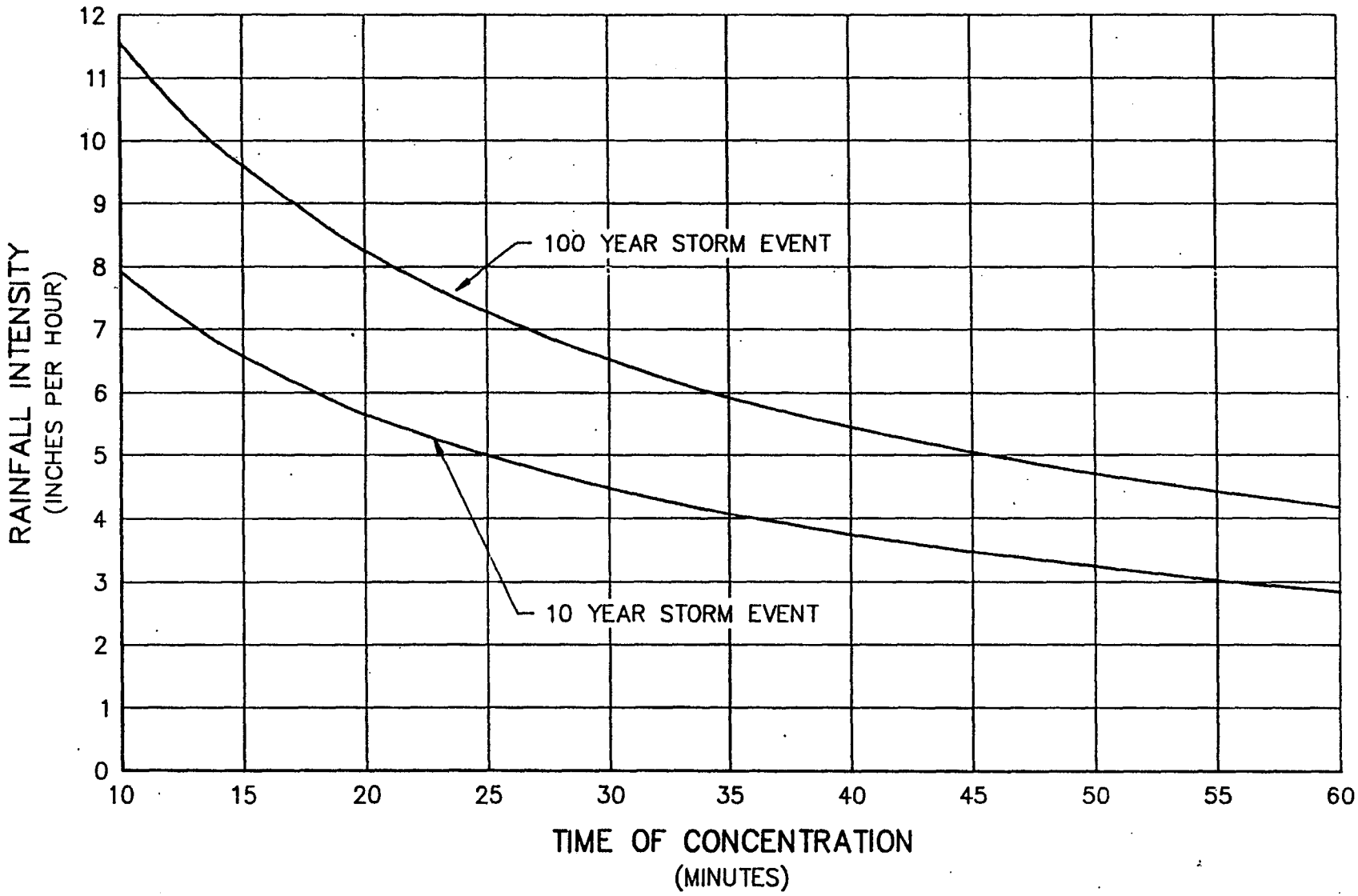
Q = CIA, where

Q = The storm flow rate at a given point in cubic feet per second (c.f.s.)

C = A coefficient of runoff (the ratio of rainfall to peak runoff) as delineated in Table 3.1

I = The average intensity of rainfall in inches per hour of the design storm for a period equal to the time of flow from the farthest point of the drainage area to the point under consideration as illustrated on Figure 3.1

A = The area in acres that is tributary to the point of design.



THE CITY OF HEATH, TEXAS

RAINFALL INTENSITY CURVES

SCALE: NONE
DATE: JAN. 1991
SHEET:
FIGURE 3.1

FREEMAN - MILLICAN, Inc.
CONSULTING ENGINEERS
DALLAS, TEXAS

Table 3.1

Runoff Coefficient for Types of Land Use

Type of Area or Land Use	Runoff Coefficient
Parks or Open Areas	0.30
Residential (Lots over 1.0 acre)	0.35
Residential (Lots 1.0 acre or less)	0.50
Multi-Family	0.80
Commercial	0.90

3.2.2 Time of Concentration: The time of concentration is defined as the longest time, without unreasonable delay, that will be required for a drop of water to flow from the upper limit of a dranange area to the point of concentration. The time of concentration to any point in a storm drainage system is a combination of the "inlet time" and the time of flow in the storm drain. The inlet time is the period of time required for water to flow over the surface of the ground to the storm drain inlet. The shortest inlet time to be allowed shall be 5 minutes.

Under average conditions the minimum time of concentration from the upstream end of a drainage system will coincide with Table 3.2.

Table 3.2

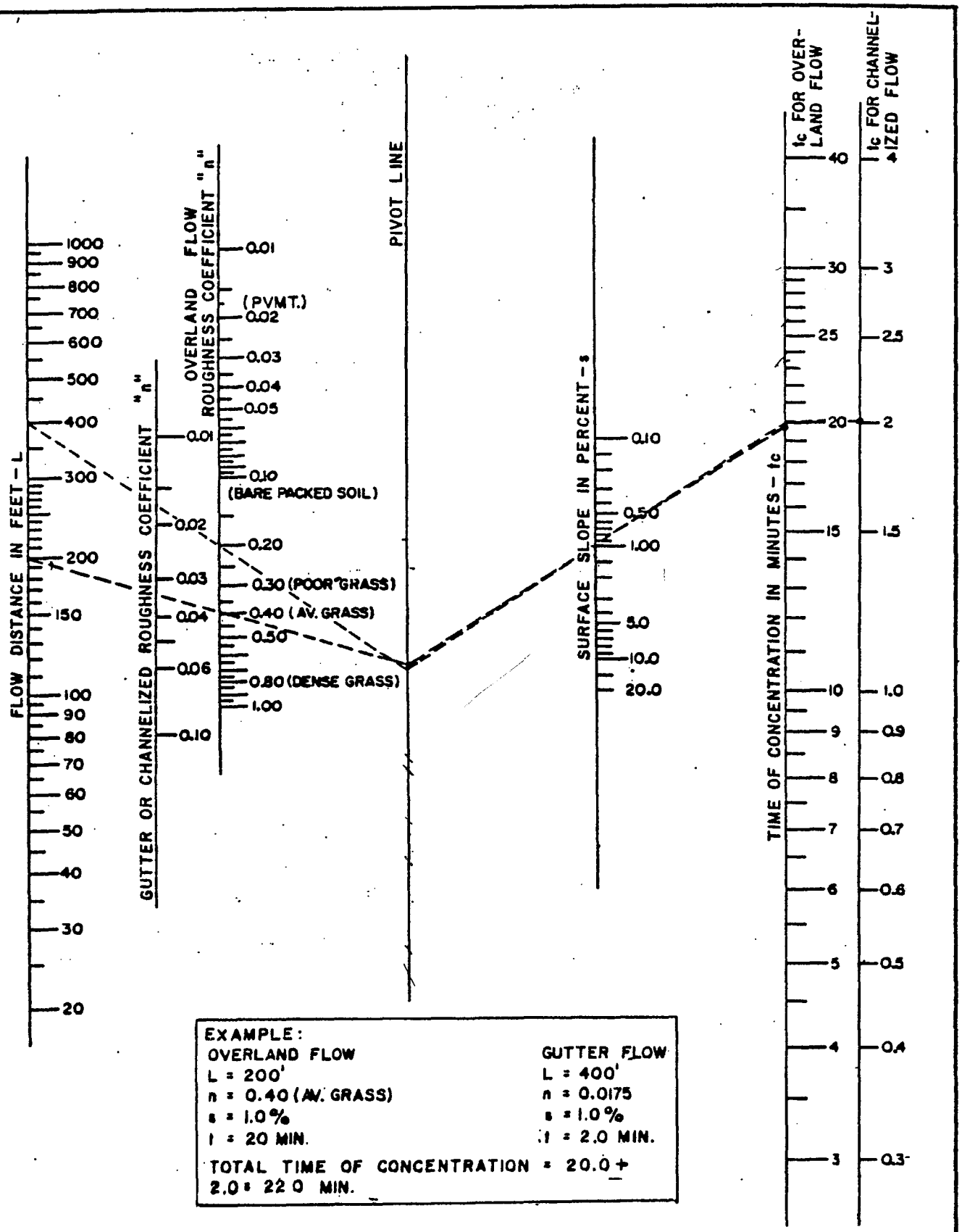
Minimum Inlet Time of Concentration

Type of Area	Minimum Inlet Time
Parks and Open Areas	20 Minutes
Residential	15 Minutes
Commercial	10 Minutes
Multi-Family	10 Minutes

Under circumstances which will produce times of concentration in excess of those shown in Table 3.2, the time of concentration shall be determined through the use of Figure 3.2, "Nomograph for Time of Cencentration." The nomograph, however, should be used in a judiciuos manner; otherwise unrealistic times of concentration may result. Some cautions to be exercised in the use of this nomograph are as follows:

a. The path along which the time of concentration is determined should be representative of the drainage area as a whole. On some irregularly shaped drainage areas it is possible to find the time of concentration along a particular path which is representative of only a small portion of the drainage area, and this time of concentration may greatly exceed the time of concentration which is more representative of the drainage area as a whole.

b. Overland flow shall be considered channelized at such time as the distance traveled exceeds 200 feet.



EXAMPLE:

OVERLAND FLOW	GUTTER FLOW
L = 200'	L = 400'
n = 0.40 (AV. GRASS)	n = 0.0175
s = 1.0%	s = 1.0%
t = 20 MIN.	t = 2.0 MIN.

TOTAL TIME OF CONCENTRATION = 20.0 + 2.0 = 22.0 MIN.

TIME OF CONCENTRATION FOR SURFACE FLOW

FIGURE 3.2

Since urbanization is anticipated on all drainage areas, all improvements shall be designed for the case of full watershed development. It is generally not practical to design improvements to gravity drainage systems in stages to match development, except in the case of unlined ditches, and then, it is essential that ultimate rights-of-way be obtained at the outset.

When the watershed in question is basically undeveloped, the developer shall attempt to anticipate future fully developed conditions and storm sewer locations when determining the time of concentration.

3.2.3. Design Storm Frequencies: The design storm frequencies shall be in accordance with with Table 3.3.

Table 3.3

Design Storm Frequencies for Storm Drainage Facilities

Facility	Storm Design Frequency
Enclosed pipe system	10 years
Enclosed pipe system at sag location	100 years
Enclosed pipe system and streets and R.O.W.	100 years
Channels and creeks	100 years
Culverts and small bridges	100 years
Large bridges**	100 years
Floodways between building lines	100 years

* Channels and creeks shall have at least one (1) foot of freeboard.

**Large bridges are those with a total span greater than 50 feet.

The relationship between rainfall intensity, duration and frequency is set forth in Figure 3.1. These curves have been developed using Technical Paper No. 40, "Rainfall Frequency Atlas of the United States" by the U.S. Weather Bureau. These curves shall be used in the design of all storm drainage facilities.

3.2.4 Drainage Calculations Summary: The calculations of storm water discharge shall be provided to the City. As a minimum, the engineering plans shall include a storm drainage summary in accordance with Section 3.2.11.

3.2.5 Permissible Spread of Water in Residential Streets Collectors and Arterials

3.2.5.1 General: Spread of water refers to the amount of water that may be allowed to collect in streets during a storm of specific design frequency. In order that excess storm water will not collect in streets or arterials during a storm of the design frequency, the following spread of water values shall be used for the various types of streets.

3.2.5.2 Major and Minor Arterials (Divided): The permissible spread of water in gutters of divided arterials shall be limited so that one traffic lane on each side remains clear. Gutter flow shall be based on a storm of ten-year design frequency. The flows from a 100-year frequency storm shall be contained within the street pavement.

Inlets shall perferably be located at street intersections, at low points of grade or where the gutter flow exceeds the permissible spread of water citeria.

Inlets shall be located, when possible, on lesser traveled streets or alleys when grades permit. Inlets located on arterials shall be recessed in order to minimize interference of the gutter depression with travel lanes. A gutter depression six (6) inches, as shown in the Standard Details, shall be used. In super-elevated sections, inlets placed against the center medians shall have no gutter depression and shall intercept gutter flow at a point of vertical curvatures to prevent flow from crossing the arterial. Unless expressly approved by the City, storm waters will not be allowed to cross arterials on the surface in valley gutters or otherwise.

3.2.5.3 Collector Streets: The permissible spread of water in gutters of collector streets shall be limited so that one lane of traffic will remain clear during the 10-year design storm. The flows from a 100-year frequency storm shall be contained within the pavement.

Inlets shall perferably be located at street intersections, low points of grade or where the gutter flow exceeds the permissible spread of water cirteria. Inlets shall be located, when at all possible, on lesser traveled streets or alleys where grade permits. Inlets with gutter depression of six (6) inches shall be used. At locations where

depressed inlets are expected to interfere with pedestrian activity, usually at crosswalks or interior spans of the block used for parking, a depression of less than six (6) inches may be required. These locations may require additional inlet width to compensate for the reduced depression. The City will consider all variances from a standard six (6) inch gutter on an individual basis.

3.2.5.4 Residential Streets: The permissible spread of water in gutters for residenital streets shall be limited by the height of the curb for standard street sections for a 10-year design storm without storm sewer. The flows from a 100-year frequency storm shall be contained within the right-of-way. The permissible spread of water in gutters for residential streets with split sections shall be limited by the height of the curb for low gutter flow and by the depth of flow at the face of the curb corresponding to the crown elevation for high gutter.

Inlets shall be located at street intersections, low points of grade or where the gutter flow exceeds the permissible spread of water criteria. A gutter depression of six (6) inches shall be used on inlets located on residential streets. At locations where depressed inlets are expected to interfere with pedestrian activity, usually at crosswalks or interior spans of the block used for parking, a depression of less than six (6) inches may be required. These locations may require additional inlet width to compensate for the

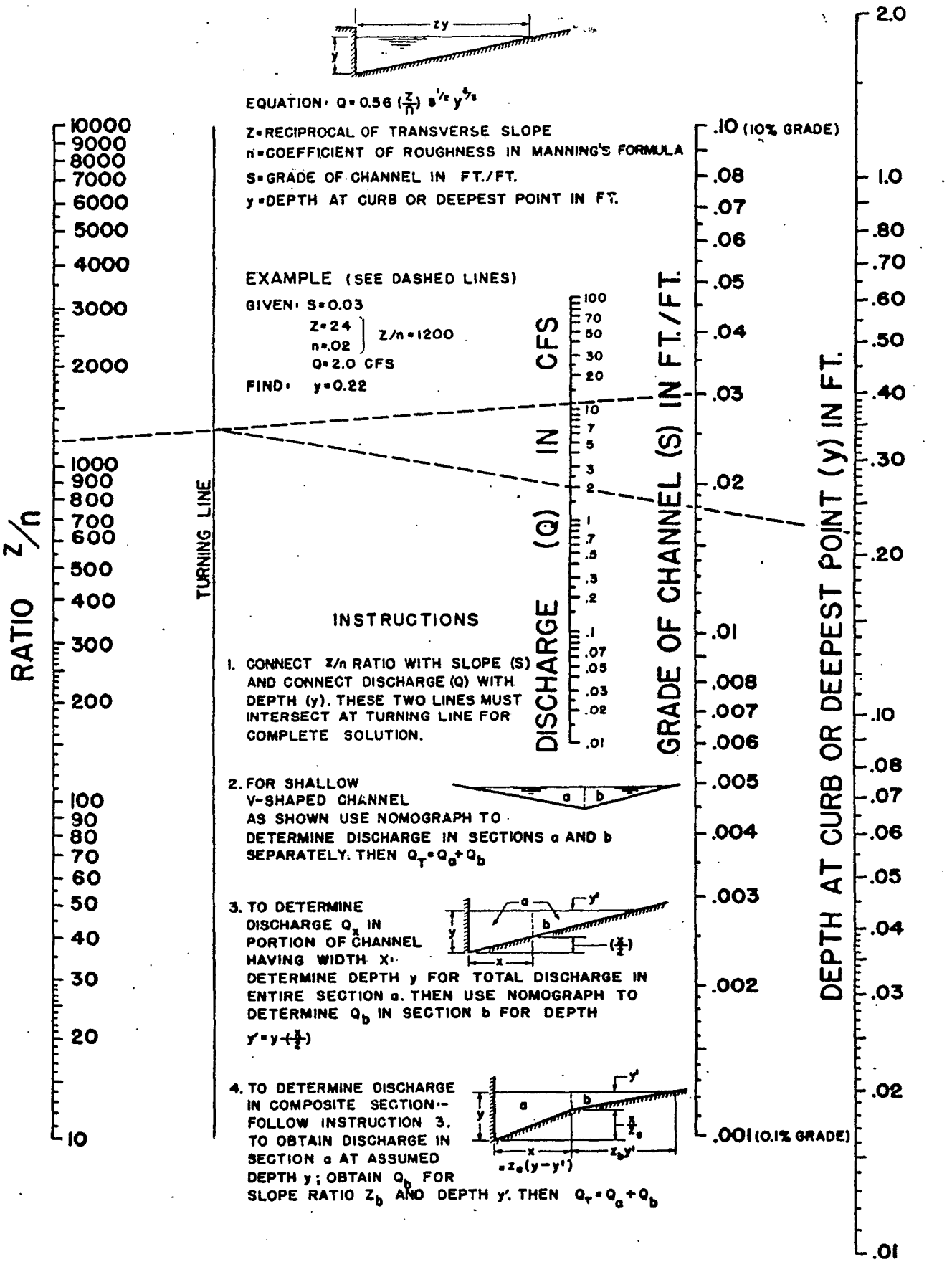
reduced depression. The City will consider all variances from a standard six (6) inch gutter on an individual basis.

3.2.5.6 Alleys: The permissible spread of water in alleys shall be limited to confining the flow to within the right-of-way.

3.2.6 Curb Inlet Design

3.2.6.1 General: A depressed curb inlet is more efficient than a non-depressed inlet because a depressed inlet induces a greater cross-flow toward the inlet allowing less water to flow past it. Also, the transition out of the depression causes a backwater effect which further increases the capacity of the storm drain. Determination of the required size of the storm drain inlet will be based on the following procedure as adapted from the Texas Highway Department Bridge Division's Hydraulic Manual. The flow rate into the inlet depends on the depth of flow in the approach gutter.

3.2.6.2 Depth of Gutter Flow: The depth of flow in the approach gutter can be estimated by assuming that the gutter will have a triangular cross-section. On streets with parabolic cross-sections, a reasonable approximation of a straight slope may be used. The nomograph shown on Figure 3.3 can be used to estimate the depth of flow in a triangular gutter. The design flow rate is determined from the runoff computations as was previously specified.



Nomograph A

NOMOGRAPH FOR FLOW IN TRIANGULAR CHANNELS

FIGURE 3.3

3.2.6.3 Discharge per Length of Curb Inlet: For determining the size and locations of inelts, the following shall be used as a minimum:

Street Grade	Length of Inlet Opening for Each C.F.S. of Gutter Flow
Sags	0.6 Feet
Less than 2%	1.0 Feet
2% to 3.5%	1.5 Feet
Greater than 3.5%	2.0 Feet

3.2.6.4 Inlet Configuration and Location: Storm sewer inlets shall be standard sizes (5, 10, 14 or 20 feet in length). Construction of inlets shall be in accordance with the Standard Details.

Inlets shall be spaced no closer than 300 feet apart without special permission from the City. The maximum length of an inlet at one location shall be 20 feet on each side of the street.

No more than 6 cfs can cross intersections in residential areas and no bypass of storm water across major intersections shall be allowed.

3.2.7 Flow in Storm Drains and Their Appurtenances:

3.2.7.1 Minimum Grades: Storm drains should operate with velocities of flow sufficient to prevent excessive deposits of solid materials; otherwise objectionable clogging may result. The

controlling velocity with regard to sediment deposition is near the bottom of the conduit and considerably less than the mean velocity of the sewer. Storm drains shall be designed to have a minimum mean velocity flowing full of 2.5 feet per second (f.p.s.). Table 3.4 indicates the minimum grades for both concrete pipe with "Mannings's n" = 0.013.

3.2.7.2 Maximum Velocities: The slope of a storm sewer should also be such that excessive velocities will not damage the pipeline or drainage structures. Table 3.5 delineates the maximum desirable velocities for storm sewers.

3.2.7.3 Discharge of Storm Drain Pipe: Storm drain pipes discharging into Lake Ray Hubbard shall be set such that the flow line of the pipe shall be set at the normal pool elevation of Lake Ray Hubbard or otherwise approved by the City Engineer. Where storm drain pipes discharge into water courses, the invert of the pipe shall be at the same grade as the low point of the water course. Adequate riprap or other erosion protection shall be provided.

The maximum discharge velocity from any storm sewer shall not exceed 6 f.p.s. Where it is impractical to meet this standard, the discharge channel shall be rip-rapped with reinforced concrete until the velocity is reduced to 6 f.p.s. or less.

Storm sewers discharging into water courses shall have the same invert level as the water course.

Table 3.4

Minimum ~~Maximum~~ Grades for Storm Drain Pipelines

Pipe Size (Inches)	Slope in Foot/Foot Concrete Pipe	Corrugated Metal Pipe
15	0.0023	0.0076
18	0.0018	0.0060
21	0.0015	0.0049
24	0.0013	0.0041
27	0.0011	0.0035
30	0.0009	0.0031
33	0.0008	0.0027
36	0.0007	0.0024
39	0.0006	0.0022
42	0.0006	0.0020
45	0.0005	0.0018
48	0.0005	0.0016
54	0.0004	0.0014
60	0.0004	0.0012
66	0.0004	0.0011
72	0.0003	0.0010
78	0.0003	0.0009
84	0.0003	0.0008
96	0.0002	0.0007

Note: Corrugated metal pipes are to only be used at private driveways. In these instances, a clean-out must be provided for each 24 feet of pipe. Corrugated metal pipes must have a reinforced concrete sloped headwall which completely surrounds the end of the pipe.

Table 3.5

Maximum Desirable Velocity in Storm Drains

Description	Maximum Desirable Velocity
Culverts (All Types)	15 f.p.s.
Storm Drains (Inlet laterals)	No Limit
Storm Sewers	12 f.p.s.

All storm drain pipes in streets and alleys shall be installed at a depth sufficient to permit all water lines to be above the storm drain pipes when the water line has a minimum cover of three (3') feet.

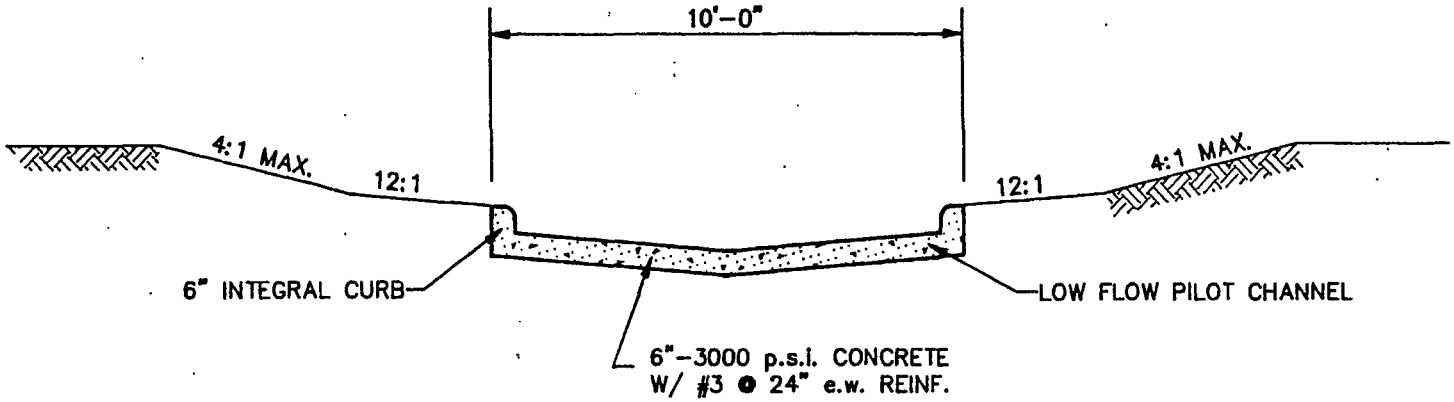
3.2.7.4 Manholes: Storm drain manholes shall be located at intervals not to exceed five hundred (500) feet for twenty-four (24) inch in diameter or smaller pipes. In general, manholes should be located at street intersections, storm pipe junctions or changes of grade and changes of alignment. Storm drain manholes for pipes greater than twenty-four (24") inches in diameter shall be located at points where design indicates entrances into the pipe are desirable. In no case shall the distance between manholes be greater than eight hundred (800) feet.

3.2.7.5 Lateral Lines: The minimum size storm sewer line from the inlet box to the collector lines shall be eighteen (18) inches in diameter.

3.2.8 Drainage Channels: All channels shall have a minimum bottom width of four (4) feet and a depth based on a maximum flow. Side slopes of channels shall not be steeper than one (1) foot rise to three (3) feet horizontal distance. In unlined open channels, the maximum side slope shall not be steeper than one (1') foot rise to four (4') feet horizontal distance. All channels shall be designed for a minimum of one (1') foot of freeboard at a maximum design flow. Channels discharging into Lake Ray Hubbard shall have inverts at no higher than the normal conservation pool level. Channels discharging into water courses shall have the same invert level as the water course. Low flow pilot channel lining of earthern channels will be required for any earthen channel carrying more than 100 c.f.s. The design of the low flow pilot channel shall be as shown in Figure 3.4.

3.2.9 100-Year Flood Zones: Where the Federal Emergency Management Administration (FEMA) has defined a flood hazard area with regard to a drainage course, the flood hazard zone and the floodplain and floodway, if available, shall be shown on the drainage area map.

3.2.10 Culvert Design: The design of culverts shall be adequate for the maximum storm discharge expected. The Standards of Design for culverts shall conform to the latest edition of the "Hydraulic Manual" of the Texas Highway Department.



TYPICAL EARTHEN CHANNEL SECTION

HEAFIG3

THE CITY OF HEATH, TEXAS TYPICAL CHANNEL SECTION	SCALE: 1/4"=1' DATE: JAN. 1991 SHEET: FIGURE 3.4	FREEMAN - MILLICAN, Inc. CONSULTING ENGINEERS DALLAS, TEXAS

3.2.11 Storm Drainage Summary: The storm drainage calculations will be summarized in a table as illustrated in Figure 3.5. This table should correspond to the drainage area map and preferably be in close proximity to that map on the engineering drawings.

3.3 Storm Drainage Management Plan

3.3.1 General: Storm drainage facilities shall include all elements of a drainage system consisting of streets, alleys, storm drains, channels, culverts, bridges, swales and any other facility through which or over which storm water flows, all of which the City must have a right in, either in the form of a dedicated right-of-way or floodway and drainage easements.

Storm drainage facilities shall be designed and constructed at such locations and of such size and dimensions to adequately serve the subdivision and the contributing drainage area above and below the subdivision. All storm drainage facilities shall be designed and constructed in accordance with the Standards of Design herein. All storm drainage facilities shall be reviewed and approved by the City Engineer.

3.3.2 Site Drainage: All new subdivisions shall provide as part of the subdivision review process a complete storm drainage management plan. This plan will include, but not be limited to, the following drainage information: the drainage management plan shall consist of complete review of all on-site, upstream and downstream drainage

STORM DRAINAGE SUMMARY*

Drainage Area	Area (acres)	Tc (Min)	C Factor	10-Year Storm			100-Year Storm		
				I (In/hr)	Q (cfs)	Accum.Q (cfs)	I (In/hr)	Q (cfs)	Accum.Q (cfs)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

*50-Year and 100-Year storm quantities should be added as needed.

FIGURE 3.5

within the impacted watershed. The plan shall analyze all existing impacted drainage facilities within the watershed. The plan shall determine all on-site and downstream drainage facility improvements due to the increased runoff from the proposed development and future upstream and downstream developments. The plan shall contain calculations necessary to determine compliance with the Standards of Design herein. The plan shall be done, using current zoning conditions or land use prescribed by the City's Land Use Plan (whichever creates the greatest storm water runoff), with maximum development considered throughout the watershed. The storm drainage plan shall show all necessary improvements with flow data provided at each point of interception of water. As part of the storm drainage plan, the developer shall show a lot grading plan to direct all water to proper intersection points avoiding cross flow of water from lot to lot. All upstream discharge shall be intercepted and carried through the proposed development in compliance with the Standards of Design herein. All discharge from the proposed development shall be designed in accordance with the Standards of Design herein with all necessary improvements being installed by the developer to protect downstream property from damage. The determination of necessary improvements to existing drainage facilities downstream of a proposed development shall be reviewed by the City Engineer for compliance and adequacy. Deviations from the City Engineer's recommendations and the Standards of Design herein may be approved thorugh the requesting and granting of a variance by the City Council. If a storm drainage plan has been

completed prior to new proposed development in question, the developer may use this plan if the City Engineer deems the existing plan adequate.

3.3.3 Subdivision Development: All subdivision developments shall be built in complete compliance with a storm drainage plan as outlined herein. All lots shall be graded at the time of development in accordance with the plan. Upon completion of a subdivision development, the developer's engineer shall certify in writing to the City that full compliance with the approved storm drainage management plan has been accomplished. All grading shall not exceed a slope of 3 to 1 unless approved by the City Engineer. Approved erosion control shall be provided as part of the development construction on any or all lots within the development to protect drainage, lot development, and adjacent property.

3.3.4 Lot Development: All lot developments shall include a drainage plan preventing all diversion of water from the approved path of discharge. The builder at the time of the permit application shall furnish a grading plan in compliance with the Uniform Building Code, and the storm drainage plan approved for that particular development. If the regrading of a lot is necessary, then the builder shall be required to furnish a new drainage plan indicating the diversion and rerouting of the affected stormwater. When the regrading of a lot prevents the drainage from flowing to the proper structures as designated in the drainage plan, then the builder will furnish a

registered engineer's review for adequacy of existing structures to which the water is diverted. If improvements are necessary to provide for adequate drainage due to regrading of a lot, then the improvement must be made at the builder's expense before a grading permit or other permits for construction will be issued by the City. The City Engineer will review the information submitted for compliance with the approved drainage management plan.

3.3.5 Off-Site Cost Sharing: The Developer shall be fully responsible for the construction of off-site drainage improvements necessary for his subdivision and the surrounding area, unless other provisions are approved by the City Council. Provisions for reimbursement of cost in excess of those necessary to serve his subdivision, and any other provisions, shall be made a part of the facilities agreement. For any subsequent subdivision utilizing such facilities, any cost due prior developers shall be pro rated based on the increased contribution of stormwater runoff. Such pro rated amounts shall be made a part of any subsequent agreement, collected by the City, and repaid to the original developer making such improvements.

The original developer shall provide the City with acceptable documentation of actual construction cost from which calculation of reimbursable amounts will be made for inclusion in the facilities agreement.

3.3.6 Exemptions: When a development is of two lots or less and in the City Engineer's opinion does not affect existing drainage facilities or affect the adjacent property, the City Engineer may allow the developer to waive any off-site pro rata costs.

4. WATER SYSTEM

4.1 General: The design and construction of the water distribution system to serve the development shall be in accordance with good engineering principles, with these Standards of Design, the Standard Specifications for Construction and the Standard Details and with the requirements of the Texas Department of Health and the State Insurance Board. All off-site water mains shall be sized and located to conform to projected demands in accordance with the latest "Report on Water Distribution Study" and the computer model adopted by the City. The City reserves the right to check the water distribution model with regard to the impact of each development on the existing and proposed water distribution system. No construction shall commence prior to the approval of the plans and specifications by the City.

All facilities shall be of sufficient size to provide adequate capacity for ultimate development. The pipelines shall be sized to meet the maximum instant domestic requirements plus an appropriate allowance for fire protection water. The design cirteria for water demand shall be submitted to the City with the plans and specifications. The City reserves the right to require larger pepelines than that required for the proposed development in order to provide capacities for areas outside the development.

The minimum pipeline size to serve residential areas shall be six (6) inches in diameter, and the minimum pipeline size serving retail and multi-family, etc. shall be eight (8) inches. In general, all lines shall be looped with no dead-ends. Dead-end lines will be allowed only upon approval by the City and shall be furnished with a flush valve arrangement. The developer shall provide facilities sufficient for fire flows in accordance with the minimum criteria of the State Board of Insurance as delineated in Table 4.1.

Table 4.1 Minimum of Fire Flow Requirements

Type of Development	Fire Flow*
Principal Mercantile and Industrial **	3,000 GPM
Light Mercantile and Apartments **	1,500 GPM
Congested Residential	750 GPM
Scattered Residential Areas	500 GPM

*All fire flows to be calculated with a minimum of 20 pounds per square inch of residual pressure.

**The State Board of Insurance loosely defines principal mercantile as downtown areas and concentrated shopping areas and defines light mercantile as scattered or strip shopping areas. However, the classification of the development will be at the descretion of the Board.

4.2 Connections to Existing Distribution System: Preliminary discussions concerning take-off points in the distribution system should be conducted with the City of Heath or its designated representative prior to finalizing the preliminary designs of the distribution system which will serve the development. Connections to the City's existing system will be allowed only at locations where the City believes that sufficient quantity and pressures are available to meet the projected requirements of the development. In general, the connections to the existing distribution system shall be made in such a manner to keep "shut-downs" to a minimum. Preference should be given to a tapping valve connection.

In a proposed development where City water is not adjacent to the property but is accessible, the developer shall provide, at his expense, an off-site water main of sufficient size to serve his development. The proposed development may require a loop into the existing water distribution system in order to provide adequate water pressure which will be at the developer's expense.

In general, the City will not approve a development which cannot be served by extensions to the City distribution system. Under unusual circumstances, the City may consider approval of a private water system which will supply an adequate quantity of potable water to every lot in a residential development. Such system must meet the approval of the City, the Texas Department of Health, the State Board of Insurnce and other appropriate regulatory agencies. In addition,

an agreement between the City and the developer must be executed whereby the City may acquire the system at such time as it can be connected into the City's owned and operated distribution network. In all cases, the engineering drawings shall show the source of water for the development.

4.3 Location of Facilities:

4.3.1 Pipelines: Water pipelines shall be located in the parkways between the back of the curb and the street right-of-way. The location shall be four (4') feet from the back of curb and be on the north side of the street on east-west streets and be on the east side of the street on north-south streets. A tracer line shall be installed with the pipeline and terminate at a main line valve. The tracer shall be 12 gauge insulated wire.

Water main easements shall be not less than fifteen (15) feet wide.

Mains over 1200 feet in length or mains supplying more than one fire hydrant, shall be a minimum size of 8-inch diameter pipe in residential districts. For mains in commercial and manufacturing districts, a minimum of 12-inch diameter pipe will be required if the main is over 600 feet in length.

In residential districts and in those supplying only one fire hydrant, a 6-inch diameter pipe is required for mains less than 1200 feet in length. Dead end mains shall not exceed 600 feet in length, and at

least one fire hydrant or blow-off valve will be required, usually at or near the end of the main.

In commercial and manufacturing districts, minimum 8-inch mains are required. In any event, water mains must be of adequate size to provide for the building total fire flow.

4.3.2 Gate Valves: In general, gate valves shall be located outside the paved streets and shall be four (4') feet if a four-foot sidewalk with a parkway is used and eight (8') feet if a five-foot sidewalk adjacent to the curb is used back of curb of the intersecting street. In general, gate valves shall be located at street intersections (except for fire hydrant leads). Unless otherwise requested by the developer and approved by the City, valves shall be located in the northeast quadrant of the street intersection. All valve boxes shall be encased in a concrete pad at the ground surface. The concrete pad shall be 12 inches x 12 inches x 6 inches, reinforced with No. 3 steel bars.

Valves twelve (12") inches and smaller shall be placed on or near street property lines and shall be spaced at a minimum of 800 feet apart in residential, duplex and apartment districts and not over 500 feet apart in all other districts. They shall be placed in such a manner as to require preferably two, but not more than three valves to shut down each City block, or as may be required to prevent shutting off more than one fire hydrant. On cross-feed mains without services,

a maximum of four valves shall be used to shut down each block. Also, valves shall be placed at or near the ends of mains in such manner that a shut down can be made for a future main extension without causing loss of service on the existing main. The location of valves larger than twelve (12") inches will be as approved by the City. Valves twelve (12") inches and under will be Resilient Seat Gate Valves (RSGV). Sixteen (16") and eighteen (18") inch valves shall be non-rising stem double disc gate valves placed in the vertical position. Valves larger than eighteen (18") inches will be butterfly valves.

4.3.3. Fire Hydrants: In general, fire hydrants shall be located at each street intersection and at intervals on the interior of each block.

A. Residential and Duplex: Residential and duplex areas shall have a fire hydrant at each street intersection and at 500-foot intervals on the interior of each block. In no case shall there be more than 500 feet of hose lay from a fire hydrant to any main building in any development from a fire hydrant.

B. Multi-family and Local Retail: Multi-family and local retail areas shall have a fire hydrant at each street intersection and at 300 foot intervals on the interior

of each block. In no case shall there be more than 150 feet of hose lay from a fire hydrant to any building in any development.

All fire hydrants which are placed off street right-of-ways shall have an all-weather access area which has been approved by the Fire Marshall. All fire hydrants shall be between two (2') feet and six (6') feet behind the curb or shall be placed as approved by the City Engineer.

The spacing of fire hydrants shall be measured along the street frontage. All fire hydrant spacing shall be reviewed by the City Fire Marshall. When a special condition exists due to land use, the Fire Marshall may require additional hydrants for fire protection.

All required fire hydrants shall be as required by the North Central Texas Council of Governments Specifications and Addenda and shall be placed on water mains of no less than six (6") inches in size. Fire hydrants shall be as specified in the North Central Texas Council of Government Specifications and associated addenda.

Valves shall be placed on all fire hydrant leads.

Required fire hydrants shall be installed so the break away point will be no less than three (3") inches, and no greater than five (5") inches above the grade surface.

A fire hydrant shall not be in the sidewalk.

All required fire hydrants placed on private property shall be adequately protected by either curb stops or concrete filled steel posts or other methods as approved by the City and shall be in easements. Such stops or posts to be the responsiblity of the landowner on which the said fire hydrant is placed.

All required fire hydrants shall be installed so that the steamer connection will face the fire lane or street, or as directed by the Fire Department.

Fire hydrants, when placed at intersections or access drives to parking lots, when practical, shall be placed so that no part of the fire truck will block the intersection or parking lot access when connections to the fire hydrant are made.

Fire hydrants, required by this article, and located on private property, shall be accessible to the Fire Department at all times.

Fire hydrants shall be located at street or fire lane intersections, when feasible.

4.3.4 Flush Valves: Flush valves, or an approved equal, shall be installed on all dead-end pipelines and shall comply with the Standard Details adopted by the City.

4.4 Water Service Connections: A water service pipeline shall be laid to each lot with fittings and a meter box in accordance with the Standard Specifications for Construction and the Standard Details.

Each service pipeline may, at the City's option, serve two adjacent single family lots or units within a development, providing it is located at the common property line and complies with the Standard Details. All service pipelines which supply water to each lot or two adjacent single family units shall be constructed of copper having a minimum size of one (1) inch. Meter box tops shall be set one-half (1/2) inch to one and one-half (1-1/2) inch above the curb, and an angle meter stop shall be set six (6) inches below the meter box top. Meter boxes shall have a one (1) inch wide slot from five (5) inches below the top of the box to the bottom of the box on the side facing the lot for service connection. All meter boxes shall be set six (6') feet behind the curb or twelve (12") inches behind the curb depending on sidewalk location. Water meters shall not be placed in the sidewalk.

4.4.1 Installation of Multiple Meter Boxes: Installation of multiple meter boxes for multi-family, condominium and townhouse developments may only be installed at approved locations. Each service box shall service one (1) single family unit or two (2) single family units (one or two water meters with a maximum capacity of approximately 20 gallons per minute each). The minimum size service line for multiple meter box installations is tabulated in Table 4.2..

Table 4.2

Minimum-Size Service Connection for Multiple Water Connections

Maximum Number of Family Unit Connections (Water Meters at 20 gpm)	Minimum Size Service Pipeline (Inches)
2	1
5	1-1/2
10	2

Service pipeline size for commercial and industrial developments shall be designed by the developer in accordance with the City's adopted Uniform Plumbing Code.

4.5 Materials and Installation:

4.5.1. Pipe: Water pipelines shall be either P.V.C. or reinforced concrete cylinder pipe conforming to the Standard Specifications for Construction. In general, the water pipelines shall be Class 150 and installed with a minimum of four (4') feet of cover, unless approved by the City. All pipe shall be installed in embedment material as shown on the Standard Details and in conformance with the Standard Specifications for Construction. A tracer line shall be installed with the pipeline and be terminated in each valve box. The tracer line shall be metallic vinyl detector tape, blue in color, bearing the legend "Buried Water Line" at not less than three (3') feet on center.

4.5.2 Gate Valves: All gate valves shall be manufactured by Mueller, American Daring, or an approved equal conforming to the requirements set forth in the Standard Specifications for Construction.

4.5.3 Fire Hydrants: Fire hydrants shall be either Mueller, American Darling, or an approved equal conforming to the requirements set forth in the Standard Specifications for Construction. All fire hydrants shall be installed with a 6-inch gate valve on the hydrant lead. The installation shall be as set forth in the Standard Specifications for Construction. Fire hydrants shall be painted to meet the City's requirement for color code as set forth in the Standard Specifications. In general, the fire hydrant will have a vermillion red base with differing bonnet color which corresponds to the size of hydrant, as detailed in Table 4.3.

Table 4.3

Fire Hydrant Color Code

Size of Hydrant	Color of Bonnet
6"	Silver
8"	Blue
10" and larger	Yellow

4.5.4 Water Service Connections: Service pipelines shall be in accordance with the designs shown on the Standard Details. The materials shall be Mueller or approved equal and shall be installed in accordance with the Standard Specifications for Construction. All connections shall be flare type or approved equal.

4.6 Testing:

4.6.1 Hydrostatic Test: All pipelines shall be hydrostatically tested to the specified test pressure of 150 psi for four (4) hours in accordance with the procedures set forth in the Standard Specifications for Construction. The test shall not be conducted until the total installation is completed, including installation of service lines, fire hydrants, flush valves, etc. All testing shall be accomplished in the presence of a representative of the City of Heath. The developer shall be responsible for all expenses to hydrostatically test water pipelines.

4.6.2. Sterilization: All facilities shall be sterilized in accordance with the procedures set forth in the Standard Specifications for Construction. The developer will be required to submit samples to an approved laboratory for certification as being free of bacteria. The facilities shall be sterilized and certification can be achieved. The sterilization and the taking of

samples shall be performed in the presence of a representative of the City of Heath. The developer shall be responsible for all expenses for sterilization of water pipelines.

5. SANITARY SEWER SYSTEM

5.1 General: The design and construction of the sanitary sewer collection system to serve the development shall be in accordance with good engineering principles, these Standards of Design, the Standard Specifications for Construction, the Standard Details and the requirements of the Texas Department of Health. No construction shall commence prior to the approval of the plans and specifications by the City of Heath.

All facilities shall be of sufficient size to provide adequate capacity for the ultimate development. The sewer lines shall be sized to meet the peak-day, dry weather flow plus an appropriate allowance for infiltration of storm water. The minimum sewer pipeline size (other than service lines) for all developments shall be six (6) inches in diameter. The design criteria and calculation shall be submitted to the City with the plans and specifications. As a minimum, the engineering drawings shall indicate the sanitary sewer calculations as per Figure 5.1. Residential dry weather flow shall be determined from Figure 5.2. The City reserves the right to require a pipeline of a larger size than that required by the development in order to provide capacities for areas outside the development.

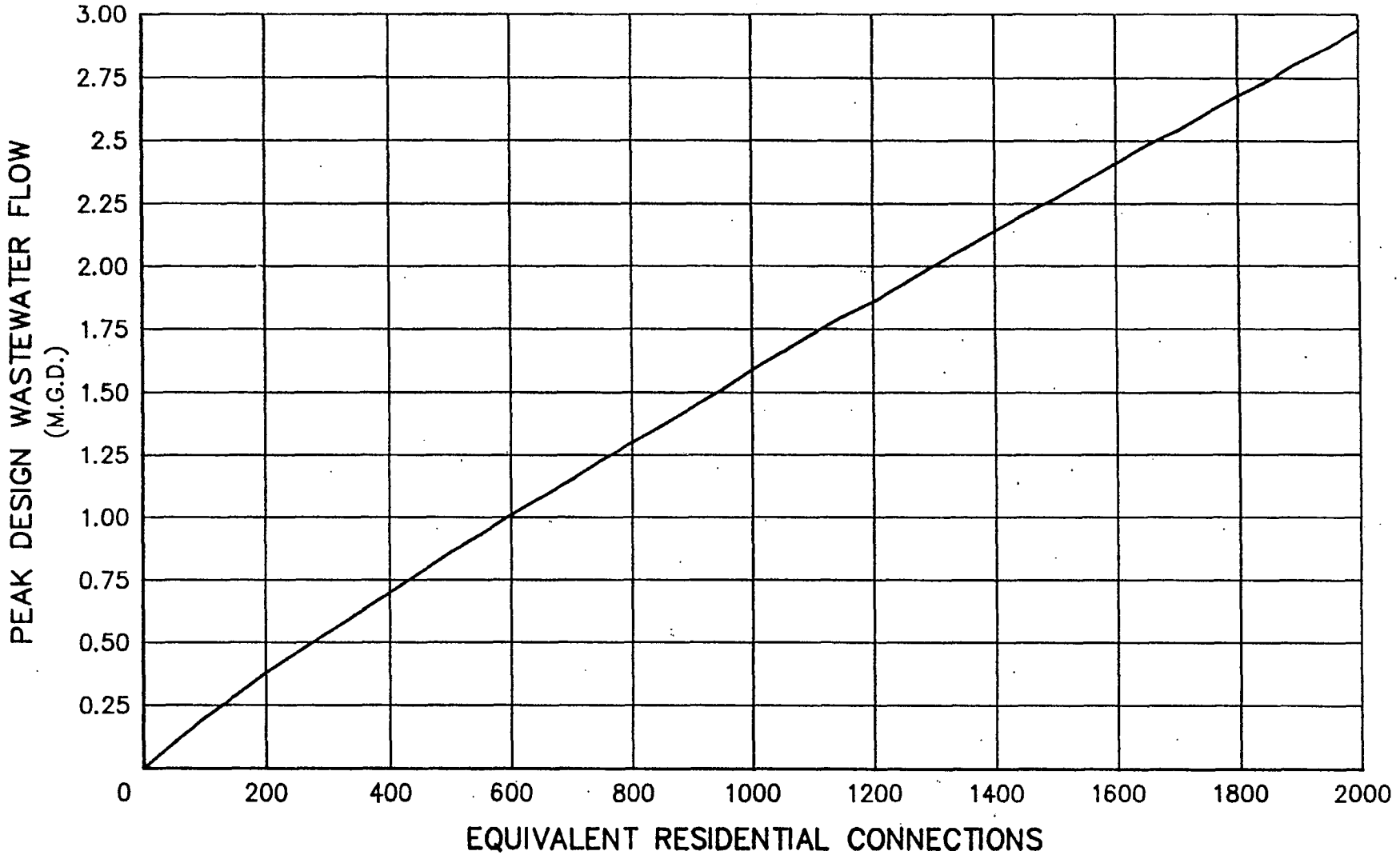
All sanitary sewers shall be installed at a depth sufficient to permit all water pipelines to be above the sanitary sewer when the water pipeline has a minimum cover of three (3) feet. In such cases where

SANITARY SEWER SYSTEM SUMMARY

MANHOLE		RESIDENTIAL FLOW			Commercial or Industrial Point Source Flow		Peak Infiltration/ Inflow	Total Design Flow Maximum Wet-Weather Day
FROM	TO	CUMMULATIVE POPULATION	AVERAGE DRY-DAY FLOW (gpm)	MAXIMUM DRY-DAY FLOW (gpm)	Units*	Average Flow (gpm)	(gpm)	(gpm)
1	2							
2	3							
3	4							
4	5							
5	6							
6	7							
7	8							
8	9							
9	10							

* Designate base measurement from which flow is calculated.

Figure 5.1



HEAFIG5

THE CITY OF HEATH, TEXAS

PEAK WASTEWATER FLOW RATES

SCALE: NONE

DATE: JAN. 1991

SHEET: FIGURE 5.2

FREEMAN - MILLICAN, Inc.
CONSULTING ENGINEERS
DALLAS, TEXAS

water pipelines either cross or otherwise come within nine (9) feet of a sanitary sewer pipeline; then a special construction method shall be applied to the sewer pipe so that the sewer pipe will be a pressure pipe at all locations where the water pipe and sewer pipe are less than 9 feet apart. The sewer pipe in such case shall be PVC with a minimum working pressure class of 150 psi. The minimum width of a sanitary sewer easement shall be 15 feet.

5.2 Connections to Existing Sewer Collection System: Preliminary discussion concerning entrance points in the collection system should be conducted with the City of Heath or its designated representative prior to finalizing the preliminary designs of the collection system to serve the development. Connections will be allowed only at locations where the city believes that sufficient capacities are available to meet the projected requirements of the development.

In a proposed development where City sewerage facilities are not adjacent to the property but are accessible, the developer shall provide, at his expense, an off-site sewer interceptor of sufficient size to serve his development and the contributing service area.

In general, the City will not approve a development which cannot be served by extensions to the City's sewer collection system. Under unusual circumstances, the City may consider approval of a private sewage system which will provide adequate collection and treatment

facilities to serve every lot in the residential development. Such system must meet the approval of the City, the Texas Department of Health, the North Texas Municipal Water District, the Texas Department of Water Resources and other appropriate regulatory agencies. In addition, an agreement between the City and and developer must be executed whereby the City may acquire the system at such time as it can be connected into the City owned and operated sanitary sewerage facilities. In all cases, the final engineering drawings will indicate how the wastewater collected from the development will be collected and/or treated.

5.3 Location of Facilities:

5.3.1 Sewer Pipelines: Sewer pipelines shall be located in the right-of-way out of pavement according to the Utility Assignment Sheets in Appendix C. A tracer line shall be installed with the pipeline and be terminated in each manhole. The tracer line shall be metallic vinyl detector tape, red in color, bearing the legend "Buried Sewer Line" at not less than three (3') feet on center.

The vertical distance from the top of the sewer to the pavement or finished grade elevation shall not be less than five (5') feet.

5.3.2. Sewer Service Pipelines: Sewer service pipelines shall be laid to each lot. The service pipelines shall be plastic pipe having a minimum diameter of six (6") inches and shall extend to the property. Sewer service pipelines shall be located ten (10') feet

downstream of the center of the lot and as approved on the final construction plans by the City. In general, only one lot shall be served by a service pipeline. Under unusual circumstances whereby a single service pipeline can serve two lots, the minimum diameter shall be six (6) inches. Special sewer service sizing may be required in some instances. Where water and sewer pipelines pass within nine (9) feet of each other, the method of construction shall be specified in order to meet TDH cirteria.

5.3.3. Manholes: In general, manholes shall be located at all intersections of sewer pipelines, changes in grade, changes in alignment and at distances not to exceed 500 feet.

5.4 Flow in Sanitary Sewers and Their Appurtenances:

5.4.1. Minimum Grades: Sanitary sewers should operate with velocities of flow sufficient to prevent excessive deposits of solid materials; otherwise objectionable clogging may result. The controlling velocity with regard to sediment deposition is near the bottom of the conduit and considerably less than the mean velocity flowing full of 2.5 feet per second (f.p.s.). Table 5.1 indicates the minimum grades for sewer pipe with a "Manning's n" = 0.013 and flowing at 2.4 f.p.s.

5.4.2. Maximum Velocities: The slope of a sanitary sewer should also be such that excessive velocities will not damage the pipeline.

The maximum desirable velocities for sanitary sewers shall be based upon the pipe manufacturers recommendations not to exceed 15 feet per second.

5.5 Materials and Installation:

5.5.1 Pipe: Pipe used for sewerage collection systems shall be plastic pipe conforming to the Standard Specifications for Construction. The sewer pipeline shall be SDR35, or an approved equal, and shall have a minimum earth cover of 3.5 feet without concrete encasement.

Table 5.1

Minimum Grades for Sanitary Sewer Pipelines

Pipe Size (Inches)	Slope in Foot/Foot (n = 0.013)
6	0.0060
8	0.0040
10	0.0030
12	0.0025
15	0.0023
18	0.0018
21	0.0015
24	0.0013
27	0.0011
30	0.0009
33	0.0008
36	0.0007
39	0.0006
42	0.0006
45	0.0005
48	0.0005
54	0.0004
60	0.0004
66	0.0004
72	0.0003
78	0.0003
84	0.0003
96	0.0002

All pipe shall be installed in embedment material as shown on the Standard Details and in conformance for the Standard Specification for Construction.

5.5.2 Manholes: Manholes shall be of precast concrete or cast-in-place and shall conform to the Standard Details and the Standard Specifications for Construction.

5.5.3 Cleanouts: In general, manholes shall be installed at the upper end of all sewer collector mains. Cleanouts may be installed in lieu of manholes at these locations subject to the approval of the final engineering plans by the City. Cleanouts shall conform to the Standard Details and the Standard Specifications for Construction.

5.6 Testing: All sewer lines shall be tested for infiltration in accordance with the procedures set forth in the Standard Specifications for Construction. A nylon cord may be inserted in all sewer lines as the pipe is laid, excluding services, to aid in the threading of television cables and camera controls. All testing shall be accomplished by the City's representative. All expenses for this work shall be the developer's responsibility.

5.7 Sanitary Sewer Lift Stations: All lift station design plans and specifications shall be submitted to the City Engineer for review and approval prior to construction.

APPENDIX A

CITY OF HEATH, TEXAS

APPLICATION AND FINAL PLAT CHECKLIST

DATE: _____

Name of Proposed Development _____

Name of Developer _____

Address _____ Phone _____

Owner of Record _____

Address _____ Phone _____

Name of Land Planner/Surveyor/Engineer _____

Address _____ Phone _____

Total Acreage _____ Current Zoning _____

Number of Lots/Units _____ Signed _____

The Final Plat shall generally conform to the Preliminary Plat, as approved by the City Council and shall be drawn to legibly show all data on a satisfactory scale, usually not smaller than one inch equals 100 feet. The final plat shall be submitted on a drawing which is 18 inches by 24 inches.

The following Final Plat Checklist is a summary of the requirements listed in the City of Heath Subdivision Ordinance. The following checklist is intended only as a reminder and a guide for those requirements.

INFORMATION

Provided or Shown on Plat	Not Applicable		
_____	_____	1.	Title or name of development written and graphic scale, north point, date of plat and key map
_____	_____	2.	Location of the development by City, County and State
_____	_____	3.	Location of development tied to USGS monument, Texas Highway monument or other approved benchmark

Provided or Shown on Plat	Not Applicable		
_____	_____	4.	Accurate boundary survey and property description with tract boundary lines indicated by heavy lines
_____	_____	5.	Accurate plat dimensions with all engineering information necessary to reproduce plat on the ground
_____	_____	6.	Approved name and right-of-way width of each street, both within and adjacent to the development
_____	_____	7.	Locations, dimensions and purposes of any easements or other rights-of-way
_____	_____	8.	Identification of each lot or site and block by letter and building lines or residential lots
_____	_____	9.	Record owners of contiguous parcels of unsubdivided land, names and lot patterns of contiguous subdivisions, approved Concept Plans referred by recorded subdivision plats or adjoining platted land by record name and by deed record volume and page
_____	_____	10.	Boundary lines, dimensions and descriptions of open spaces to be dedicated for public use of the inhabitants of the development
_____	_____	11.	Certificate of dedication of all streets, alleys, parks and other public uses signed by the owner or owners
_____	_____	12.	Designation of the entity responsible for the operation and maintenance of any commonly held property and a waiver releasing the City of such responsibility, a waiver releasing the City for damages in establishment or alteration of grades

Provided or Shown on Plat	Not Applicable		
_____	_____	13.	Instrument of dedication or adoption signed by the owner or owners
_____	_____	14.	Space for signatures attesting approval of the plat
_____	_____	15.	Seal and signature of the surveyor and/or engineer responsible for surveying the development and/or the preparation of the plat
_____	_____	16.	Compliance with all special requirements developed in preliminary plat review
_____	_____	17.	Waiver of drainage liability by the City due to development's design
_____	_____	18.	Statements indicating that no building permits will be issued until all public improvements are accepted by the City.

City of Heath, Texas

ENGINEERING DRAWINGS CHECKLIST

Date: _____

Name of Proposed Development _____

Name of Developer _____

Address _____ Phone _____

Owner of Record _____

Address _____ Phone _____

Name of Land Planner/Surveyor/Engineer _____

Address _____ Phone _____

Total Acreage _____ Current Zoning _____

Number of Lots/Units _____ Signed _____

The engineering drawings submitted for review and approval of the proposed utilities shall be complete design drawings and shall comply with the Standards of Design, the Standard Specifications for Construction and the Standard Details. These drawings will be submitted with the final plat.

The following Engineering Drawings Checklist is a summary of the requirements contained in the Standards mentioned. In all cases, the engineering drawings should conform to good engineering practices.

The drawings should be placed in the order of the following checklist.

The applicant should submit three (3) sets of all engineering drawings to the City for review. Any resubmissions should contain the marked up set of drawings returned to the applicant.

After completion, the City will be provided with the original and two copies of the as-built drawings showing all corrections as approved by the City.

The drawings must be accompanied by documentation from all utility companies verifying their agreement with the easements shown.

FOR CITY USE ONLY

Information Included on Plans	Information Sufficient For Review	Item
		UTILITY PLAN:
_____	_____	1. Plan view shall show relationship of all existing and proposed utilities, including streets, storm drainage, water distribution pipelines, sewer pipelines, natural gas pipelines, electric lines, telephone cables and television cables.
_____	_____	2. Plan veiw shall also include all existing and proposed easements and rights-of-way.
_____	_____	3. Plan view shall show street lighting.
		STREETS SYSTEM:
_____	_____	1. Paving plan shall show plan of existing and proposed street improvements.
_____	_____	2. Paving plan shall show paving width and street classification with standard curve data.
_____	_____	3. Paving profile shall show existing ground grade and the proposed grade of the right and left curb and the existing and proposed utilities.
_____	_____	4. Paving details shall comply with the Standard Details for the City of Heath.

FOR CITY USE ONLY

Information Included on Plans	Information Sufficient For Review	Item
		STORM DRAINAGE SYSTEM:
_____	_____	1. A map showing the entire watershed on which the project is located shall be included on the drainage map as an insert. This map shall show contours at a minimum of 5 foot intervals and be on a scale no larger than 1 inch = 2000 feet.
_____	_____	2. A drainage area map of the project site with contours at a minimum of 2 feet intervals shall be included. This map shall show the existing topography of the project site and the proposed grading plan of the site. Drainage contributing from areas outside the project site shall be specifically addressed.
_____	_____	3. The drainage calculations for the site shall be provided on the plans as per the standard table. This calculation shall identify the sub-drainage area by number, the contributing area in acres, the time of concentration in minutes, the coefficient of runoff, the storm frequency and duration, the storm intensity in inches per hour and the accumulated runoff in cubic feet per second.
_____	_____	4. The direction of storm water flow on the site shall be shown on the drainage area map, with a "Q" shown at locations where flow enters inlets, channels or other structures.

FOR CITY USE ONLY

Information Included on Plans	Information Sufficient For Review	Item
_____	_____	5. The drainage facilities shall be designed for ultimate watershed development as shown on the Growth and Management Plan even though the project may be developed in phases or the topography is such that other developments contribute to the proposed site.
_____	_____	6. Where phased development will occur, the drainage plans and calculations shall show how the drainage will be controlled during intermediary construction.
_____	_____	7. Where the storm drainage facilities tie into existing facilities, the plans shall show how this project will affect those existing facilities.
_____	_____	8. All exisitng and proposed drainage easements on the project site shall be shown.
_____	_____	9. The storm drainage details shall comply with the Standard Details for the City of Heath.
		WATER DISTRIBUTION SYSTEM:
_____	_____	1. The plans shall show existing and proposed water supply improvements, including size of pipelines, location of valves (gate and flush) and location of fire hydrants and services.

FOR CITY USE ONLY		
Information Included on Plans	Information Sufficient For Review	Item
		2. Summary calculations pertaining to the water demand of the development, including appropriate fire flows, shall be shown in tabular form on the water plan sheet.
		3. The plans shall identify the source of water supply.
		4. The water distribution system details shall comply with the Standard Details for the City of Heath.
		SANITARY SEWER SYSTEM
		1. The plans shall show existing and proposed wastewater collection improvements, including location of manholes, cleanouts, and services.
		2. The calculations for the wastewater collection system shall be included. These calculations shall include the collection area by number, the maximum, dry weather flow in million gallons per day (MGD), the infiltration/inflow allowance in MGD and the total accumulated wastewater flow in MGD.
		3. Where proposed facilities tie into existing facilities, the plans shall show the flowline of the existing facilities and how the proposed facilities affect the system.

FOR CITY USE ONLY

Information Included on Plans	Information Sufficient For Review	Item
_____	_____	4. Where a portion of the proposed wastewater collection system will service areas outside the project, the plans shall clearly indicate how the design of the common pipeline is determined.
_____	_____	5. The details of the wastewater collection system shall comply with the Standard Details of the City of Heath.
_____	_____	6. If a wastewater collection system will not be provided, the plans should indicate how the wastewater will be collected and treated.

FOR CITY USE ONLY

Date Submitted: _____

Sent to Engineer: _____

P & Z Approval: _____

City Council Approval: _____

Pre-Construction: _____

As Built Submitted: _____

Case No.: _____

Fee Paid: _____

Availability Paid: _____

APPENDIX B

CITY OF HEATH

STANDARDS OF DESIGN

APPENDIX "B"

GENERAL NOTES

GENERAL

1. All construction shall be in accordance with the North Central Texas Council of Governments "Standard Specifications for Public Works Construction" and the City of Heath's addendum thereto.

2. Before beginning construction, the contractor shall prepare a construction sequence schedule. The construction schedule shall be such that there is the minimum interference with traffic along or adjacent to the project.

3. Construction may not be begun earlier than 7:00 A.M. on weekdays nor continued after dark without permission from the City. Construction on Saturday may not be begun before 8:00 A.M. and work on Sunday is prohibited without special permission.

4. Utilities shown on the plans were taken from field surveys and information provided by the utility companies. The completeness and the accuracy of this data is not guaranteed. Contact the following utility companies before beginning construction:

City of Heath	xxx-xxxx
TU Electric	xxx-xxxx
Lone Star Gas Company	xxx-xxxx
Southwestern Bell Telephone	xxx-xxxx

   The contractor is responsible for verifying the location of all underground utilities and structures and protecting them from damage during construction.

5. Work may not be backfilled or covered until it has been inspected by the City.

6. Material testing shall be performed by an independent testing laboratory and paid for by the Owner or Contractor.

7. All excavation on the project is unclassified.

8. Temporary erosion control shall be used to minimize the spread of silt and mud from the project on to existing streets, alleys, drainageways and public and private property. Temporary erosion controls may include straw bales, berms, dikes, swales, strips of undisturbed vegetation, check dams and other methods as required by the City.

9. Finished slopes on public rights-of-way and easements shall not be steeper than 4:1. All slopes steeper than 6:1 shall be hydro-mulched and maintained by the contractor until grass covers all parts of the slope.

10. The contractor shall maintain two-way traffic at all times along the project.

11. Remove, salvage and replace all street and traffic control signs which may be damaged by the construction of the project.

12. All trenching and excavation shall be performed in accordance with OSHA standards.

PAVING

1. All embankment shall be compacted to 95% Standard Proctor density.

2. All streets and alleys shall be placed on lime stabilized subgrade with a lime content of not less than 6%.

3. The minimum 28 day compressive strength of concrete street paving shall not be less than 3600 psi and shall be air entrained. Water may not be applied to the surface of concrete paving to improve workability.

4. All curb and gutter shall be integral with the pavement.

5. Parabolic crowns are required on all street pavement except on major thoroughfares where straight sections are required.

6. Streets and alleys shall be constructed with provisions for sidewalk ramps at all intersections.

DRAINAGE

1. Storm sewer pipe shall be reinforced concrete, Class III unless otherwise noted.

2. All structural concrete shall be Class "C" (3600 psi compressive strength at 28 days), air entrained.

3. The contractor shall install plugs in storm sewer lines or otherwise prevent mud from entering the storm sewer system during construction.

WATER AND SANITARY SEWER

1. Water mains shall be AWWA C-900 PVC Class 150 unless otherwise noted. Minimum cover for waterlines is 48" or as required to clear existing utilities, whichever is greater.

2. Marking tape shall be installed over PVC water lines.

3. Fittings for PVC water lines shall be ductile iron and be encased in a polyethylene sheath.

4. Valves shall be resilient seat gate valves.

5. All direct burial valves shall be provided with cast iron valve boxes with PVC stacks. Valve stacks shall be vertical and concentric with the valve stem. Stainless steel valve extensions are required on all valves where the operating nut is greater than 4 feet below finished grade.

6. Fire hydrants shall be field painted per City of Heath specifications.

7. All exposed bolting on any buried equipment or material shall be stainless steel. Included are:

   a. Bonnet and stuffing box bolts on valves.
   b. Shoe bolts on fire hydrants.
   c. Flange bolts.

   "Cor-ten" mechanical joint "T" bolts are acceptable for direct burial service.

8. Meter boxes shall be as approved by the City of Heath.

9. Sanitary sewer mains shall be DR 35 PVC.

10. The contractor shall install and maintain water tight plugs in all connections to the City's sanitary sewer system until the project is accepted by the City.

11. All sanitary sewer lines and manholes shall be leak tested before the project is accepted. Deflection testing of PVC sewer lines is required.

APPENDIX C

CITY OF HEATH

ADDENDUM TO THE
NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
STANDARD SPECIFICATIONS FOR
PUBLIC WORKS CONSTRUCTION

DECEMBER 1990

CITY OF HEATH
ADDENDUM TO THE
NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
STANDARD SPECIFICATIONS FOR
PUBLIC WORKS CONSTRUCTION

This addendum to the North Central Texas Council of Governments Standard Specifications for Public Works Construction - 1989, as amended, sets forth (by reference number) exceptions or requirements of the City of Heath and thereby takes precedence over any conditions or requirements of the Standard Specifications with which it is in conflict.

1.0 The term "OWNER" shall refer to the City of Heath. The term "OWNER'S Representative" shall refer to the City's Engineer or other duly authorized assistant, agent, engineer, inspector, or superintendent acting within the scope of the particular duties instructed to him.

1.21.1(e) MAINTENANCE BONDS

The Contractor shall furnish the City of Heath with a Maintenance Bond from an approved surety company which protects the City against defective workmanship and materials for a period of two (2) years from the date of the final acceptance by the City. Where defective workmanship and/or materials are discovered requiring repairs to be made under this guarantee, all such repair work shall be done by the Contractor at this own expense within five (5) days after written notice of such defect has been given to him by the City. Should the Contractor fail to repair leaks or correct such defective workmanship and/or materials within five (5) days after being notified, the City may make the necessary repairs and charge the Contractor with the actual cost of all labor and materials required.

The Maintenance Bond shall be in the amount of ~~one hundred~~ percent (~~100%~~) of the amount of the Contract. The Contractor shall execute the Maintenance Bond on the forms approved by the City.

1.35 Insert the following between the third and fourth paragraphs:

Neither such usage, as performed under this section nor the written statement of work still to be done shall be held in any way as an acceptance of said work or structure or any part thereof or as a waiver of any of the provisions of the specifications or the contract pending final completion and acceptance of the work. All necessary repairs and removal of any section of the work so put into use, due to the defective materials or

workmanship or due to operations of the Contractor, shall be performed by the Contractor at his own expense.

1.42.3 Testing of all materials shall be performed by an independent testing laboratory acceptable to the City. The Contractor shall pay the cost of all material testing including the retesting of all materials which fail the required tests. Test reports of all materials tested shall be sent to the City.

1.64 MEASUREMENT AND PAYMENT

Only those items in the Proposal will be measured and paid for. All other items of work required to complete the project shall be considered subsidiary to the pay items in the proposal and no claims whatsoever for extra work for such subsidiary items will be considered.

1.65 RECORD DRAWINGS

The Contractor shall furnish two (2) sets of prints and one mylar reproducible set of drawings marked with the location of all water and sewer services, electrical cables and any changes in the plans to the City of Heath.

2.1.1(c)(4) Add the following after the first paragraph:

No more than 40% difference shall be retained between any two consecutive sieves.

2.10.1(b) Add the following:

All supplied extra material to make systems operational must be shown on "As-built" drawings with copies provided to the City.

2.12.2 The following materials may be used only with special permission by the City:

Section	Material
2.12.1	Clay Sewer Pipe
2.12.7	Gray Cast Iron Pipe and Fittings
2.12.10	Asbestos - Cement Non Pressure Sewer Pipe
2.12.11	Asbestos - Cement Pressure Pipe
2.12.12	ABS and PVC Composite Pipe for Sanitary Sewers
2.12.18	Corrugated Metal Sanitary Sewer

2.12.5(c)(1) Bolts for flanges shall be Type 316 stainless steel.

2.12.5(c)(2)(Add) Mortar for Joints

a) Inside of joint - one part portland cement and two parts washed sand. Add only enough water to form a zero slump mixture. Mix in a mechanical mixer to a uniform consistency.

b) Outside of joint - one part portland cement and two parts washed sand. Add enough water to make the mixture flowable. Mix in a mechanical mixer to a uniform consistency.

2.12.5(c)(3)(Add) Dielectric Bushings, Sleeves and Washers

a) The dielectric bushings and sleeves shall be made from a nylon molding compound or a nylon-base, Grade N-1, laminated thermosetting material. Washers shall be made from linen or fiber reinforced thermosetting plastics.

b) The insulation for each bolt in the bolt circle shall be 1/32" thick and shall be in length equal to the thickness of the two steel flanges and the 1/8" thick insulating gasket. They shall fit the bolts snugly.

c) The insulating fiber reinforced plastic washer shall be of the same diameter as the steel washers furnished with the bolt set and shall be 3/32" thick.

2.12.5(c)(4)(Add) Apply mortar support rings on at least ten (10') foot centers on all pipe to be placed in encasement pipe to prevent the pipe from resting on the bells.

2.12.5(g)(2) Design Criteria - Prestressed Concrete Cylinder Pressure Pipe

The pipe manufacturer shall design the pipe to withstand the design pressure and support the trench loads with the embedment type (including the bedding angle) shown on the plans. All design shall be performed according to the Applicable Standards and according to generally accepted engineering procedures. Submit design calculations to the Engineer for review before manufacturing pipe. The following values shall be used in designing the pipe:

a) Unit weight of soil (w) = 125 lb. per cu. ft.

b) Coefficient of friction between backfill and trench wall (K1′ = 0.110)

c) Bedding angle - a = 30°

Unless otherwise noted, pipe shall be designed for a pressure of 150 p.s.i.

2.12.5(h)(2) Design Criteria - Pretensioned Concrete Pressure Pipe

a) The pipe manufacturer shall design the pipe to withstand the design pressure and support the trench loads with the embedment type (including the E′) shown on the plans. All design shall be performed according to the Applicable Standards and according to generally accepted engineering procedures. Submit design calculations to the Engineer for review before manufacturing pipe. The following values shall be used in designing the pipe:

1) Unit weight of soil (w) = 125 lb. per cu. ft.

2) Coefficient of friction between backfill and trench wall (K1′ = 0.110)

3) Modulus of soil reaction - E′ = 100

Unless otherwise noted, pipe shall be designed for a pressure of 150 p.s.i.

b) The manufacturer may use only 25% of the calculated composite moment of inertia of the pipe wall for P-303 pipe. The pipe shall be capable of supporting the trench loads with superimposed H-20 wheel load.

2.12.5(j) Add: Repair or replace pipe or fittings with the following imperfections as directed by Engineer:

1) A piece broken out of the pipe.

2) Any crack extending entirely through the barrel of the pipe or to the steel cylinder or rods.

3) Any shattering or flaking of concrete at a crack.

4) Any excessive surface cracking due to temperature conditions. The pipe supplier shall control these cracks by adequate concrete mix, curing or preser-

vation of moisture in pipe interior during yard storage and shipment to jobsite.

2.12.7(d) All gray iron pipe fittings shall be sheathed in polyethylene film and tape per section 2.9.5.

2.12.7(e) Bolts and nuts for mechanical joint ends shall conform to ASTM Designations A 325 (A 325M) (Type B). Bolts for buried flanged ends shall be Type 316 stainless steel. Fittings shall be cement mortar coated with a seal coat in accordance with AWWA C-104 and sheathed in polyethylene film.

2.12.8(c) Change "Type 3" to "Type B".

2.12.8(d) All ductile iron pipe and fittings shall be bituminous coated outside and cement-mortar lined inside in accordance with AWWA C-104 and sheathed with polyethylene film and tape per section 2.9.5.

2.12.8(e) Bolts and nuts for mechanical joint ends shall conform to ASTM Designations A 325 (A 325M) (Type B). Bolts for buried flanged ends shall be Type 316 stainless steel. Fittings shall be cement mortar coated with a seal coat in accordance with AWWA C-104 and sheathed in polyethylene film and tape per section 2.9.5.

2.12.8(i)(Add) The embedment to be used for ductile iron pipe shall be Class D+ unless otherwise specified.

2.12.20(b) Polyvinyl Chloride (PVC) Water Pipe. PVC pipe shall have a pressure class of 150 psi, be minimum thickness DR 18, and have cast iron outside dimensions.

2.12.20(d) Fittings shall be sheathed in polyethylene film and tape per section 2.9.5.

Change "Type 3" to "Type B".

2.12.20(g) The embedment to be used for PVC water pipe shall be Class C+ unless otherwise noted. The bolts and nuts for direct buried flanges shall be Type 316 stainless steel. Mechanical joint bolts and nuts shall conform to ASTM A325 (Type B).

2.12.24(Add) Copper Water Service Tubing.

(a) Copper water service tubing shall be type K copper per Section 2.18.

(b) Embedment for copper water service tubing shall be Class D+ except as otherwise noted.

(c) Service fittings for copper water service tubing shall be as follows:

(1) Corporation Stops - Mueller H15000 or approved equal.

(2) Branch Valve Assemblies for Double Water Services - Mueller H-15362 with two H-14265 angle stops or approved equal. Branch valve assemblies shall have 7 1/2" centers.

(3) Angle Stops for Single Water Services - Mueller H-14255, or approved equal.

2.12.25(Add) Polyethylene Water Service Tubing (PE)

(a) Polyethylene water service tubing shall conform to AWWA C901 and shall have a pressure rating of at least 160 psi. Tubing shall be made from PE 3406 and be copper tubing O.D.

(b) Embedment for PE water service tubing shall be Class C+ except as otherwise noted.

(c) Service fittings may be either of the flared joint or packed joint type. Flared joint fittings shall be as specified for copper water service tubing. Stainless steel insert stiffeners are required for packed joint fittings. Packed joint fittings shall be as follows:

(1) Corporation Stops - Mueller H15006 or approved equal.

(2) Branch Valve assemblies for double water services Mueller H15363 or approved equal.

(3) Angle stops for single water services - Mueller H14267 or approved equal.

2.12.26(Add) Special Requirements for Water Service Taps on PVC Water Pipe

(a) Direct tapping of PVC pipe will not be permitted.

(b) Taps may be made on PVC pipe using the following devices at the Contractor's option.

(1) Service Saddles - Clow Twin Seal brass saddle or Mueller Series 16100 double strap bronze. Any other service saddle must be submitted to the Engineer for approval before installing.

(2) Main Line Fitting - Taps may be made in a mechanical joint plug installed in the branch of a tee.

(c) All Water Services shall be marked on the end of services with a blue plastic tape with the word "Water" stamped thereon.

(d) After the completion of paving, all water deadheads shall have a meter box installed by the Contractor. The type of meter box shall be approved by the City.

2.13 The following valves types shall be used unless special permission is given to do otherwise:

2.13.1 Gate Valves (AWWA C 500) 14" through 48"
2.13.2 Air Valves
2.13.3 Brass Wheel Valves 3" and smaller
2.13.4 Butterfly Valves 16" and larger
2.13.5 Resilient Seat Gate Valves (AWWA C 509) 4" through 12"

2.13.1(b) Bonnet bolts shall be Type 316 Stainless Steel.

2.13.1(i)(3) Stuffing box bolts and nuts shall be Type 316 Stainless Steel.

2.13.1(o) Add: "Valves shall be sheathed in polyethylene film and tape per section 2.9.5."

2.13.1(r)(2) Change third paragraph to read "Steel sleeves shall be restricted to use on pipe sizes 20" and larger and subject to the following additional specifications:"

2.13.4(a)(7) Delete split-V packing.

2.13.4(a)(8) Discs shall be epoxy coated.

2.13.4(a)(10) The interior of the valve shall be epoxy coated.

2.13.4(a)(11) Valves shall be Class 150-B unless otherwise noted.

2.13.4(a)(12) Unless otherwise noted, valves for direct burial service shall have mechanical joint ends and exposed valves shall have flanged ends.

2.13.4(d)(4) Change "Type 3" to "Type B".

2.13.4(f)(1) (1) Operator shall be located on the side of the valve, suitable for buried service.

(2) Manufacturing Experience - Five (5) years minimum manufacturing experience is required.

2.13.4(f)(1)(A) Add:

(3) Operator shall be located on the side of the valve, suitable for buried service.

(4) Manufacturing Experience - Five (5) years minimum manufacturing experience is required.

2.13.4(f)(1)(D) Add: Operator shaft extensions are required and shall be stainless steel. Shafts shall be of sufficient length to bring operating nut to within 2" of the bottom of the valve cover.

2.13.4(j) Valves and operators shall be sheathed in polyethylene film and tape per section 2.9.5.

2.13.5(Add) Resilient Seat Gate Valves

(a) General Description - All gates valves 4" through 12" NPS shall conform to the AWWA standard for Resilient Seated Gate Valves, 3 through 12 NPS, of Water and Sewage Systems, AWWA Standard C509, except for changes or specified alternatives as detailed in this section of these specifications or as shown on the plans or in the contract specifications.

All valves 4" through 12" shall be iron body, non-rising stem, resilient-seated gate valves.

(b) Stuffing Box Bolting and Nuts shall conform to AWWA Standard C509 with the following exceptions: Stuffing box bolts and nuts shall be Type 316 Stainless Steel.

(c) Drawings - The manufacturer shall have on file with the City for approval a detail drawing of each type and size of valve to be furnished under these specifications. Offerings having exceptions or modifications to these specifications must be accompanied by new detailed drawings and statement of changes effected. Failure to meet these requirements shall be sufficient cause for rejection.

(d) Ends - Valves shall have flanged, push-on, or mechanical-joint ends, or any combination of these as may be specified. Bolts for mechanical joint ends shall meet ASTM A-325M (Type B). Bolts for direct buried flanges shall be Type 316 Stainless Steel.

(e) Bonnet Bolts and Nuts shall conform to AWWA Standard C509 with the following exception. All Bonnet bolts and nuts shall be Type 316 Stainless Steel.

(f) Stuffing Boxes - Stuffing Boxes shall conform to AWWA Standard C509 with the following exceptions. A minimum of two (2) O-rings shall be used in stuffing box. Packing shall not be used.

(g) Hand Wheels and Operating Nuts - All valves 2" (5.1 cm) in diameter and above shall be nut operated unless otherwise shown or specified. All operating nuts shall be ductile iron or cast iron. Handwheels shall be furnished only when called for on plans or in the contract specifications

All valves shall open by turning counterclockwise.

(h) Tests - All valves shall be tested by the manufacturer in accordance with AWWA Standard C500. Any leaking at the test pressure through any casting or between the bronze ring and the cast iron body shall cause the said casting to be rejected. No plugging or patching to stop any leakage shall be allowed.

(i) Inspection and Rejection - When requested by the City, the Contractor shall furnish test coupons on each heat of ferrous or nonferrous metal going into the valves. Such specimen shall be furnished upon sworn affidavit by the manufacture.

When requested at any time, notarized reports of physical tests performed on material used in the manufacture of valves furnished hereunder shall be provided.

Such reports or coupons furnished shall be identified by purchase order or contract. The material shall also be identified as to location within the valve and specification or composition.

Valves may be rejected for failure to comply with all of the requirements of this specifications.

(j) Valve Seats - Resilient seats shall be applied to the gate. The seating surface in the body of the valve shall be machined and shall be metallic. Resilient seats shall be secured to the gate mechanically by stainless steel screws.

(k) Valves shall be sheathed in polyethylene film and tape per section 2.9.5.

2.14.1 Fire hydrants shall be Mueller Centurion or approved equal.

2.14.2.(a) Scissor type main valves are not acceptable.

2.14.2(b) All accessories for mechanical joint hub shall be attached to foot when shipped. All mechanical joint gland bolts and all bolts located below finished grade, shall be high strength, low alloy, corrosion resistant steel, and shall conform to ASTM Designation A 325, Type B. or type 316 stainless steel

2.14.2(c) All hydrants shall be equipped with:

Two hose nozzles 2 1/2" in (6.4 cm) nominal I.D. National Standard Fire-Hose Coupling Screw Thread. One Pumper nozzle 4 1/2" x 4 threads/inch nominal I.D. National Standard Thread.

2.14.2(h) Two or more non corrosive outlets for drainage shall be provided in the base or barrel or between the base and barrel of the hydrant. The outlet shall be an integral part of the drain valve. Drain rods independent of the main stem shall not be accepted.

2.14.2.(i) Direction to open shall be counter-clockwise.

2.14.2.(k) The operation nozzle cap nuts shall be 1-1/2 in. point to face at base and 1-1/4 in. point to face at top. A weathercap or shield shall be furnished to protect the opening between the operating nut and the top of the bonnet.

2.14.4 Replace paragraph 2.14.4 with the following:

Breakable type hydrants shall be furnished.

(a) Definition

A breakable type hydrant is one that will break at the design point and is repaired by replacing the stem coupling and bolting the head back on to the

standpipe. The whole repair shall not require any excavation or any work on the seat valve.

(b) Standpipe

Breakable parts of standpipe shall be located at the base of the head assembly. These parts shall be of the breakable flange type, or integral flange with sawed bolts or breakable nuts. Breakable flanges screwed to the standpipe will not be accepted. Flanges shall be designed so that an end wrench can be used on the nuts and bolts. Two piece standpipes are not permitted.

(c) Stem

Provision shall be made in the design of the stem to disconnect the stem from the hydrant parts above the standpipe break point.

Provision shall be made for an automatic travel stop to prevent the hydrant from being opened. Travel stop may be in the form of a stop-nut or a positive stop against the base of the hydrant shoe.

(d) Breakable or Sleeve Type Couplings

If breakable or sleeve type couplings are used they shall have sufficient torsional strength such that the torsional failure of the stem will occur at some point other than at the coupling. Design of the coupling shall be such that when the coupling is broken no parts will come loose and fall into the hydrant barrel, and the break will not occur through the pins or bolts holding the coupling to the stem.

(e) Blocking Requirements

The foot of the hydrant shall be design with surfaces for placement of temporary thrust blocking and weight support. The area provided for temporary thrust blocking shall be opposite the center line of the inlet waterway.

2.14.5 Main valve seats shall be of such design that incorrect positioning is impossible and that the threads will be adequately guided into position. Arrangements shall also be made to hold the main valve gasket in place during assembly. The main valve shall be made of bronze and threaded into a bronze retainer ring or it

may be threaded into a heavy bronze bushing in the hydrant base.

2.14.8 Any flanges shall have a minimum thickness of 7/8 in. (2.2 cm). Bolt hole edge distance shall be sufficient to provide full support for the bolt head and nut.

2.14.9 Operating stems whose threads are located in the barrel or waterway shall be of Manganese bronze, Everdur, or other high quality non-corrodible metal, and all working parts in water way shall be bronze to bronze.

Operating stems whose threads are not located in the barrel or water way may be made of high grade bronze or steel, and stem nuts shall be bronze. Steel stems shall have bronze, stainless steel, or other non-corrodible metal sleeve where passing through O-rings. Operating threads must be sealed against contact with the water at all times regardless of open or closed position of the main valve.

2.14.11 All hydrants shall be capable of being extended to accommodate future grade changes without excavation. Hydrants shall have breakable type stem couplings installed at the ground line flange. Extension of this type hydrant shall be made by adding at the ground line flange, a new coupling and stem section equal to the length of the extension. Stem extensions made by adding new section of stem to the threaded section of the stem at the top of the hydrant will not be accepted.

2.14.17 A copy of an independent certified testing laboratory test results shall be submitted regarding the flow data from hydraulic tests for head loss through the hydrant.

2.14.20(Add) Hydrants closing against the flow or with the flow must have any stem threads protected against contact with the water. This protection can be in the form of cap nuts or lower valve washers. Cap nuts shall be locked in place to prevent loosening by normal operation of the fire hydrant.

If cap nuts are provided, they can be made of either bronze or ductile iron. If ductile iron cap nuts are used, a gasket must be provided to prevent seepage of water from contacting stem threads.

2.14.21(Add) Nozzle outlets shall not be of the lead-in type. Nozzles shall be screw-in or breach lock type and safeguarded against blowing out. A pin or other ap-

proved method shall be employed to prevent the outlet nozzle from turning or backing out.

2.16.3 Add the following at the end of the second paragraph: "Valve must have a positive stop to prevent damage to brass ball over opening."

In the sixth paragraph add "and 1 inch" after 3/4" in the first sentence and change "streamline" to "solder."

In the seventh paragraph change "streamline" to "solder."

2.19.2 Joints shall have trapped O-ring rubber gaskets in accordance with Item 2.12.4(c).

2.19.6 Exfiltration and Infiltration

Each manhole shall be tested either individually or with an associated sewer line. If manholes are tested individually, they may be tested by either infiltration or exfiltration. The maximum allowable leakage is 0.1 gallons per hour per foot of height.

2.20 Fiberglass manholes may be used only with special permission of the City.

3.7.3 Density tests shall be performed by an independent testing laboratory and paid for by the Contractor. One density test shall be performed for each 1000 C.Y. of embankment at a location selected by the City. The City may perform additional density tests at his expense. Density tests which fail shall be retested at the Contractor's expense. The minimum density for embankments subjected to vehicular traffic is 95% at 0 to 2% above optimum moisture in accordance with method Tex 113 E.

4.6.1 Unless otherwise noted, lime treatment applied to pavement subgrade shall be at a rate of not less than 6% of the subgrade dry weight.

4.6.4(b)(1) Dry placing of lime is allowed only with special permission of the City.

4.6.4(c)(1) One gradation test shall be performed for each 300 linear feet of pavement which receives lime treatment. The gradation test shall be performed by an independent testing laboratory. The City shall select the location of each test. The cost of testing shall be borne by the Contractor.

4.6.4(d) One density test shall be performed for each 300 linear feet of pavement. The density test shall be performed by an independent testing laboratory. The City shall select the location of each test. The cost of testing shall be borne by the Contractor.

4.7 Portland cement treatment of base and subgrade may be used only with special permission of the City.

4.8 Asphalt treatment of subbase may be used only with special permission of the City.

5.7.2 Add to the second paragraph, substitute the following:

If measurement for payment is in tons of material in place and accepted, weight shall be computed at 110lb./in-S.Y.

5.8.2(e)(1) Expansion joints shall be spaced at not greater than 600 foot centers. Expansion joints are required across the entire pavement width on all sides of an intersection.

5.8.2(e)(2) Construction joints (sawed dummy joints) shall be spaced both transversely and longitudinally on 20 foot centers. Longitudinal joints are not required on 20 foot wide pavement.

5.8.3(j)(Add) A stamp or die shall be used to mark on the face of the curb or edge of pavement, the location of all of the following facilities:

Facility	Marking
Water Valve	V
Water Service	W
San. Sewer Service	S

For water valves, the bottom of the "V" shall point in the direction of the valve. The stamp or die shall be approved by the City.

5.8.6(a) Testing of concrete pavement strengths shall be performed by an independent testing laboratory acceptable to the City and paid for by the Contractor. The Contractor shall furnish all materials, equipment and labor required to perform all concrete tests including but not limited to slump, air content and concrete test beams.

5.8.6(c) Minimum pavement flexural compressive strength shall be 3600 psi at 28 days for all streets, curbs, gutters and

alleys unless otherwise noted. Air content shall be 3-5%.

6.1.11 Add: For City financed projects, the City will pay for ninety (90%) per cent of the actual quantity of pipe which has been installed and backfilled until such time that the right-of-way is finish graded, and cleaned up. Such payment for pipe installed is additionally subject to the project retainage.

6.1.12 Add the following:

All construction water shall be furnished at standard commercial rates by the City from the nearest convenient City main. A water meter shall be used to determine the amount of water used. The Contractor may rent water meters from the City or furnish his own meters at the choice of the City. If City water is unavailable, Contractor shall be responsible for purchasing water from a local supplier or another city. The City reserves the right to designate the time of day in which water can be withdrawn from City mains.

6.2.6 Where pipelines and conduits are placed in existing lawns or landscaped areas, remove and replace topsoil sod and other plants and guarantee the survival of all plants so replaced.

6.2.8(d) Removal and separation of topsoil is required unless otherwise noted. Finished grade shall be $\pm$ 0.1 feet of original grade unless otherwise noted. The Contractor is responsible for removing and disposing of all excess excavated materials. Such materials may not be left on public right-of-way or adjacent property without written permission to do so.

6.2.8(f) EXCAVATIONS, TRENCHING AND SHORING

All trenches excavated within the City Limits of Heath, Texas shall be excavated in accordance with OSHA standards.

6.2.8.(g) TRENCH SAFETY

(1) After award, the Contractor shall submit to the Owner five (5) sets of a trench excavation plan. This excavation plan must be designed and sealed by a professional engineer registered in the State of Texas with professional experience in Soil Mechanics. Trench safety systems shall be designed for Type "C" soils ("Hydrostatic Pressure" in Table P-

2) unless evidence is submitted to the City that a lesser design is acceptable.

(2) The Contractor is responsible for obtaining borings and soil analysis as required for plan design. The trench excavation plan shall be designed in conformance with OSHA standards and regulations.

(3) No trenching in excess of 5 feet below existing grade will be allowed until this plan is reviewed. Any changes in the trench excavation plan after initiation of construction will not be cause for extension of time or change order and will require the same review process. The Contractor accepts sole responsibility for compliance with all applicable safety requirements.

(4) The review is only for general conformance with OSHA safety standards and review of the trench excavation plan does not relieve the Contractor of any or all construction means, methods, techniques and procedures. Any property damage or bodily injury (including death) that arises from use of the trench excavation plan, from Contractor's negligence in performance of contract work, or from City's failure to note exceptions to the excavation plan shall remain the sole responsibility and liability of the Contractor.

(5) Contractors' options to meet OSHA Standards for Trench Excavation include:

a) Minimum Angle of Repose for sloping of the sides of excavations.

b) Utilization of Trench Box.

c) Shoring, Sheeting and Bracing Methods.

(6) Contractors electing to utilize the minimum angle of repose method must submit; to the Owner:

a) Soil classification according to the Unified Soil Classification System including water content and plasticity index and a minimum angle of the slope of excavation for the trench.

b) A detailed plan of the excavation area and the impact on existing right-of-way and infrastructure.

(7) Contractors electing to utilize a trench box must submit, to the Owner, physical dimensions, materials, position in the trench, expected loads and the strength of the box.

(8) Contractors electing to utilize hydraulic jack type shoring, sheeting and bracing must submit to the Owner, dimensions and materials of all uprights, stringers, cross-bracing and spacing required to meet OSHA requirements.

(9) Under any of these methods, no claims for delay will be permitted.

6.2.9(b) Add: The Contractor shall guarantee the backfilling of excavation and trenches against excessive (as determined by the Engineer) settlement for a period of one year after the final completion of the contract under which the work is performed. Make all repairs or replacements necessary by settlement including refilling and compacting the upper portion of the ditch and repairing broken or settled pavements within thirty (30) days after notice from the Engineer or City.

6.2.9(b)(1) Add: Excavations within five (5') of pavement shall be considered to be influenced by vehicular traffic.

The moisture content shall be 2-4% above optimum moisture.

6.2.9(b)(6) Density tests shall be performed by an independent testing laboratory and paid for by the Contractor. One density test shall be performed for each 500 L.F. of backfill placed at a location selected by the City. The City may perform additional density tests at their expense. Density tests which fail shall be retested at the Contractor's expense.

6.2.9(c)(15) Change "select material" to "granular material".

6.4.3(b) The maximum vertical deviation from the plan grade for sanitary sewer lines shall be 1/2 inch per 10 feet. Reverse grades shall not be permitted.

6.4.3(d) In the first sentence of the sixth paragraph - after "tunnel lining shall be" add "backfilled with Class B concrete or grouted per ASTM C476.

6.5.1(b)(1)&(2) Delete in both paragraphs.

6.5.2(c) Add: "(c)(1) Measurement of Reinforced Concrete Pavement."

Replacement of the reinforced concrete pavement shall be measured at the specified trench width plus 2 feet, thickness in inches and length in linear feet. Additional reinforced concrete pavement ordered by the City to be placed will be measured as the thickness in inches; and length and width in linear feet."

6.5.2(h) Add Replacing Gravel Pavement on a Dirt Base.

The existing gravel pavement shall be replaced with compacted flexible base, as specified in Item 2.1.3(b). The minimum thickness of flexible base shall be eight inches.

The flexible base shall be measured at specific trench width only, eight inches thick, and the length measured in linear feet.

6.5.3 Add: "If the limiting ditch width occurs within 3 feet of an expansion joint, construction joint, or dummy joint, the City may order the pavement removed and replace to the existing joint."

Replacement of the reinforced concrete pavement shall be the thickness measured in inches, specified ditch width plus two feet, and the length measured in linear feet.

Additional reinforced concrete pavement ordered by the City to be placed will be measured as the thickness in inches, and the length and width in linear feet.

6.7.1(c) Pipe must be swabbed clean prior to placing in the ditch.

6.7.2(c) Visual inspection of sanitary sewers is required. The contractor shall furnish one copy of the video tape of the sewer inspection in VHS format to the City.

6.7.2(d) Add the following:

The rate of infiltration or exfiltration for manhole testing shall not exceed one tenth of a gallon per hour per foot of height.

6.7.2(h)(7) Add the following:

Laterals to property shall be marked under the ground surface by placing red plastic tape. The word "SEWER" shall be printed at intervals. One end shall be placed at end of lateral, the other just under the ground surface projecting at least one foot (30 cm) back of

proposed or existing curb and extending out of ground for one foot.

6.7.2(i) Fiberglass manholes may be used only with special permission of the City. Brick manholes shall not be used.

6.7.2.(i)(1) Throughout this section, change "Type 'F'" to read "Class 'F' with limestone course aggregate and silica sand."

6.7.2(i)(1)(A) Add the following:

Wall thickness will be as follows:

Diameter	Wall Thickness
48"	5"
60"	6"
72"	7"

6.7.3(b) Polyethylene wrap meeting 2.9.5 is required for all cast iron and ductile iron pipe, fittings and valves.

6.7.3(c) Add: Installation of Concrete Pressure Pipe

(1) Pipe Laying

a) Install pipe and fittings at the locations shown on the plans. Lay pipe to the grade shown on the shop drawings which have been reviewed by the Engineer and released for construction. The Contractor shall establish the grade in the trench from grade stakes set by the Engineer. Use a string line or laser set on the centerline of the ditch to establish trench and pipe grades.

b) Minor deflections in the line may be made by unsymmetrical closure of pipe joints; however, the maximum pull shall be 3/4" for sizes twelve (12") inch through twenty-one (21") inch and one (1") inch for sizes twenty-four (24") inch through forty-eight (48") inch. Beyond these limits use short pipe sections, beveled joints or angle adaptor to make necessary line and grade changes.

c) Lay pipe and fittings on specified bedding so as to be uniformly supported along its entire length. No "blocking up" of pipe or joints

will be permitted. Provide bell holes to allow making the exterior joint.

d) Keep the pipe clean during the laying operation and free of all sticks, dirt and trash, and at the close of each working day, seal the open end of the pipe against the entrance of all objects, especially water.

(2) Pipe Jointing

a) After the subgrade and embedment materials have been placed and the length of pipe has been placed in the trench, true to line and grade, thoroughly clean the bell and spigot by brushing and wiping.

b) Lubricate the rubber gasket and the inside surface of the bell with a lubricant approved by the pipe manufacturer. Snap the rubber gasket into the spigot ring groove to equalize circumferential distribution of the gasket. For pipe 18" and smaller, butter the end bell with mortar such that when the joint is made up, the mortar will completely fill the recess in the inside surface of the pipe at the joint. After the joint is engaged, clean the inside of the joint with a swab. Mortar the inside of joints of pipe eighteen (18") inches and larger by applying mortar to the annular space by hand after the joint is made up and hand troweling the mortar smooth.

c) Force the spigot into the bell by use of a choke chain or chain and ratcheting hoist. Do not use a backhoe or other excavating machinery to force the spigot into the bell. After the spigot is forced into the bell of the adjacent pipe, the inside recess between the ends of the pipe shall have a maximum opening of 1" and a minimum opening of 1/4".

d) Mortar the exterior surface of the joint by placing a joint wrapper around the pipe, using a band crimping tool. The joint wrapper shall be seven (7") inches minimum width and be hemmed on each side with steel bands. It shall encircle the pipe, leaving an opening at the top to allow placing mortar. Joint wrappers shall be the type and quality recommended by the pipe manufacturer.

e) Pour liquid grout in the top of the joint wrapper in a continuous operation until the grout is completely around the pipe. During the filling of the wrapper, rod the mortar to eliminate voids.

f) Apply a one (1") inch coating of portland cement mortar on all exposed steel on fittings or specials. Allow the coating to take an initial set. Wrap the mortar coating in steel wire mesh and apply a second one (1") coating of mortar. Immediately after the mortar has set, cover the mortar with damp earth or burlap to prevent rapid moisture loss.

(3) Cutting of Pipe

Field cutting of pipe will not be permitted except with special permission of the Engineer.

(4) Reaction Blocking and Anchorage

a) Block, anchor or harness all piping subject to internal pressure to preclude separation of joints. Provide suitable reaction blocking, anchors, harnesses or other acceptable means for preventing movement of pipe caused by internal pressure for all unlugged bell and spigot or all-bell tees, Y-branches, bends deflecting 11-1/4 degrees or more, and plugs.

b) Extend 2000 psi concrete blocking from the fitting to solid undisturbed earth and install so that all joints are accessible for repair. The bearing area shall be as shown on the plans.

c) If adequate support against undisturbed ground cannot be obtained, install metal harness, anchorages consisting of stainless steel rods, bolts and washers across the joint and securely anchor to pipe and fitting or install other adequate anchorage facilities to provide necessary support. Should the lack of a solid vertical excavation face be due to improper trench excavation, the entire cost of furnishing and installing metal harness anchorages shall be borne by the Contractor. Welding of joints will not be permitted without special permission of the Engineer.

d) Protect from corrosion all steel clamps, rods, bolts and other metal accessories used in reaction anchorages or joint harnesses subject to submergence or in direct contact with earth and not encased in concrete with two inches of wire reinforced field applied mortar cured with wet burlap bags.

(5) Insulation of Dissimilar Metals

Furnish and install dielectric bushings, sleeves and washers between concrete steel cylinder pipe and cast iron pipe, ductile iron pipe or any dissimilar metal. Also furnish dielectric bushings, sleeves and washers on all blind flanges.

6.7.3(g) Underground marking tape shall be installed 6"-12" above the top of all PVC water pipe. Marking tape shall consist of a 0.5 inch thick layer of aluminum foil bonded between two pieces of polyethylene film. The total thickness of the marking tape shall be not less than 5.5 mils thick nor less than 2 inches wide. Marking tape shall be blue in color and have the wording "Caution Water Line Buried Below" displayed prominently and continuously along the tape. The ends of the marking tape shall be brought up inside each main line valve box.

6.7.3(i)(2) Add the following:

Taps and blow-offs for testing and disinfection purposes on all contracts will be installed by the Contractor, at locations specified by the City, and shall not be paid for separately but shall be included in the appropriate bid item.

Upon completion of the testing and purification the Contractor shall return to the job site and remove the blow-off down to the corporation stop. He shall leave the corporation stop and backfill, replacing all pavement. Removal of blow-off shall include all labor, materials, tools, equipment and incidentals necessary to complete the work, including excavation, disposal of surplus materials and backfill and shall not be paid for separately but shall be included in the appropriate bid item.

6.7.3(j)(1)(A)(2) Add the following:

The two sections or halves type saddle may only be used on PVC pipe. Single strap clamps will not be permitted on any type pipe.

6.7.3(j)(1)(B) Only soft copper (Type K) tubing will be allowed and a curb stop will be required in lieu of a brass gate valve.

6.7.3(j)(2) Direct tapping of cast iron and ductile iron pipe will be 3/4" and 1" only.

6.7.3(j)(3) Flanged outlets will be required for taps greater than 2".

6.7.3(j)(5) Taps must be made with a shell cutter assembly and the coupon removed.

6.7.3(k)(2) Add: All valve stacks shall be of cast iron pipe or PVC pressure pipe and of one continuous piece to the finished grade. Furnish and install stainless steel valve operator extensions when operating nut is more than four (4') feet below finished grade.

6.7.3(m)(2) Fire hydrants shall be braced and blocked on concrete slab or stone slab not less than 4" thick unless in sound rock trench.

Above grade, fire hydrants shall be painted with two (2) coats of red paint. Bonnets shall be painted based of the largest size line within 75 feet horizontally from the hydrant according to the following table:

Line Size	Color
6"	Aluminum
8"	Blue
10" & Larger	Yellow

A Blue Stimsonite, Fire-Lite reflector (or approved equal) shall be placed in the center of the street opposite fire hydrants.

6.7.3(m)(3) Blocking shall be included in payment for fire hydrants and shall not be paid separately.

6.7.3(o)(1) Tape shall also project out of ground for one foot at a point one foot back of the curb.

Bullheads and services 1" and smaller in diameter up to fifty (50') feet (15 meters) in length shall be installed with one continuous piece of water service tubing with no splices, couplings, etc.

6.7.3(r)(2) Blocking will not be measured and paid for as a separate pay item but is subsidiary to water conduit installation.

6.7.3(s) The Contractor shall furnish all labor, materials and equipment to purge, disinfect and test the completed waterline. Bacteriological test samples shall be collected and tested by an independent testing laboratory approved by the City. The cost of testing shall be borne by the Contractor.

7.1.3(b) Add the following:

2000 psi concrete will be used in inaccessible locations when a mechanical device cannot compact to required densities and as directed by the City, i.e.: under pipes, road washouts, under paving, etc.

Backfill shall be placed and compacted in not greater than 6" layers. The minimum backfill density shall be 95% at 2% to 4% above optimum moisture for all backfill subject to vehicular traffic. All other backfill shall be placed at a density equal to adjacent, undisturbed soil. Backfill density tests shall be determined in accordance with ASTM D698 by an independent testing laboratory selected by the Contractor and acceptable to the City. The Contractor shall pay for all costs of testing backfill densities. One density test shall be performed at each location for each 500 C.Y. of backfill placed. The location of the backfill test shall be selected by the City. The City may perform additional backfill density tests at his expense. The Density tests which fail shall be retested at the Contractor's expense.

7.4.5 All structural concrete shall be Class C.

7.4.5(b) Testing of structural concrete strength shall be performed by an independent testing laboratory acceptable to the City and paid for by the Contractor. The Contractor shall furnish all materials, equipment and labor required to perform all concrete tests including but not limited to slump, air content and concrete test beams or cylinders.

7.6.10(a) Add the following to the first paragraph:

No water or dry cement shall be added to surface of concrete for finishing.

7.9.1	Pneumatically Placed Concrete may be used only where specifically called for on the plans or where special permission has been obtained from the City.
8.3.1	All concrete for sidewalks and driveways approaches shall be Class A with an air content of 3-5%.
8.3.2(b)	Reinforcement is required in all driveways and walks.
8.4.1	All concrete for medians shall be Class A with an air content of 3-5%.
8.5.1	All concrete for headers shall be Class A with an air content of 3-5%.
8.6.1	All concrete for concrete steps shall be Class A with an air content of 3-5%.
8.7.1	All concrete for retaining walls shall be Class C.
8.10.3	Delete the entire fifth paragraph beginning with "Unless otherwise specified.....".
8.13.3(a)	Delete the last sentence in the paragraph and replace with: The Contractor shall locate the position of work according to plans.
8.15.4	Measurement of rip-rap will be based on specified trench width plus 2 feet. In the event of excessive excavation, the Contractor will be required to rip-rap the entire excavation plus 1 foot on both sides at his expense.

OTHER PROVISIONS:

1. Measurement and Payment

   Only those items in the Proposal will be measured and paid for. All other items of work required to complete the project shall be considered subsidiary to the pay items in the proposal and no claims whatsoever for extra work for such subsidiary items will be considered.

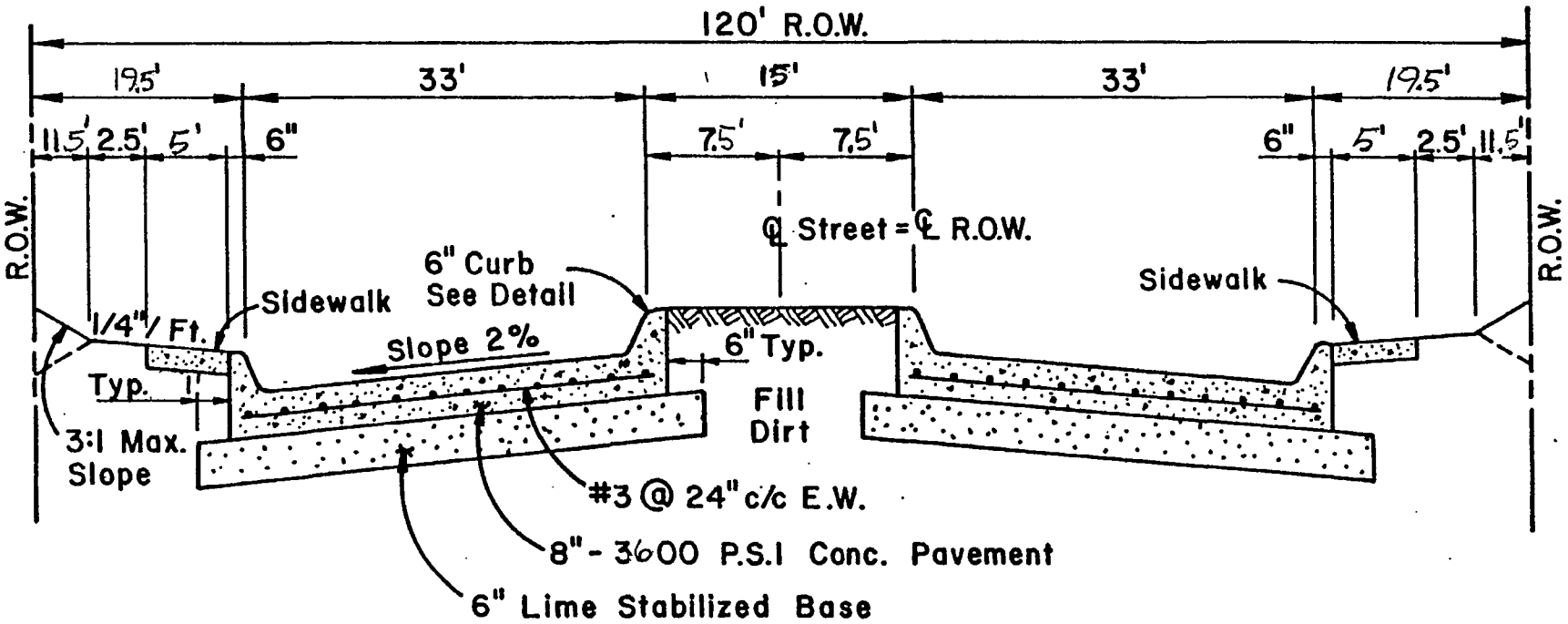
2. Record Drawings

   The Contractor shall furnish two (2) sets of prints of the drawings marked with the location of all water and sewer services, electrical cables and any changes in the plans to the Engineer.

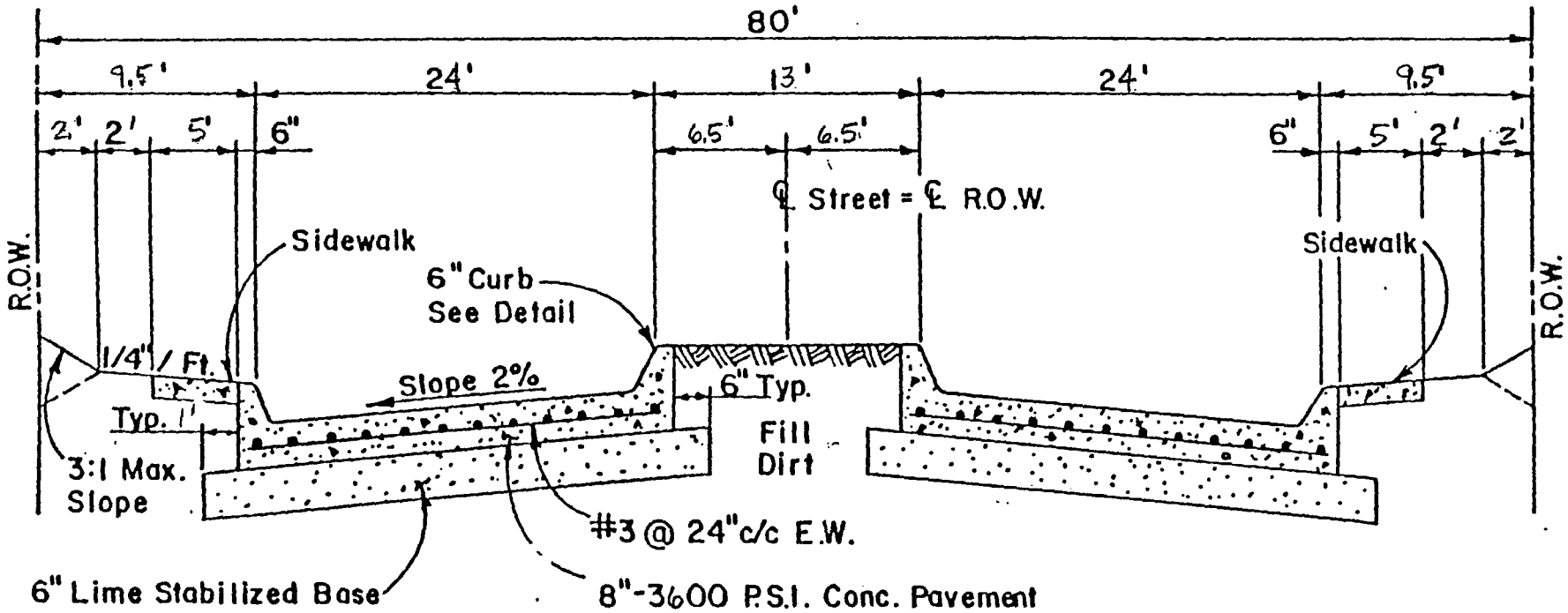
3. Concrete Class

Unless otherwise noted or specified, concrete shall be Class C.

PAVING SECTIONS

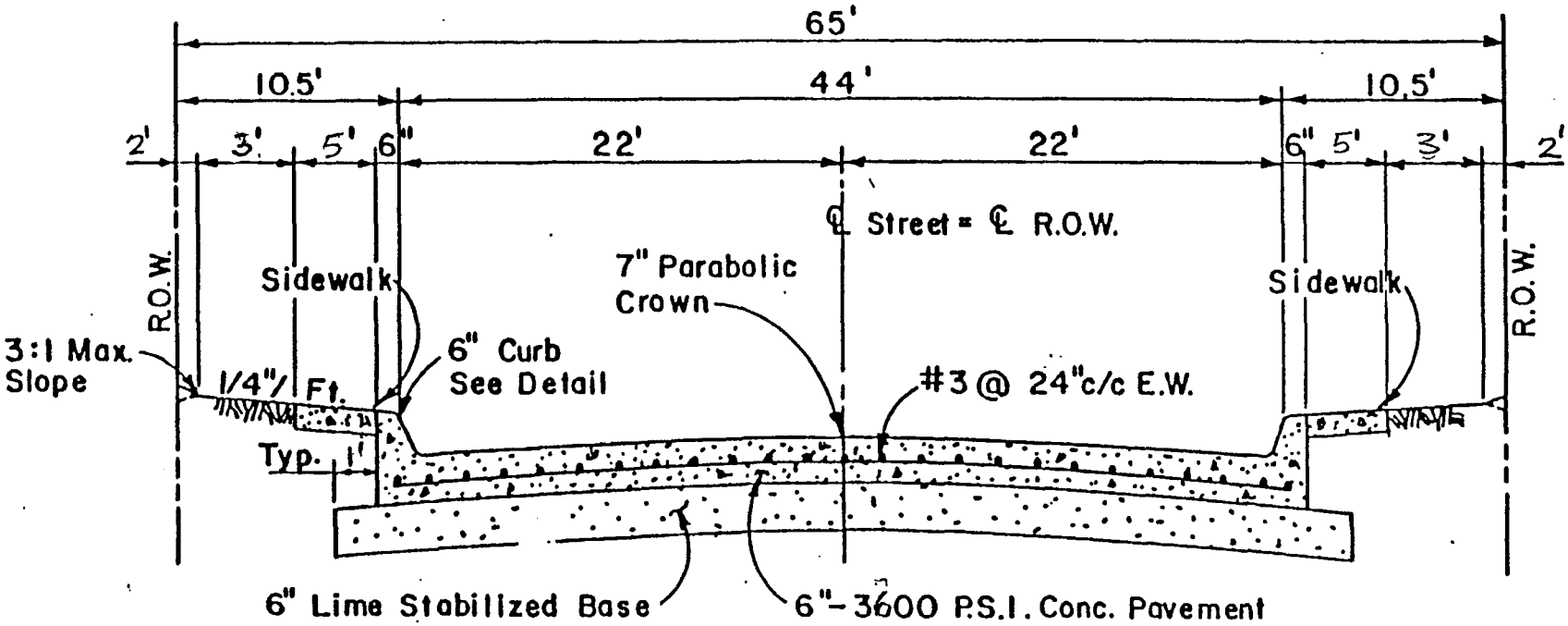


MAJOR THOROUGHFARE

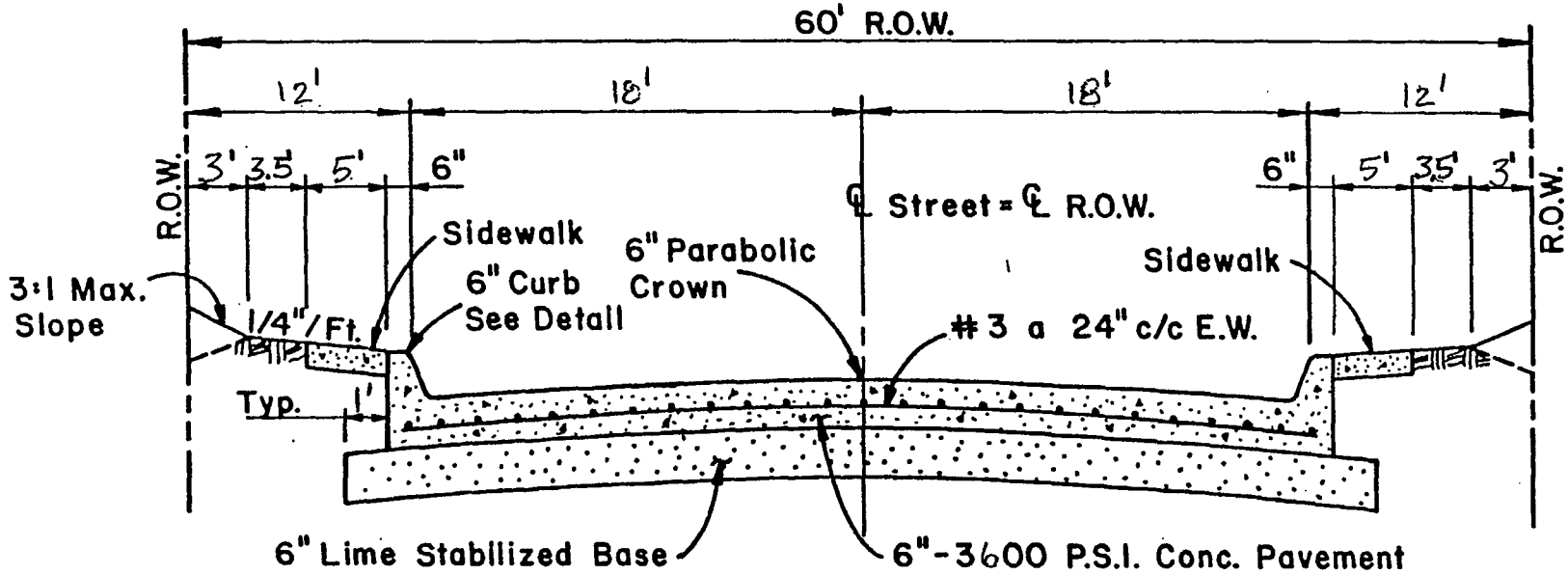


SECONDARY THOROUGHFARE

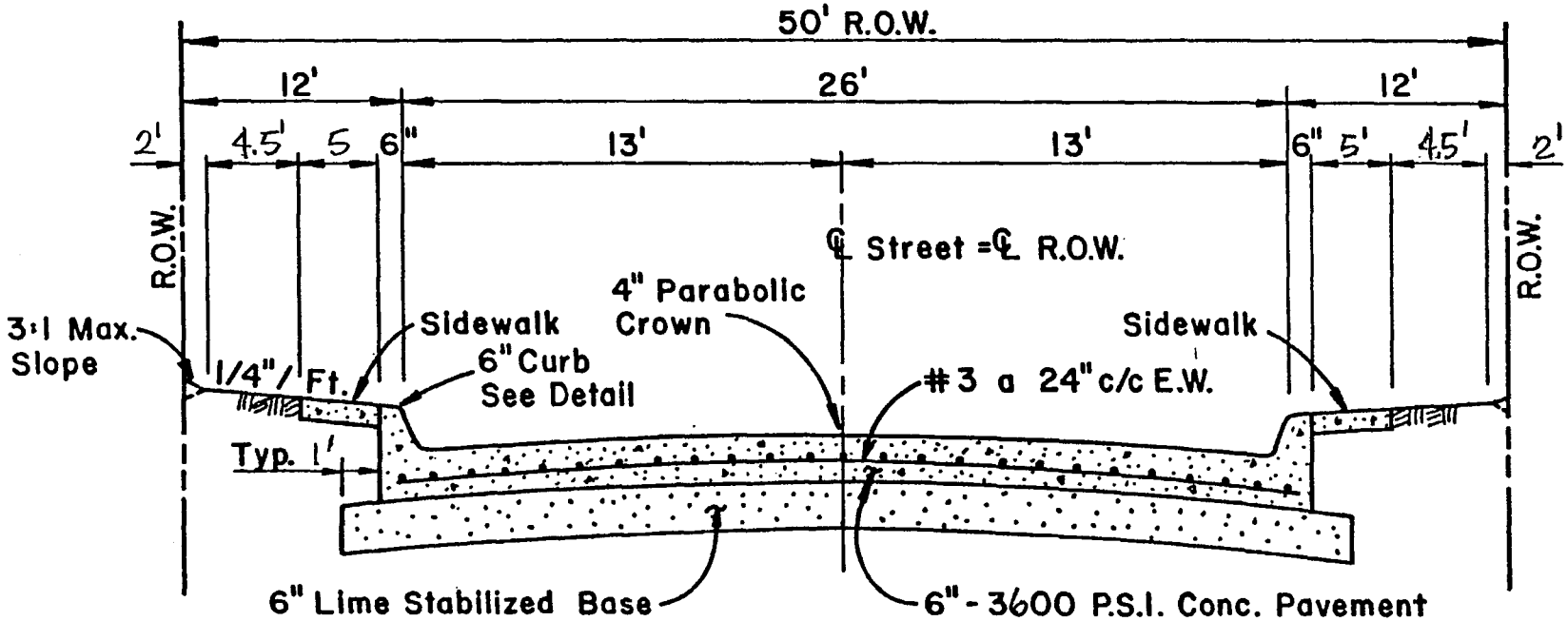
MAJOR COLLECTOR



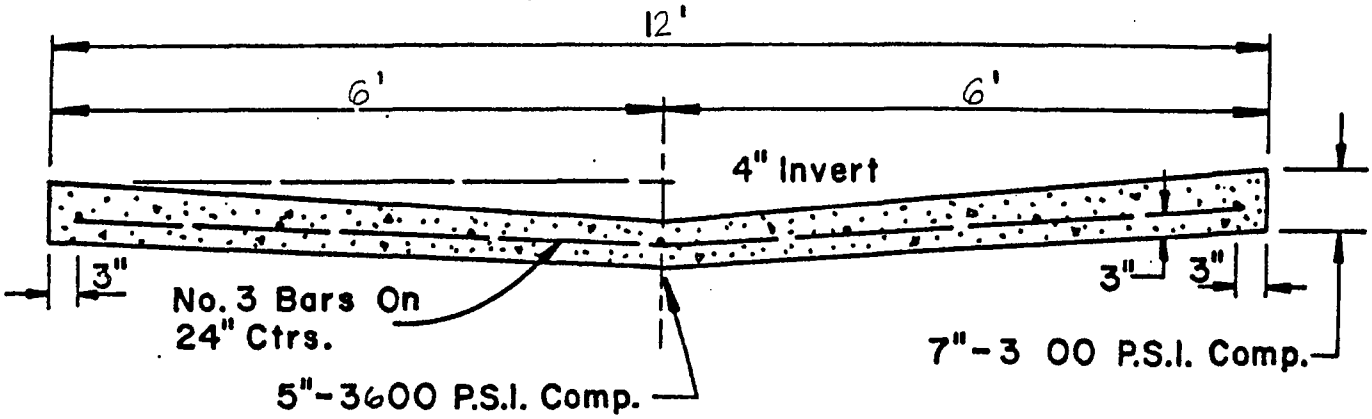
MAJOR COLLECTOR



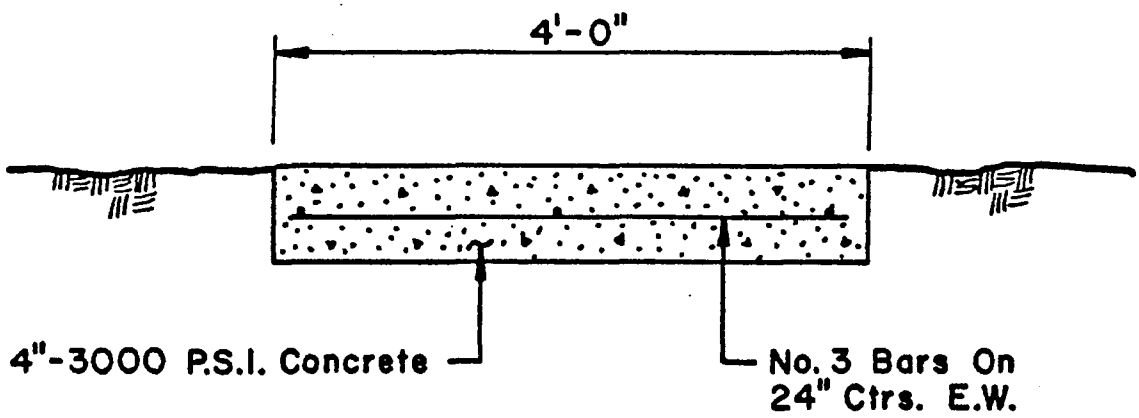
MINOR COLLECTOR



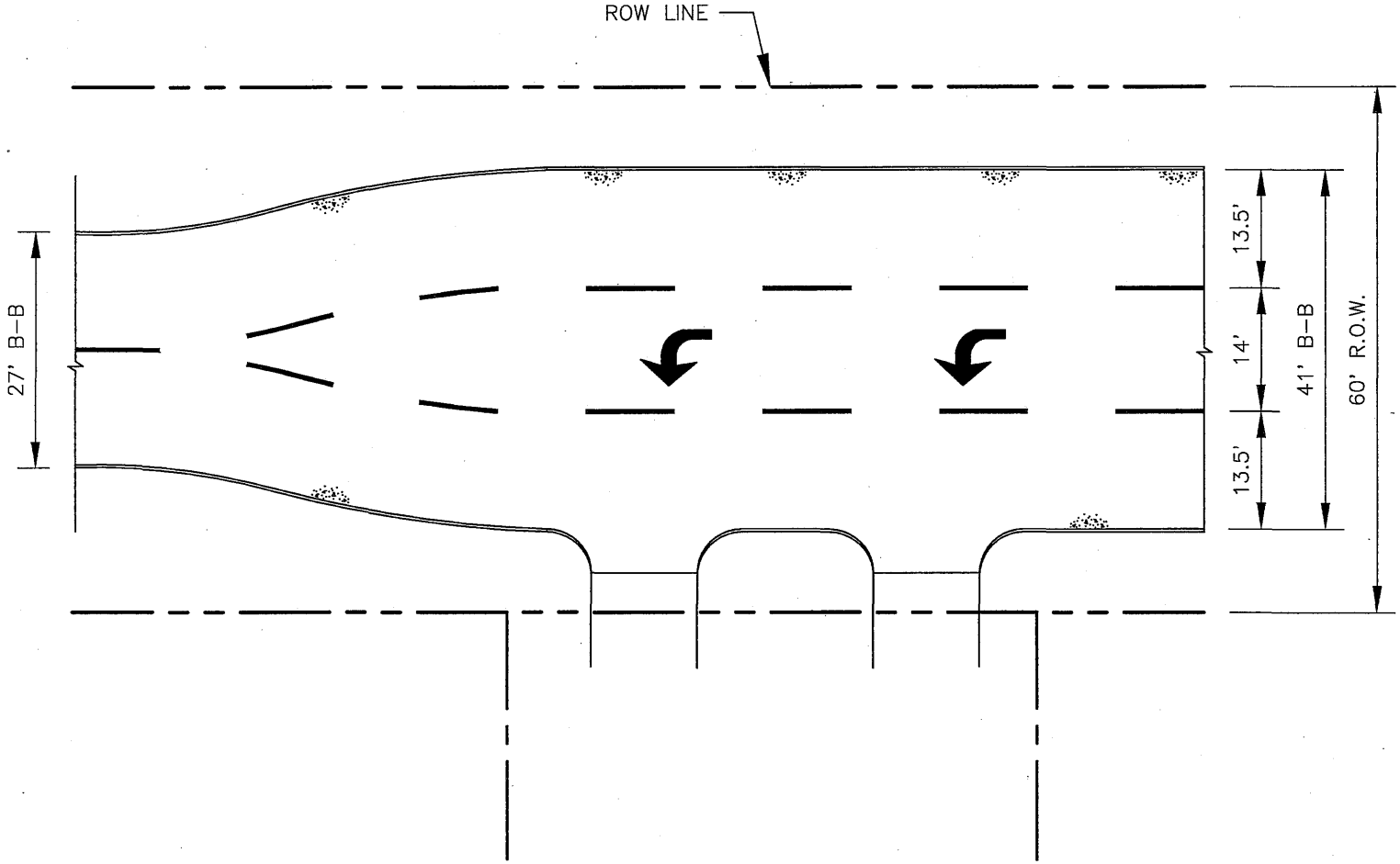
RESIDENTIAL



STANDARD 12' ALLEY SECTION



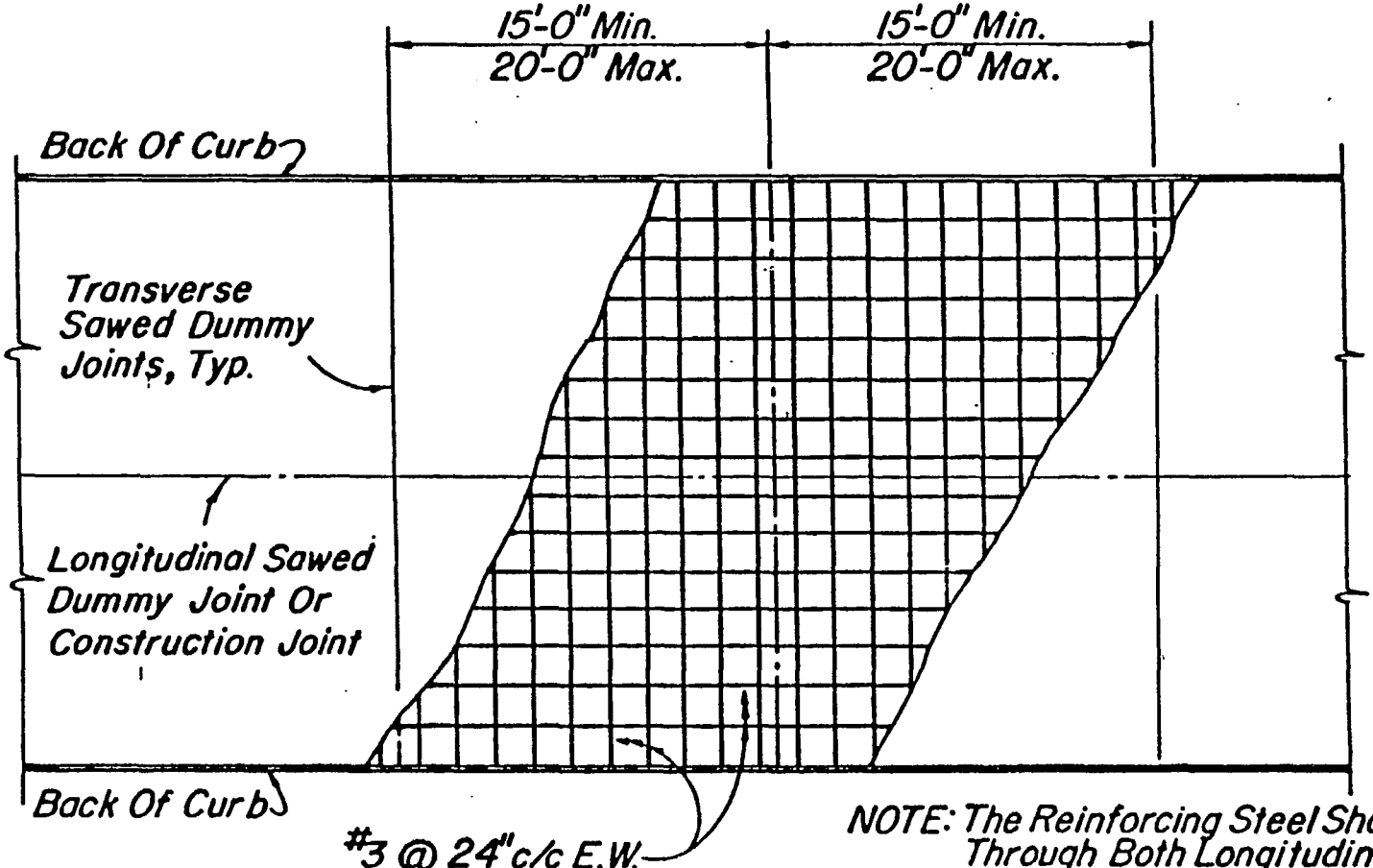
STANDARD 4' SIDEWALK DETAIL



Left Turn Configuration.dwg

THE CITY OF HEATH, TEXAS	SCALE: 1"=20'	FREEMAN-MILLICAN, INC.
	DATE: APRIL 2006	ENGINEERS - ARCHITECTS - PLANNERS
LEFT TURN CONFIGURATION	SHEET:	

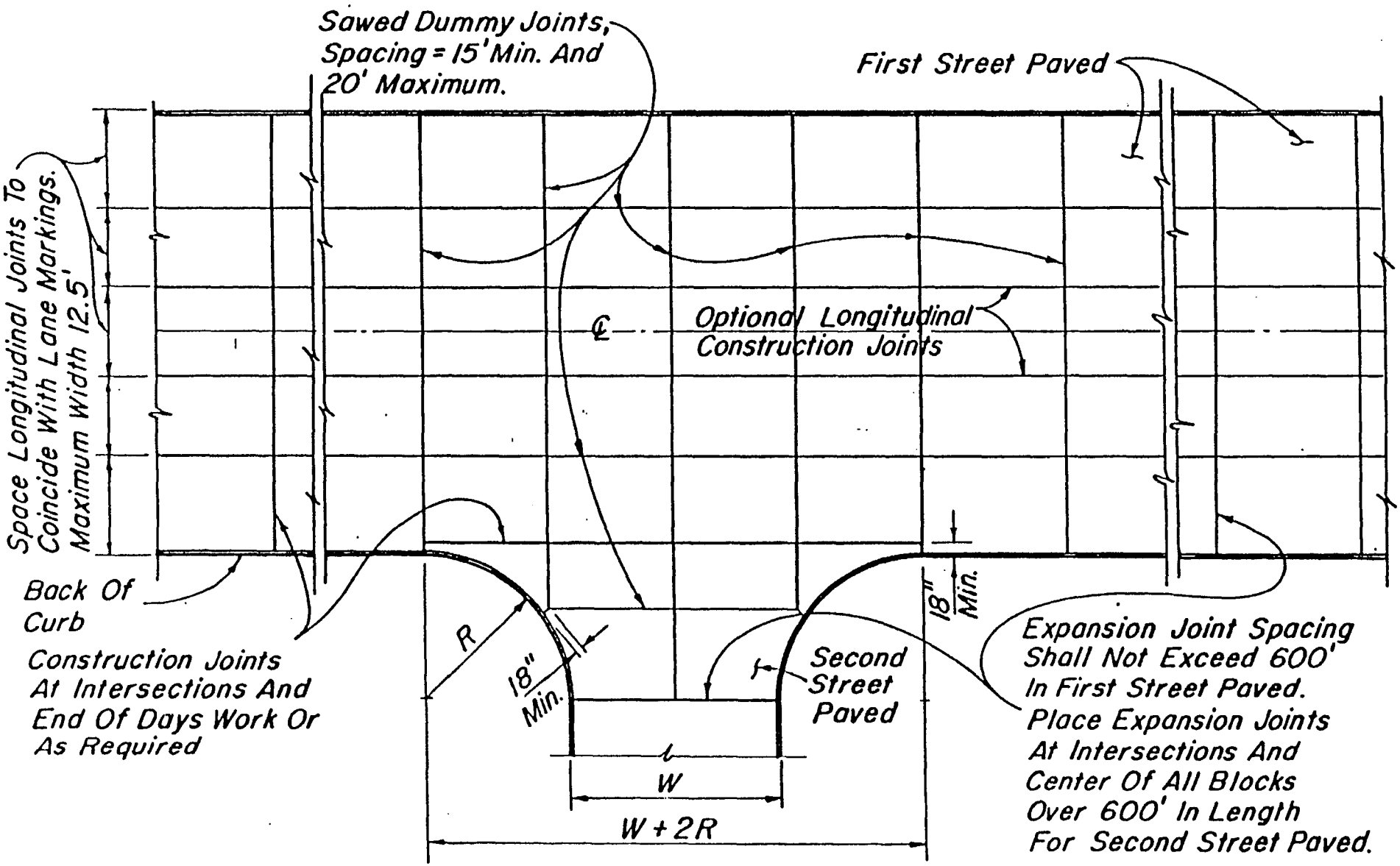
PAVING DETAILS



NOTE: The Reinforcing Steel Shall Extend Through Both Longitudinal Dummy And Transverse Construction Joints. Lap Bars 40 Diameters And Tie.

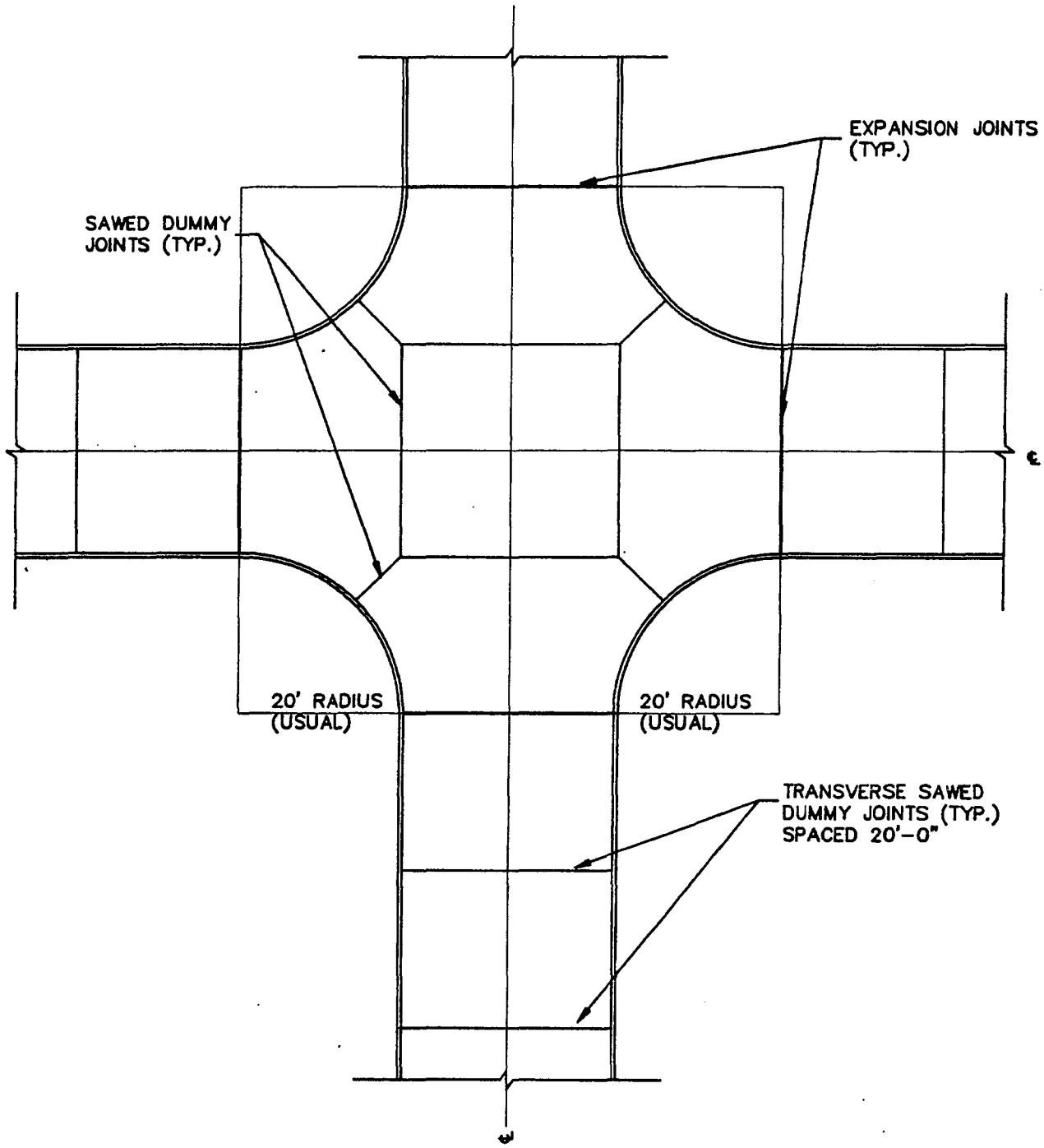
PLAN OF STEEL LAYOUT

Not To Scale

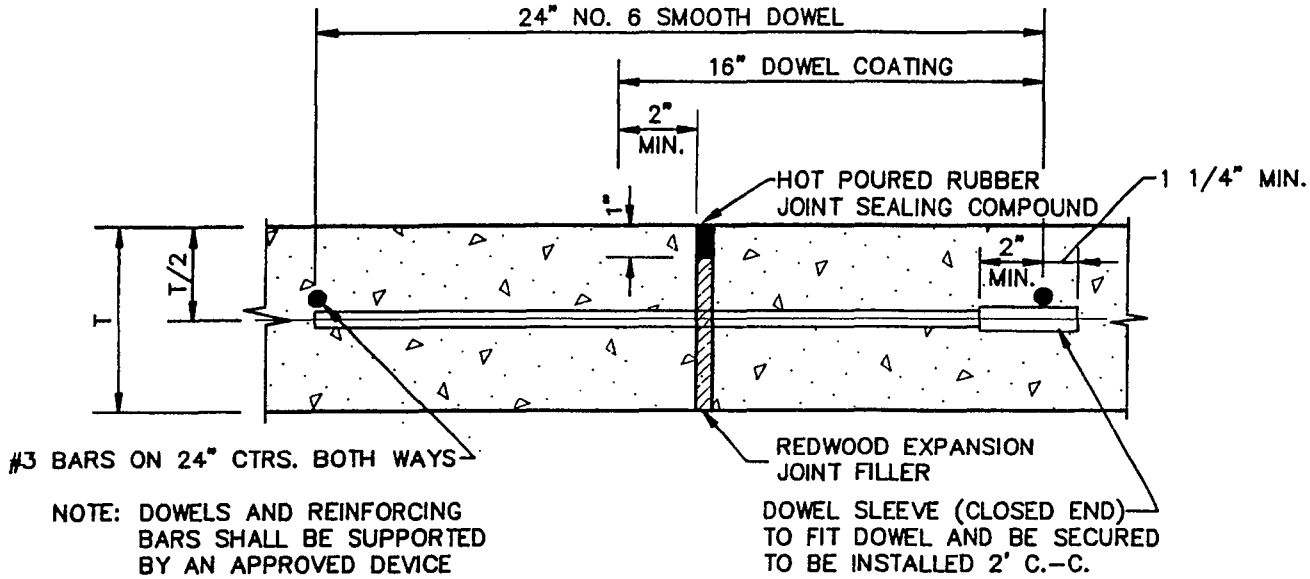


PLAN - JOINT SPACING

Not To Scale



TYPICAL INTERSECTION JOINTING

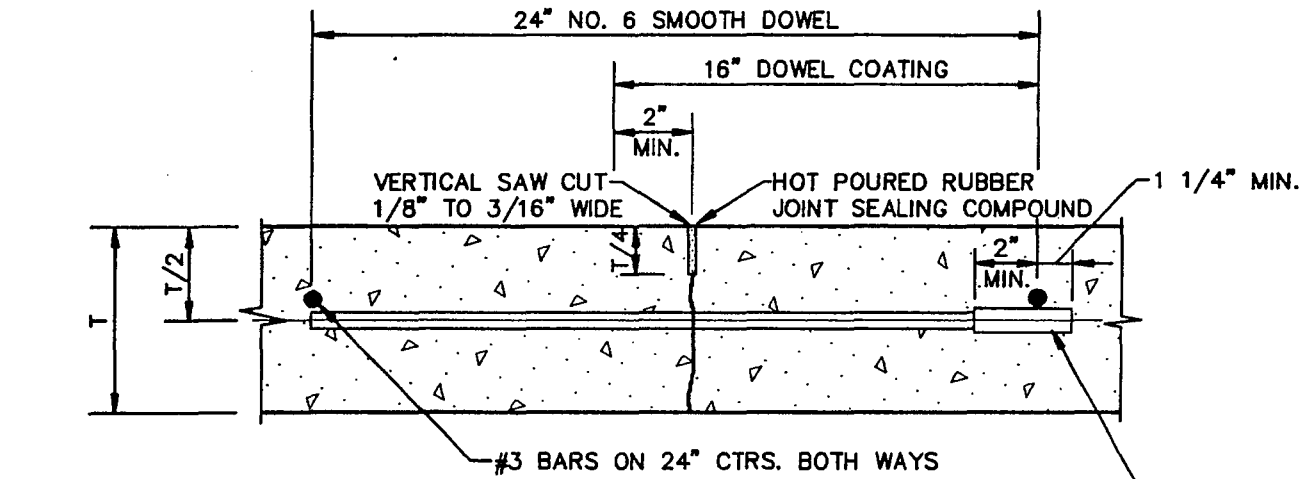


NOTE: DOWELS AND REINFORCING BARS SHALL BE SUPPORTED BY AN APPROVED DEVICE

TRANSVERSE EXPANSION JOINT DETAIL

NO SCALE

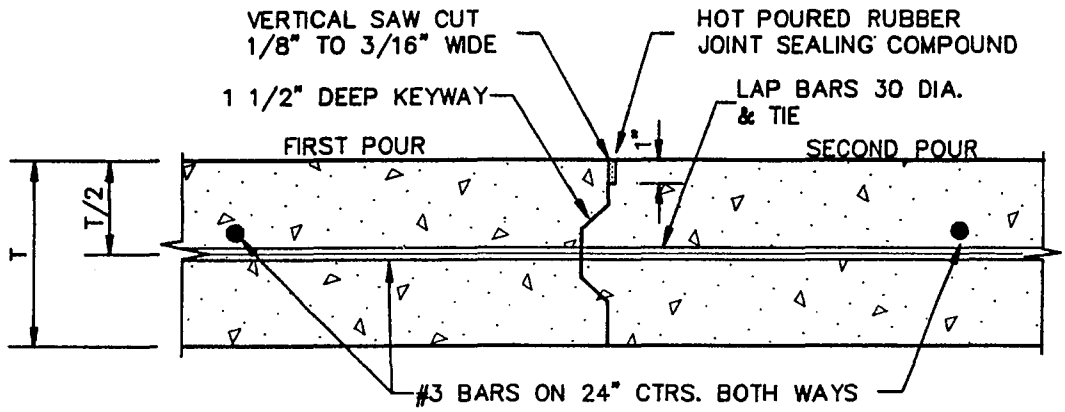
NOTE: SPACE 600' O.C., LOCATE AT INTERSECTIONS



NOTE: DOWELS AND REINFORCING BARS SHALL BE SUPPORTED BY AN APPROVED DEVICE

CONTRACTION JOINT DETAIL

NO SCALE



CONSTRUCTION JOINT DETAIL

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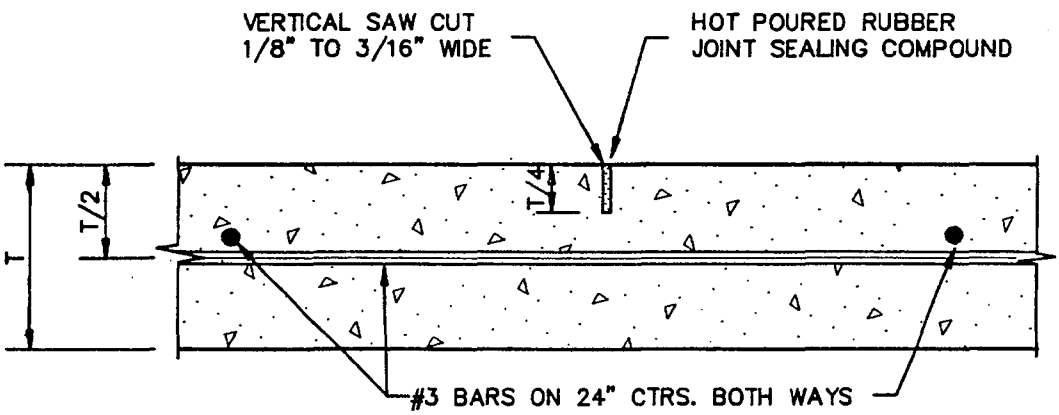
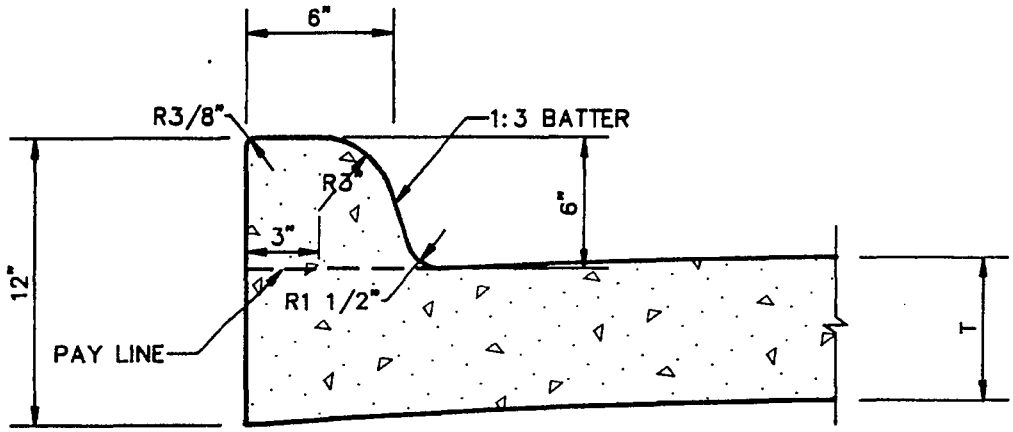
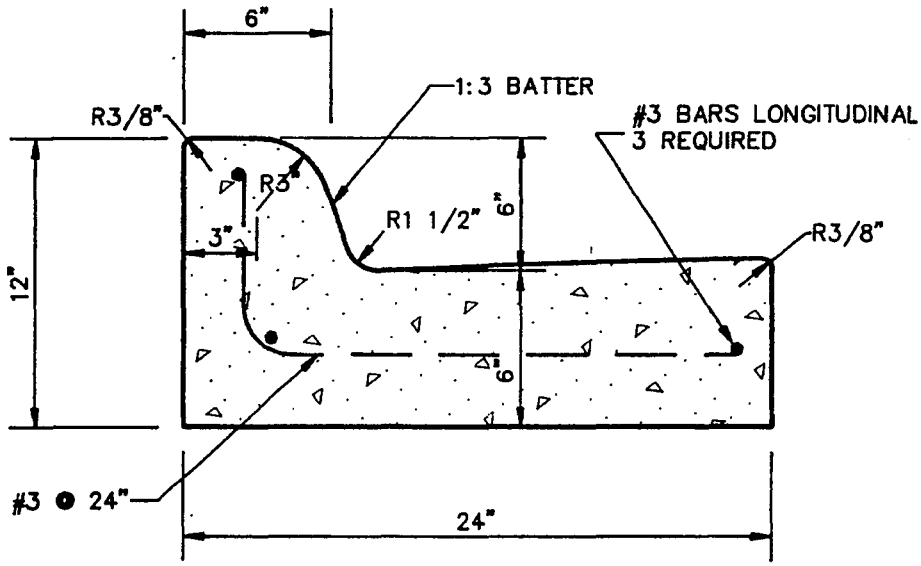


SAWED DUMMY JOINT DETAIL

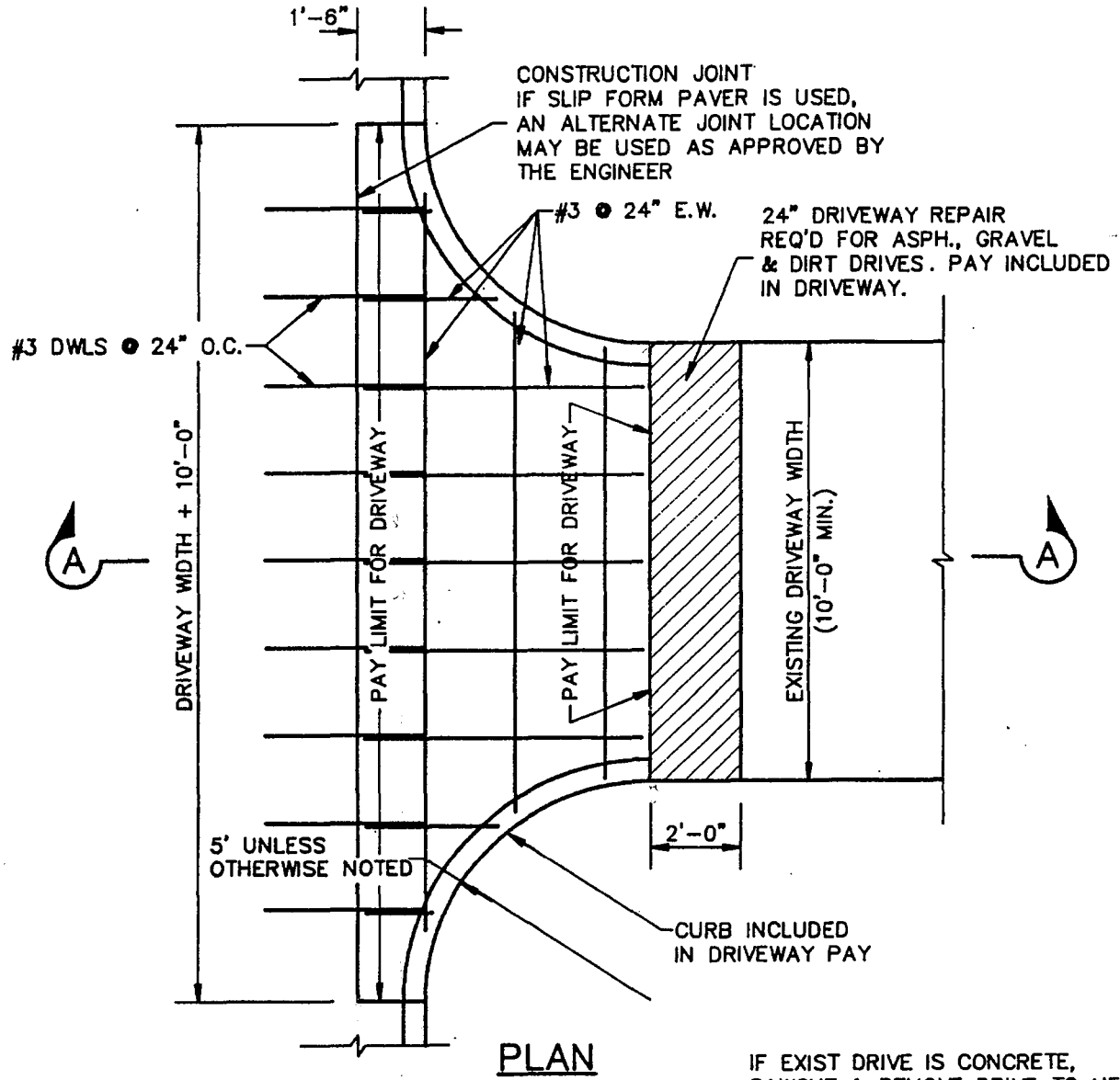
NO SCALE



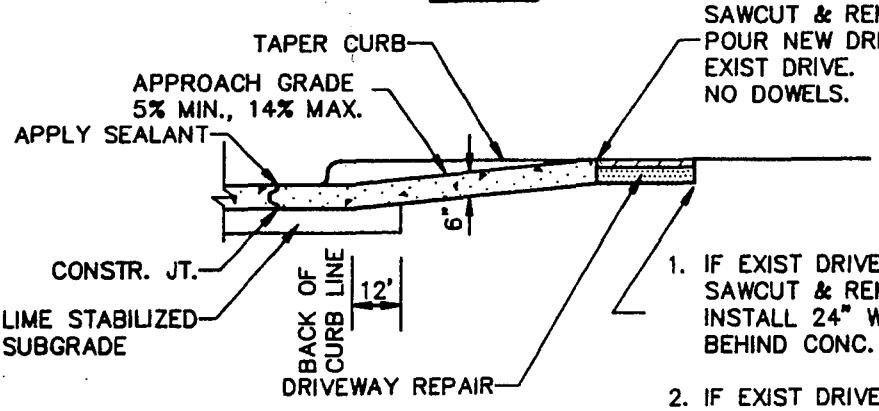
INTEGRAL CURB DETAIL



24" SEPARATE CURB & GUTTER DETAIL



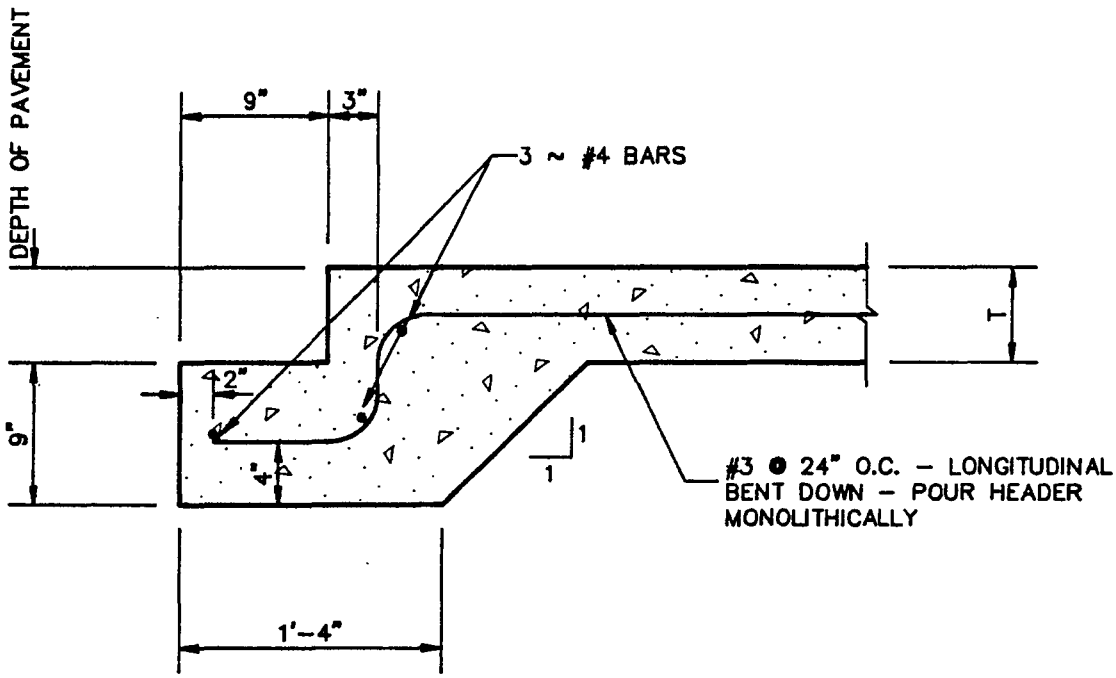
PLAN



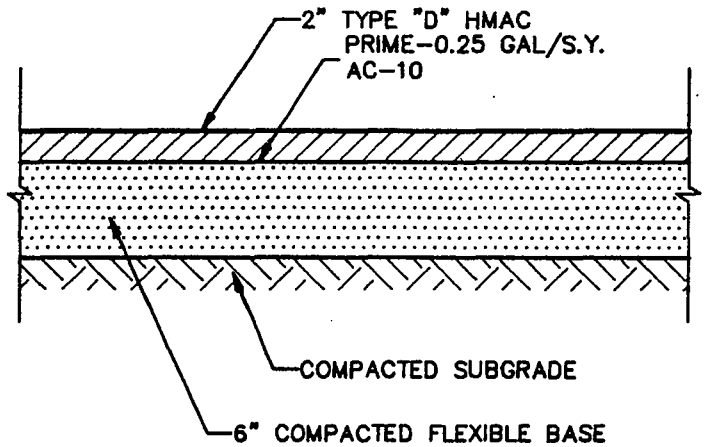
1. IF EXIST DRIVEWAY IS ASPHALT, SAWCUT & REMOVE DRIVE TO HERE. INSTALL 24" WIDE ASPHALT PVMT. BEHIND CONC. APPROACH
2. IF EXIST DRIVE IS GRAVEL, REMOVE DRIVE TO HERE. INSTALL 6" FLEX. BASE. COMPACT UNTIL SETTLEMENT CEASES.
3. IF EXIST DRIVE IS DIRT, BACKFILL BEHIND APPROACH AND COMPACT TO 95% STD. PROCTOR DENSITY

SECTION A-A

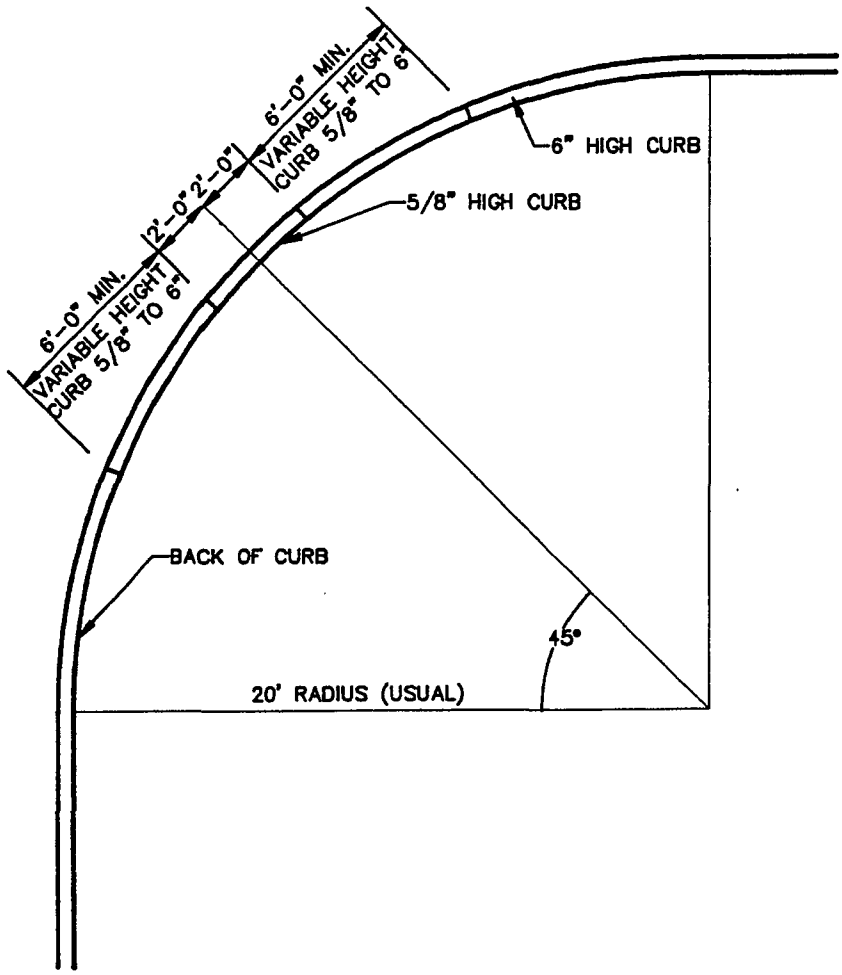
DRIVEWAY APPROACH DETAIL



CONCRETE HEADER DETAIL

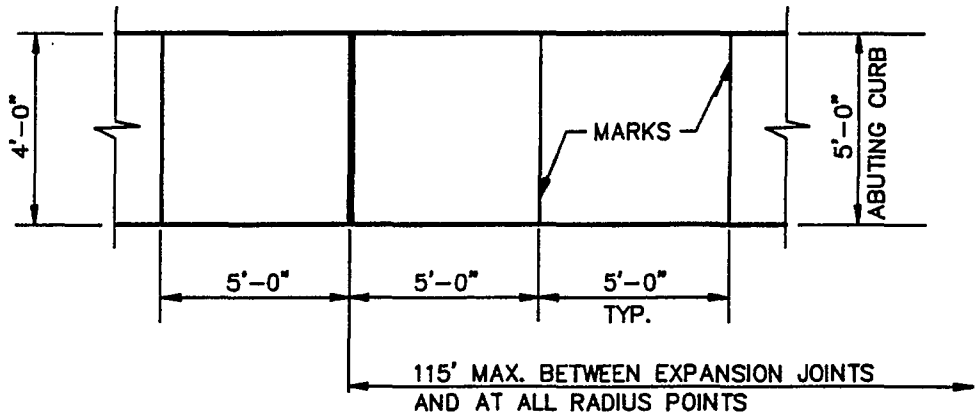


ASPHALT PAVEMENT DETAIL



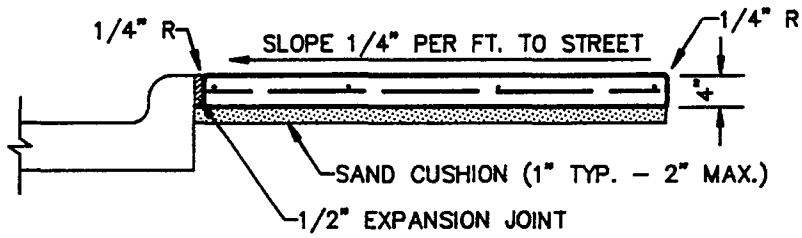
BARRIER FREE CURB RETURN DETAIL

NO SCALE

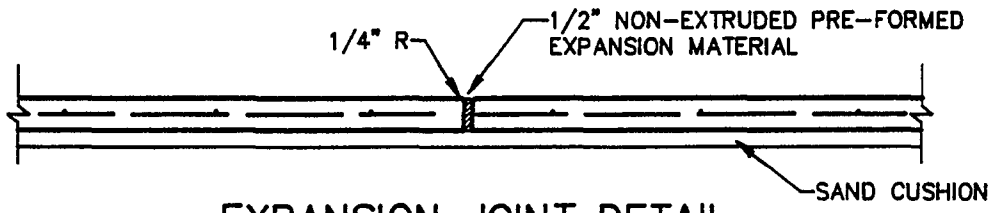


NOTE:
AT MARKINGS THE CONCRETE SHALL BE CUT 1" DEEP, FOLLOWED BY GROOVING TOOL. STRENGTH SHALL BE 2500 p.s.i. WITH #3 BARS @ 24" O.C.

PLAN
NO SCALE

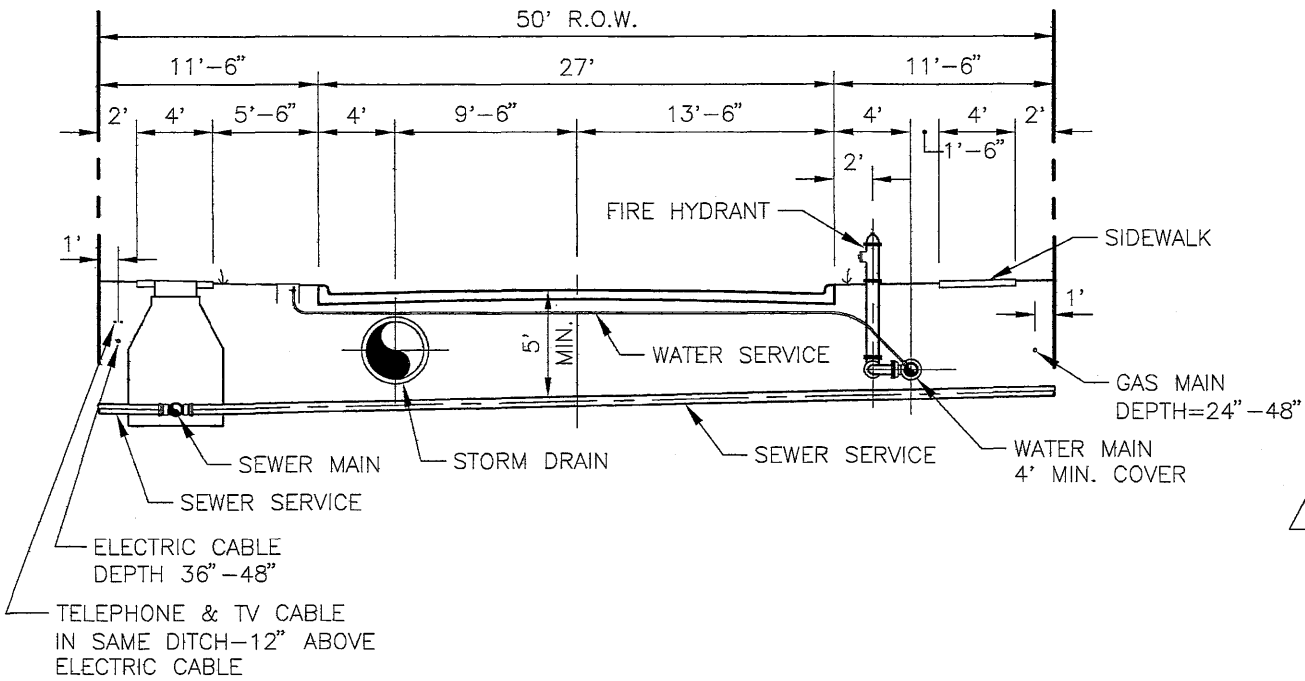


TYPICAL SECTION
NO SCALE



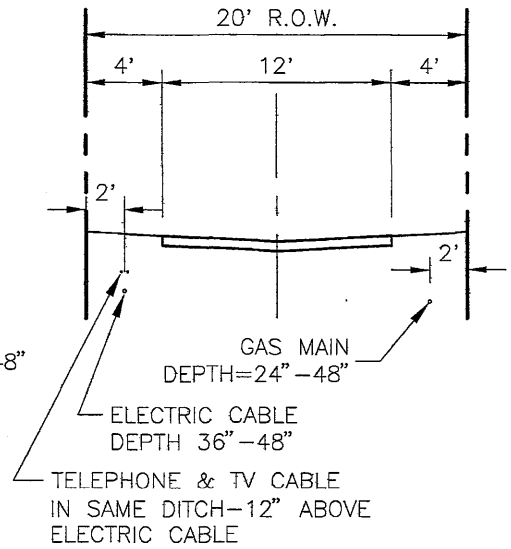
EXPANSION JOINT DETAIL
NO SCALE

UTILITY ASSIGNMENTS



RESIDENTIAL TYPE "A"

SECTION LOOKING NORTH OR WEST



ALLEY

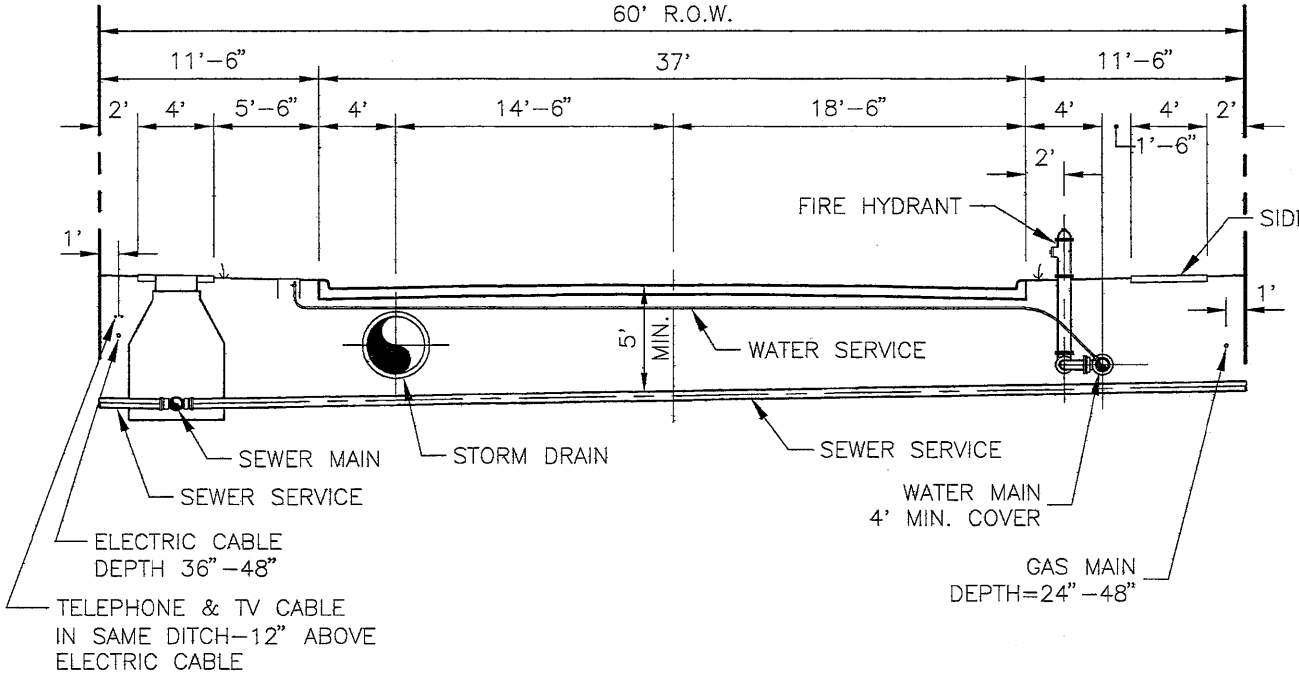
SECTION LOOKING NORTH OR WEST

NOTE: GAS, ELECTRIC AND T.V. CABLE UTILITIES ARE TO BE LOCATED IN ALLEYS WHERE POSSIBLE.

Utility Assign Residential.dwg

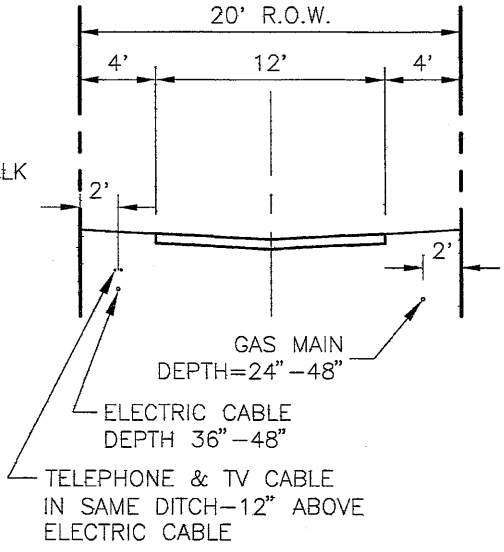
THE CITY OF HEATH, TEXAS	SCALE: 1"=10'
	DATE: JAN 2006
UTILITY ASSIGNMENTS RESIDENTIAL TYPE "A"	SHEET:

FREEMAN-MILLICAN, INC.
ENGINEERS - ARCHITECTS - PLANNERS



COLLECTOR TYPE "C"

SECTION LOOKING NORTH OR WEST



ALLEY AT FLARES

SECTION LOOKING NORTH OR WEST

NOTE:

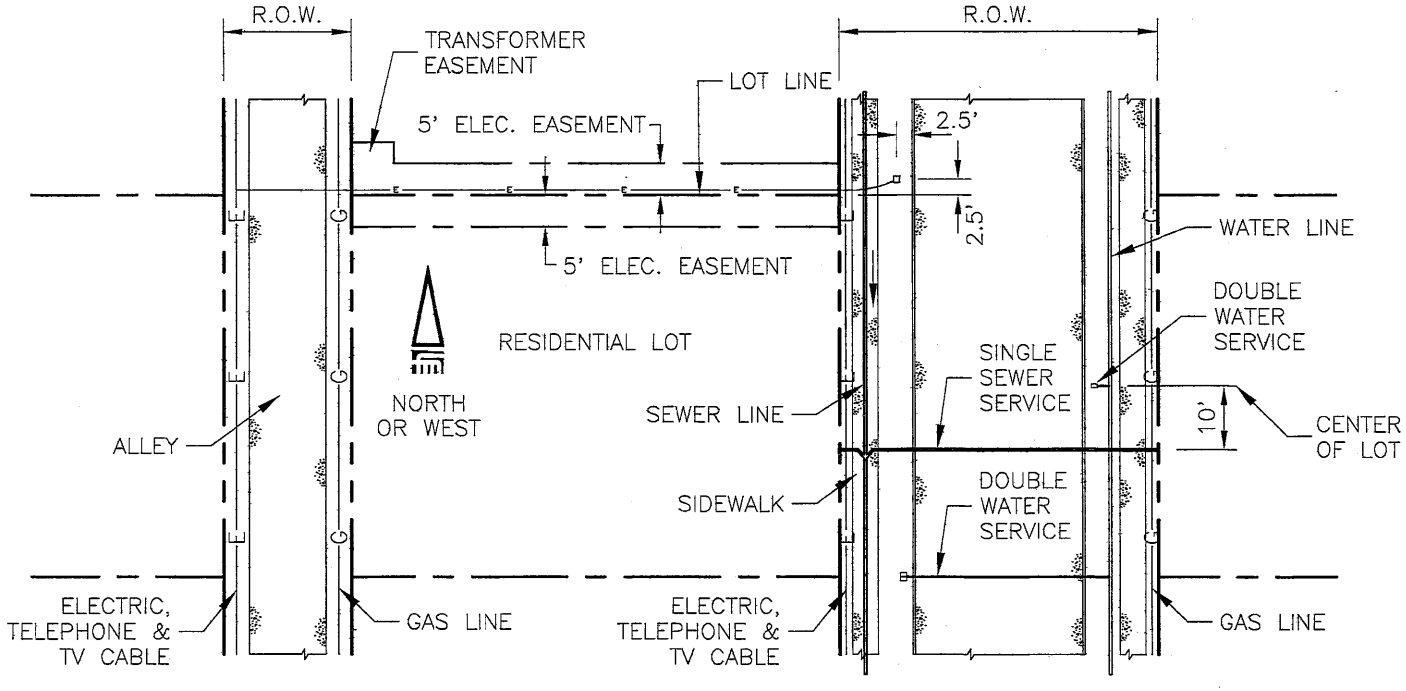
IF A SCREENING WALL IS REQUIRED, ALL FRANCHISED UTILITIES MUST BE LOCATED IN A 5' WIDE EASEMENT ADJACENT TO STREET R.O.W. EASEMENTS ARE REQUIRED ON BOTH SIDES OF THE STREET IF BOTH GAS ELECTRIC UTILITIES ARE PRESENT IN THE SAME STREET.

NOTE: GAS, ELECTRIC AND T.V. CABLE UTILITIES ARE TO BE LOCATED IN ALLEYS WHERE POSSIBLE.

Utility Assign Collector.dwg

THE CITY OF HEATH, TEXAS	SCALE: 1"=10'
	DATE: JAN 2006
UTILITY ASSIGNMENTS COLLECTOR TYPE "C"	SHEET:

FREEMAN-MILLICAN, INC.
ENGINEERS - ARCHITECTS - PLANNERS



NOTE:

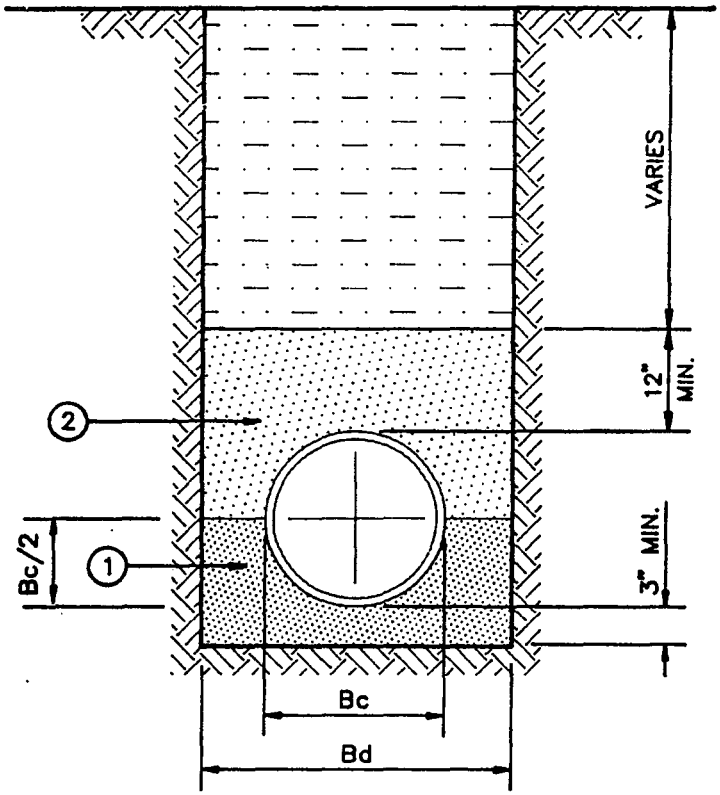
TELEPHONE AND TV CABLE PEDESTALS, WHEN LOCATED IN THE STREET, SHALL BE PLACED AT THE SAME LOT LINE AS THE DOUBLE SEWER SERVICES

TYPICAL UTILITY PLAN

Utility Assign Plan.dwg

THE CITY OF HEATH, TEXAS	SCALE: 1"=30'	FREEMAN-MILLICAN, INC. ENGINEERS - ARCHITECTS - PLANNERS
UTILITY ASSIGNMENTS	DATE: JAN 2006	
	SHEET:	

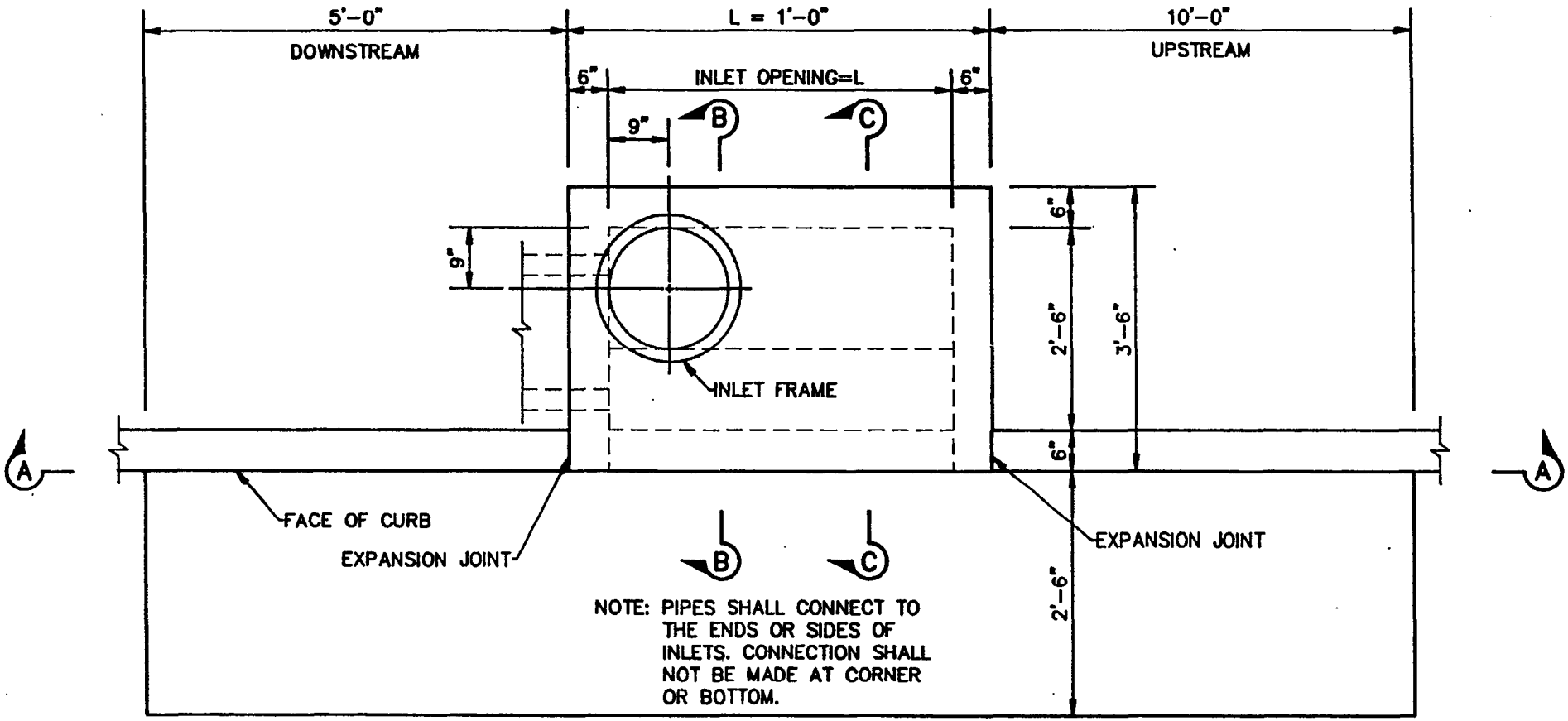
STORM DRAINAGE DETAILS



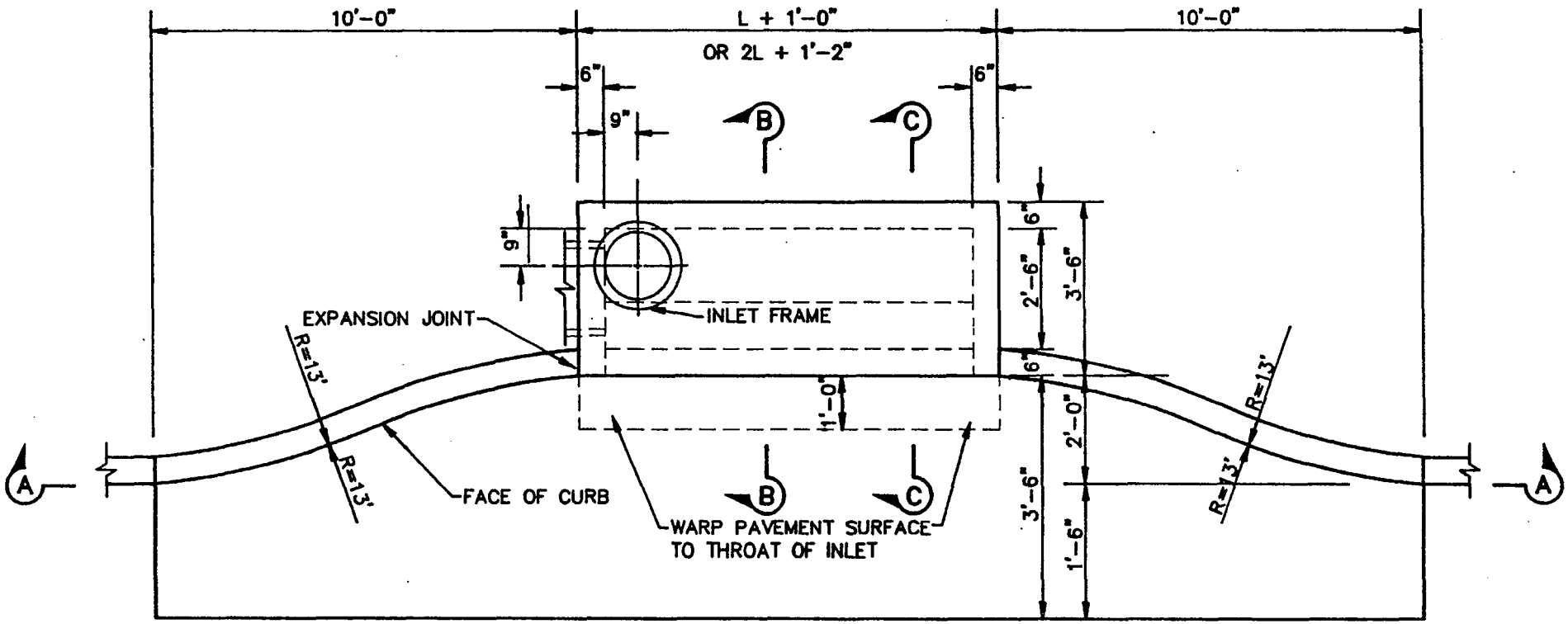
① FINE GRADATION CRUSHED STONE – TOP LAYER IS TO BE PLACED TO GRADE TO PROVIDE UNIFORM SUPPORT OF PIPE BARREL. EXCAVATE BELL HOLES.

② SELECT MATERIAL FREE OF ROCKS, CLUMPS OR DEBRIS LARGER THAN 6" IN GREATEST DIMENSION. COMPACT TO 90% STANDARD PROCTOR DENSITY. UNDER STRUCTURES, ROADWAYS AND PAVEMENT, USE GRANULAR MATERIAL (SAND) COMPACTED TO 95% STANDARD PROCTOR DENSITY.

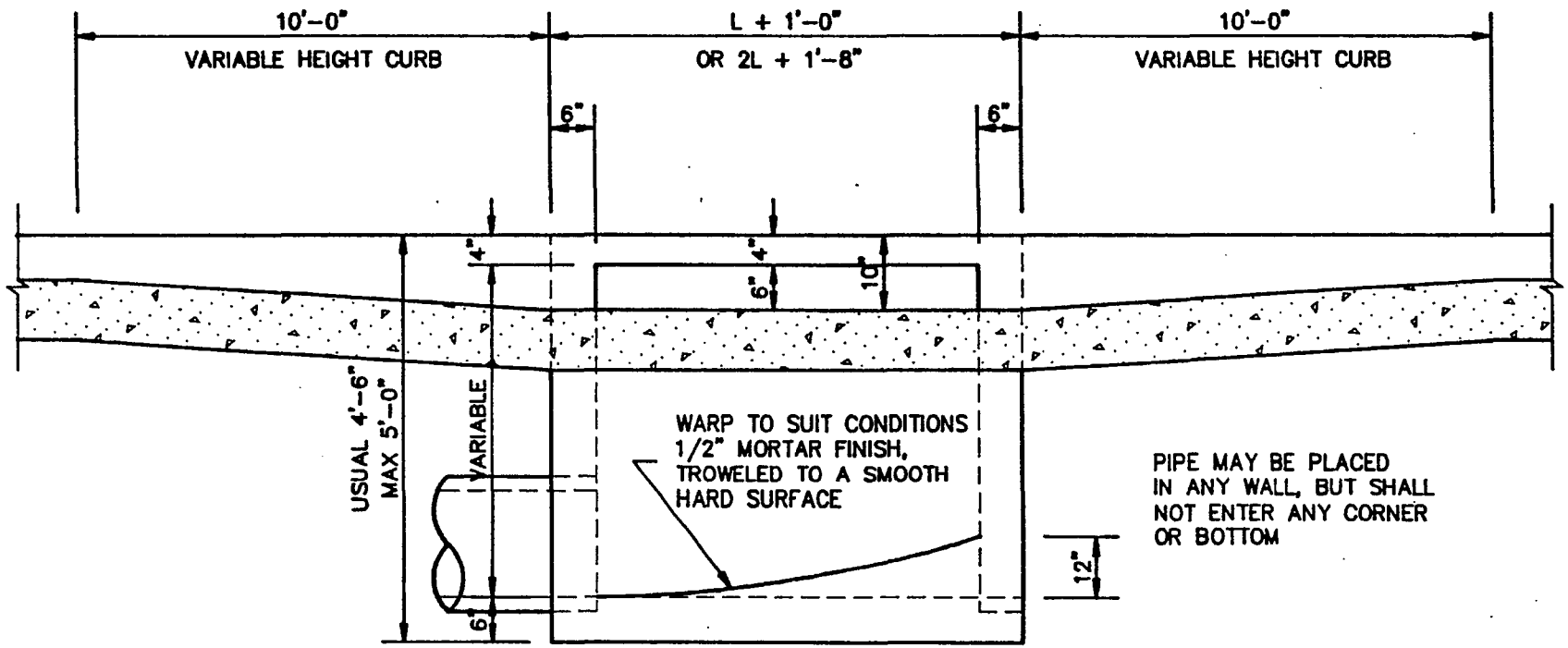
R.C.P. EMBEDMENT



PLAN – STANDARD INLET



PLAN–RECESSED INLET



SECTION A-A

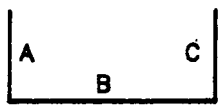
RECESSED AND STANDARD DETAILS

REINFORCING STEEL SCHEDULE

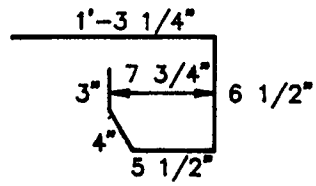
DIMENSIONS SHOWN ARE FOR MAX. SIZE INLETS

INLET LENGTH L	BAR TYPE	BAR DIA. (1/8")	NO. REQD.	BAR DIMENSIONS		
				A	B	C
6 FT.	A	3	9	3'-2"	0'-3"	---
	B	3	1	4'-10"	---	---
	C	4	15	6'-8"	0'-6"	---
	D	4	5	4'-8"	---	---
	F	4	1	3'-2"	---	---
	G	3	5	2'-0"	1'-3"	---
	H	3	3	*	*	*
	N	3	3	3'-2"	3'-2"	3'-2"
8 FT.	A	3	12	3'-2"	0'-3"	---
	B	3	1	6'-10"	---	---
	C	4	15	8'-8"	0'-6"	---
	D	4	5	4'-8"	---	---
	F	4	1	3'-2"	---	---
	G	3	5	2'-0"	1'-3"	---
	H	3	4	*	*	*
	N	3	3	3'-2"	3'-2"	3'-2"
10 FT.	A	3	10	3'-2"	0'-3"	---
	B	3	2	8'-10"	---	---
	C	4	16	10'-8"	0'-6"	---
	D	4	4	4'-8"	---	---
	E	5	6	10'-8"	---	---
	G	3	5	2'-0"	1'-3"	---
	H	3	15	*	*	*
	I	4	8	4'-8"	3'-2"	3'-2"
	L	4	5	4'-3"	---	---

* SEE DIAGRAM FOR DIMENSIONS



TYPICAL BAR BENDING



BAR H

REINFORCING DETAILS

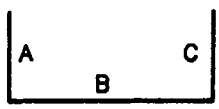
REINFORCING STEEL SCHEDULE

DOUBLE INLETS

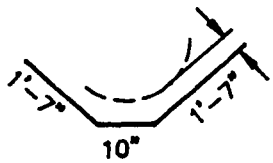
DIMENSIONS SHOWN ARE FOR MAX. SIZE INLETS

INLET LENGTH L	BAR TYPE	BAR DIA. (1/8")	NO. REQD.	BAR DIMENSIONS		
				A	B	C
8 FT.	A	3	19	3'-2"	0'-6"	---
	B	3	2	15'-6"	---	---
	C	4	16	17'-4"	0'-6"	---
	D	4	9	4'-8"	---	---
	E	5	6	17'-4"	---	---
	F	4	5	1'-2"	---	---
	G	3	12	2'-0"	1'-3"	---
	H	3	26	*	*	*
	I	4	16	4'-8"	3'-2"	3'-2"
	J	5	1	*	*	*
	K	5	6	3'-2"	0'-6"	---
	L	4	11	3'-2"	0'-6"	---
	M	4	2	3'-0"	---	---
	N	4	2	4'-8"	3'-2"	4'-8"
10 FT.	A	3	23	3'-2"	0'-6"	---
	B	3	2	19'-6"	---	---
	C	4	16	21'-4"	0'-6"	---
	D	4	9	4'-8"	---	---
	E	5	6	21'-4"	---	---
	F	4	5	1'-2"	---	---
	G	3	15	2'-0"	1'-3"	---
	H	3	32	*	*	*
	I	4	20.	4'-8"	3'-2"	3'-2"
	J	5	1	*	*	*
	K	5	6	3'-2"	0'-6"	---
	L	4	11	3'-2"	0'-6"	---
	M	4	2	3'-0"	---	---
	N	4	2	4'-8"	3'-2"	4'-8"

* SEE DIAGRAM FOR DIMENSIONS

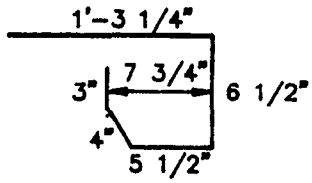


TYPICAL BAR BENDING



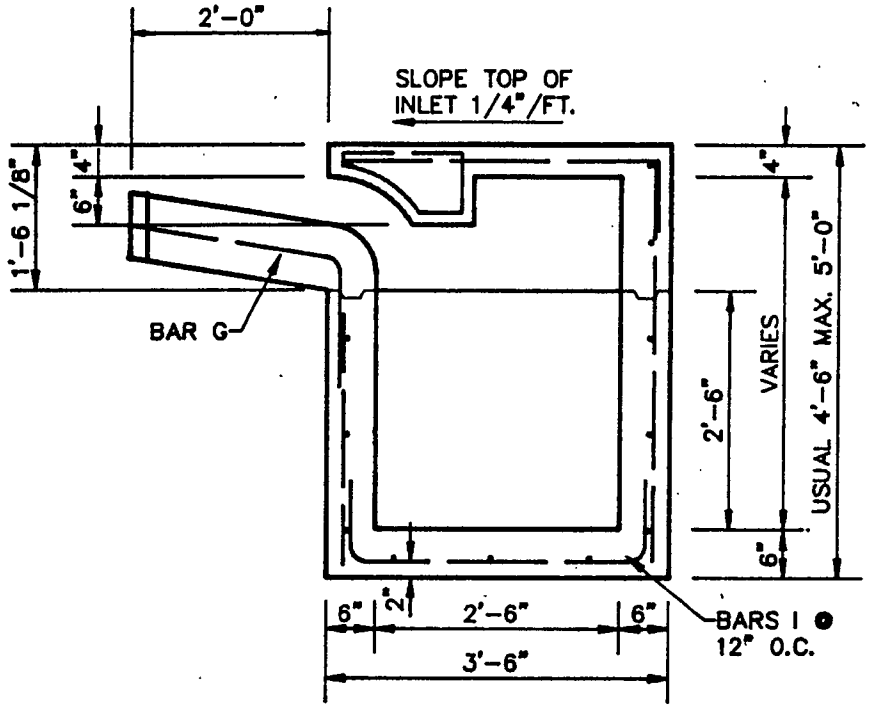
BAR J

BEND TO ALLOW A MIN. 1 1/2" CLR. OF DRAIN PIPE.



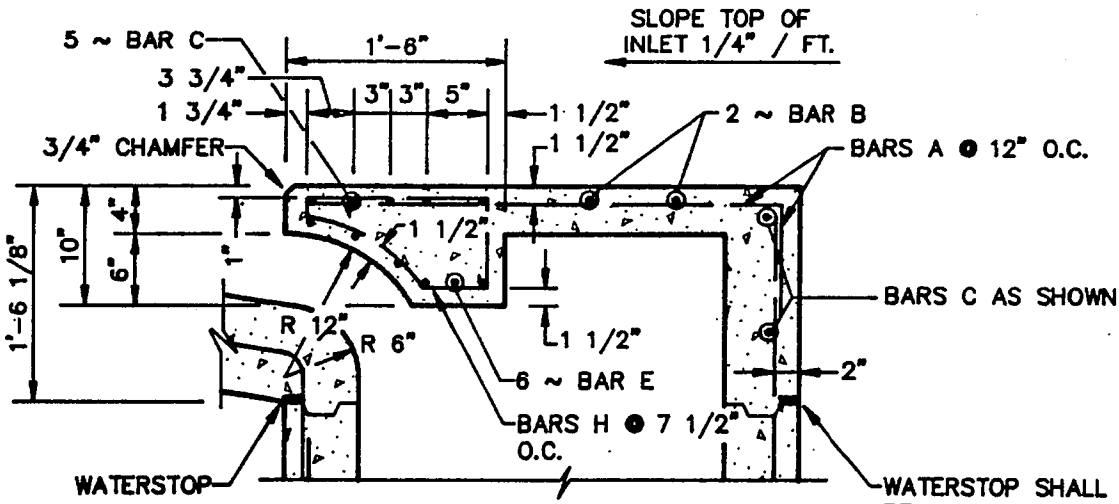
BAR H

REINFORCING DETAILS



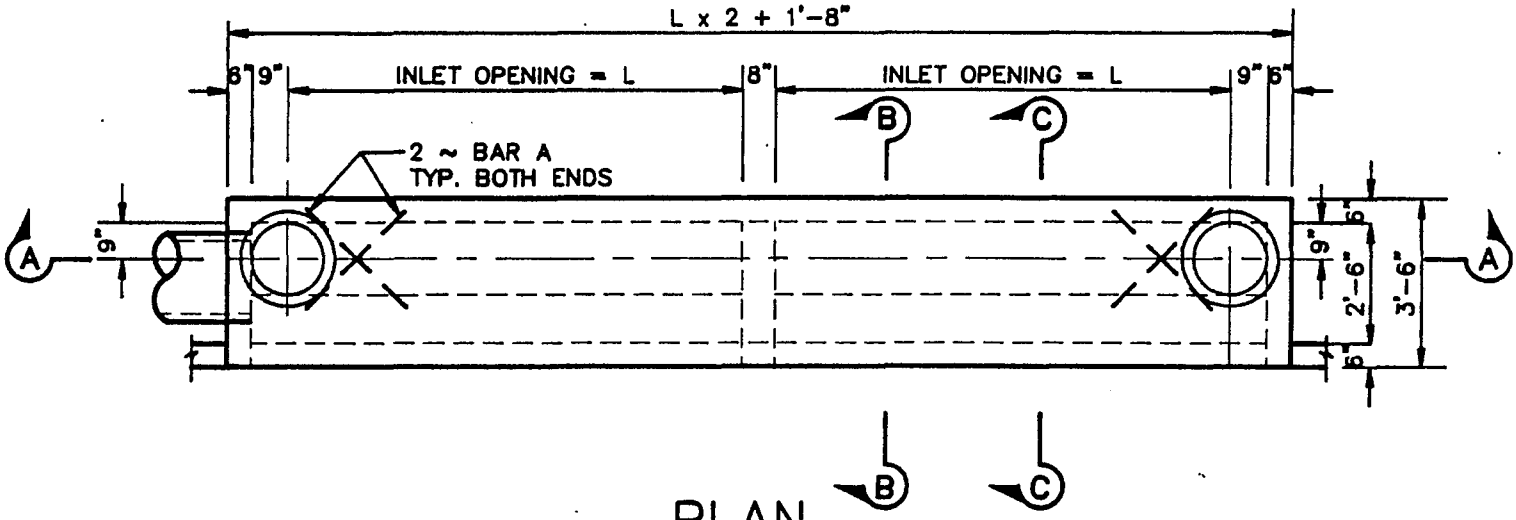
SECTION "B-B"

1/2"=1'-0"



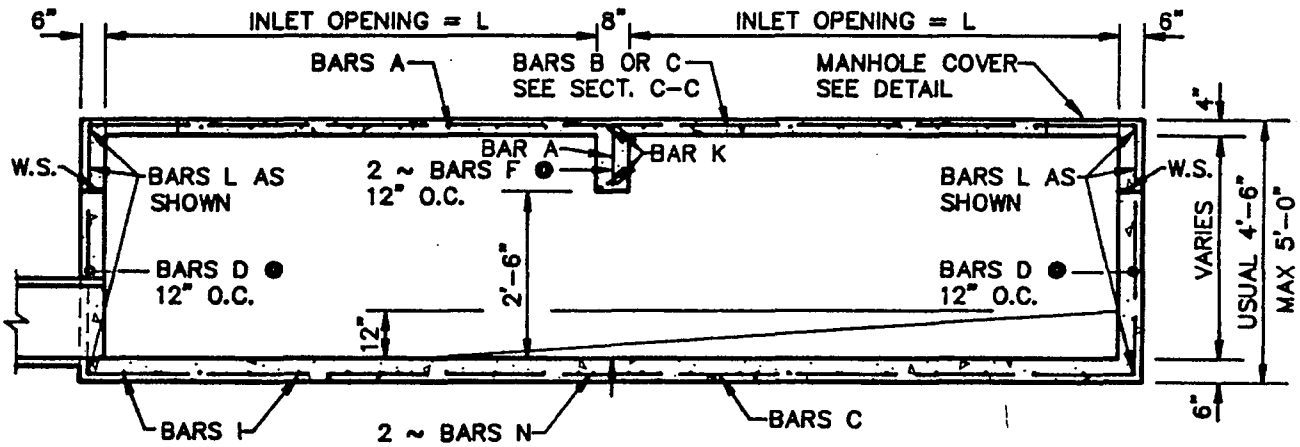
SECTION "C-C"

3/4"=1'-0"



PLAN

1/4"=1'-0"

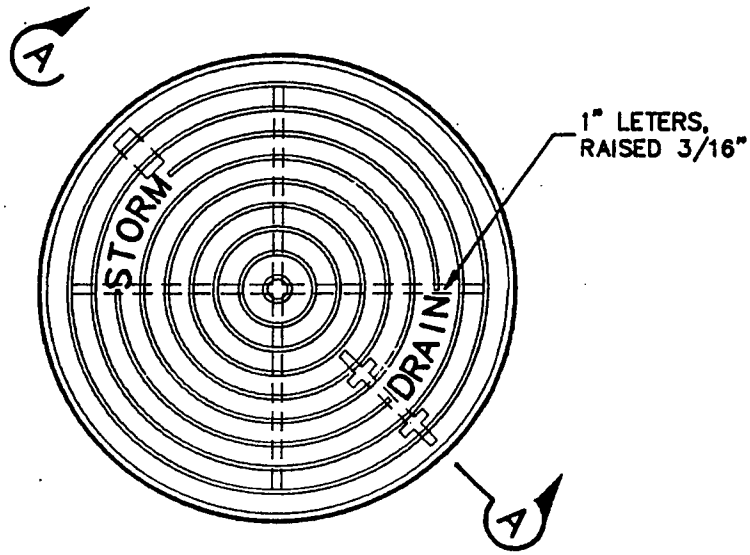


SECTION "A-A"

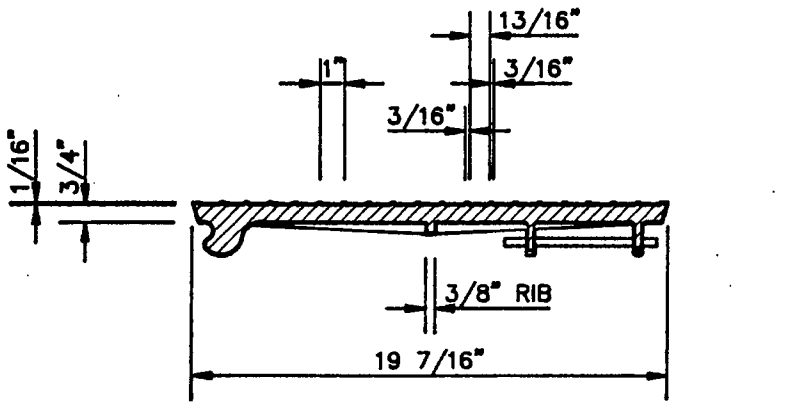
1/4"=1'-0"

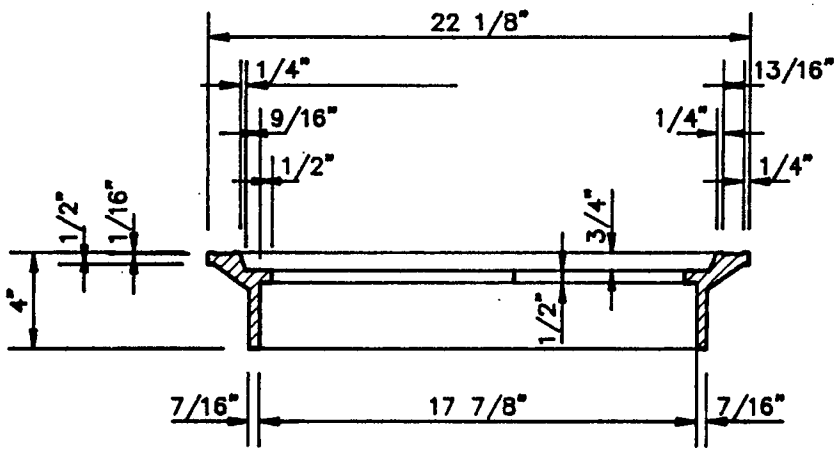
NOTE:

DETAIL SHOWN IS FOR INLETS LARGER THAN 10' IN WIDTH. FOR INLETS 10' IN WIDTH AND LESS, DELETE CENTER ROOF BEAM AND ONE MANHOLE COVER.



PLAN OF COVER

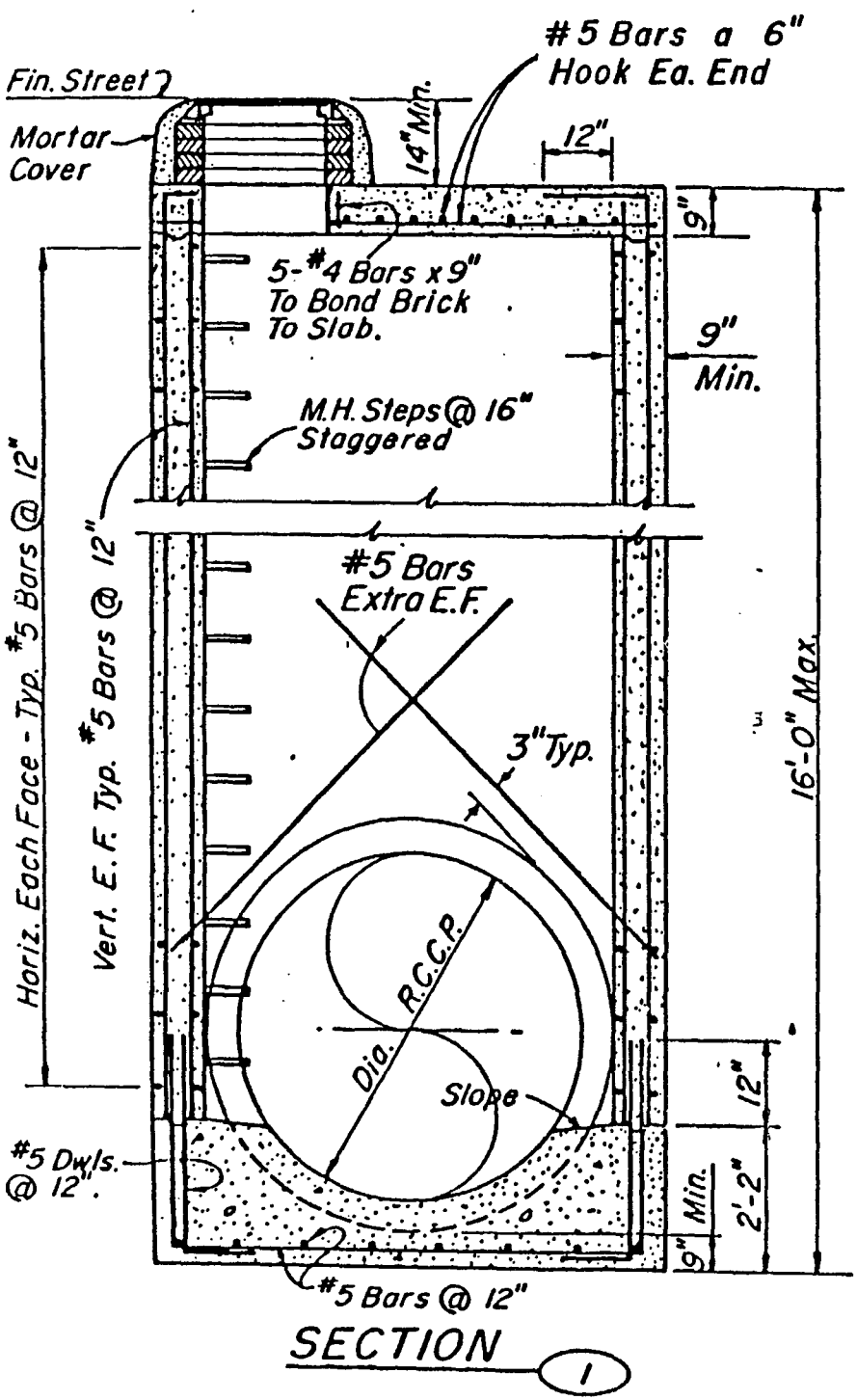




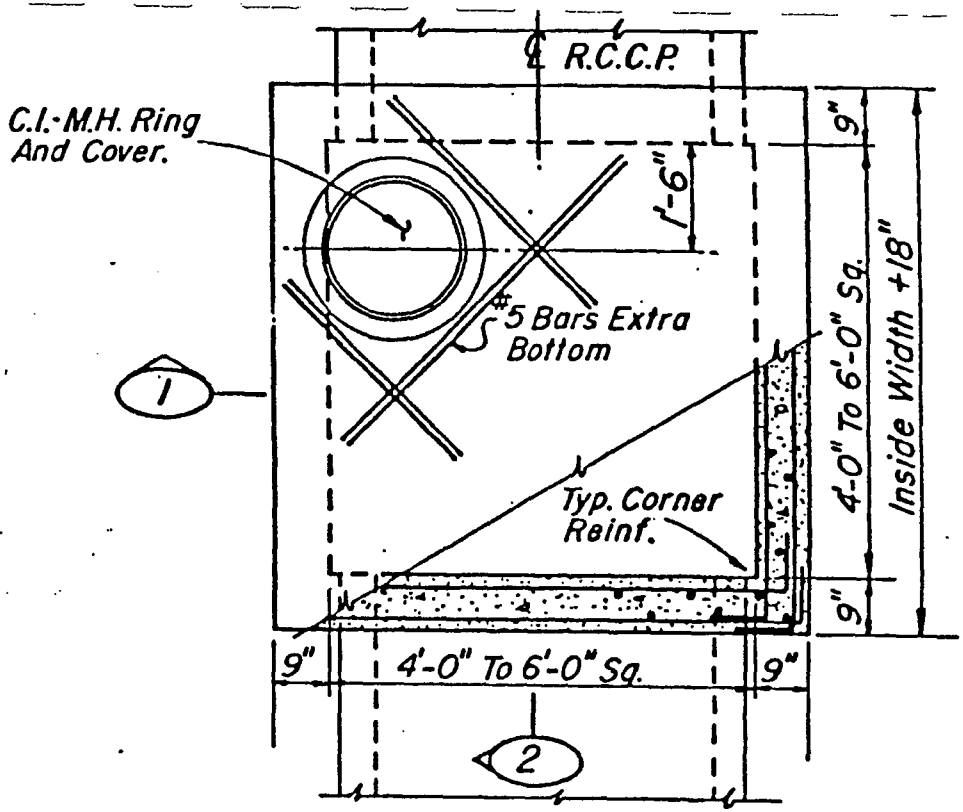
SECTION OF FRAME AND COVER

INLET FRAME AND COVER

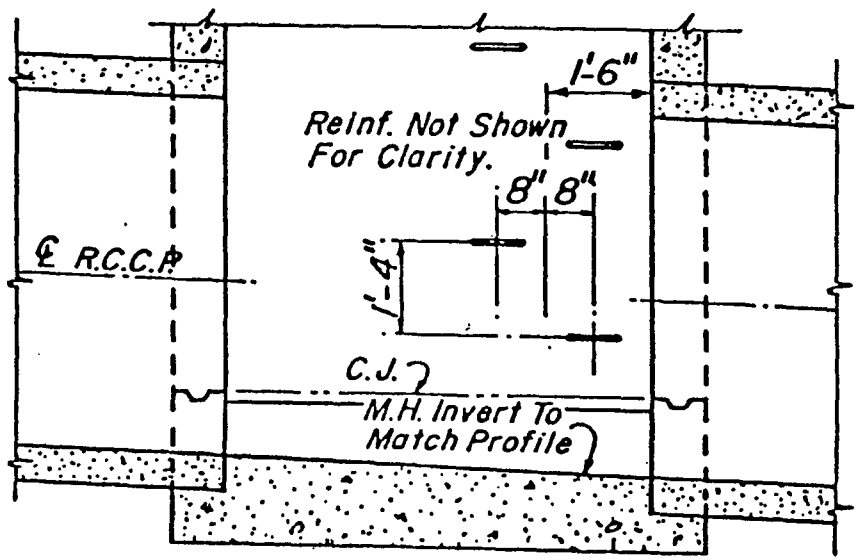
SCALE: 1 1/2" = 1'-0"



SECTION (1)

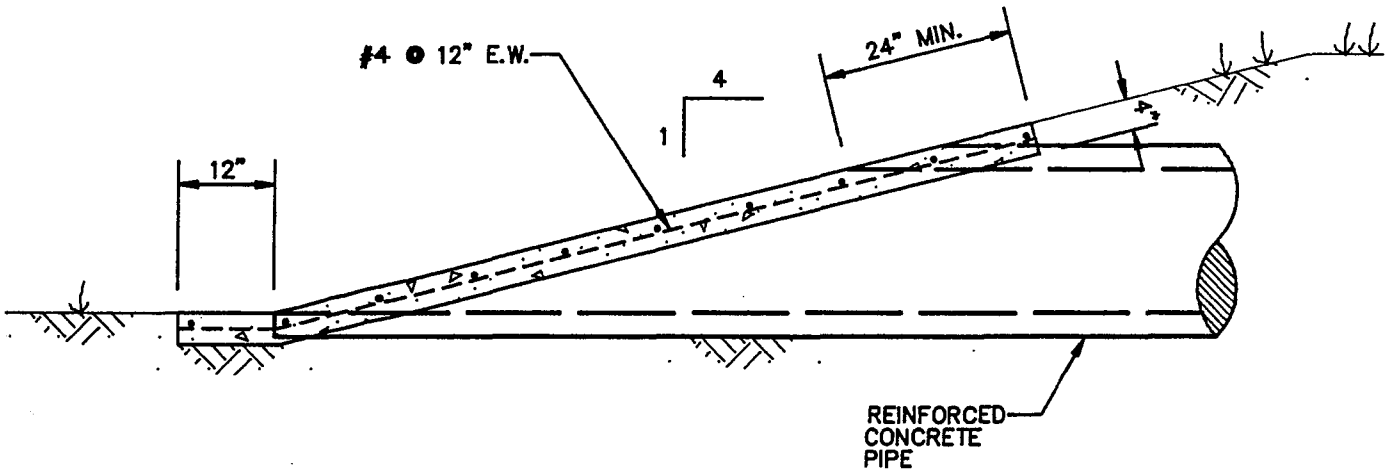


PLAN



SECTION (2)

4'-0" TO 6'-0" SQ. - STORM DRAIN M.H.



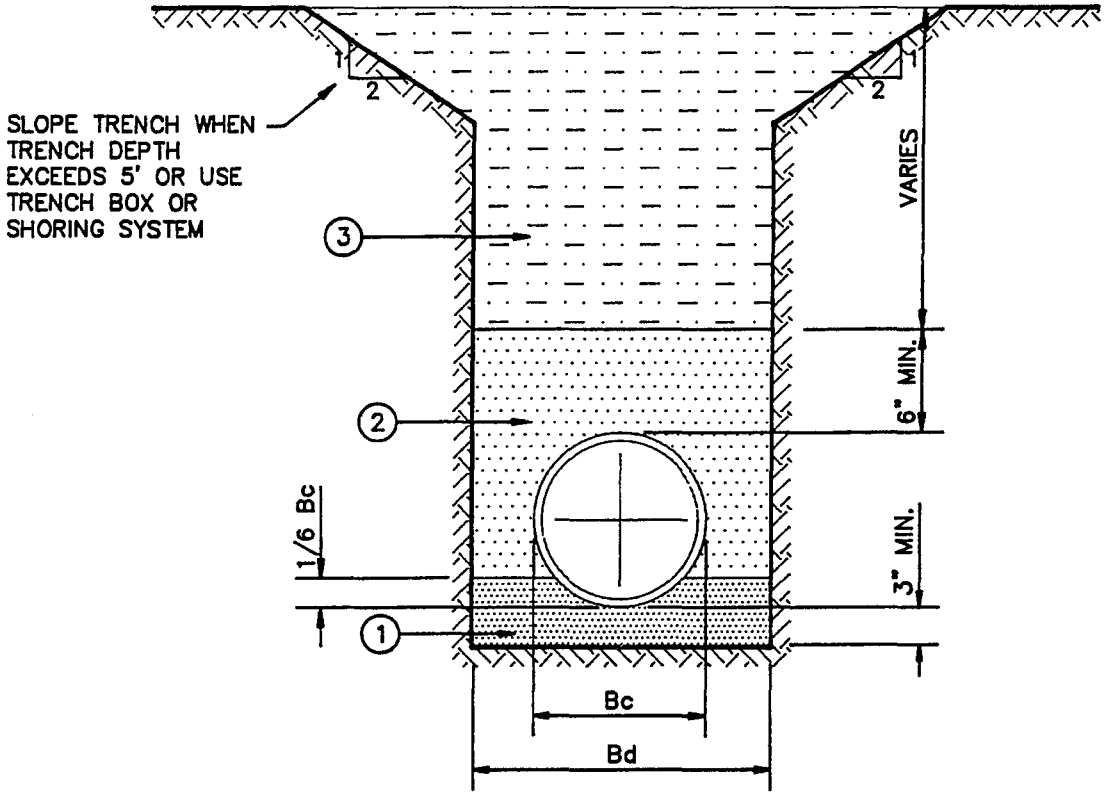
HEADWALL DETAIL

NO SCALE

NOTES:

1. WIDTH OF HEADWALL IS EQUAL TO PIPE O.D. + 24".
2. SAWCUT 4:1 BEVEL ON PIPE.

WATER SYSTEM DETAILS



(1) STANDARD GRADATION CRUSHED STONE – TOP LAYER IS TO BE PLACED TO GRADE TO PROVIDE UNIFORM SUPPORT OF PIPE BARREL. EXCAVATE BELL HOLES.

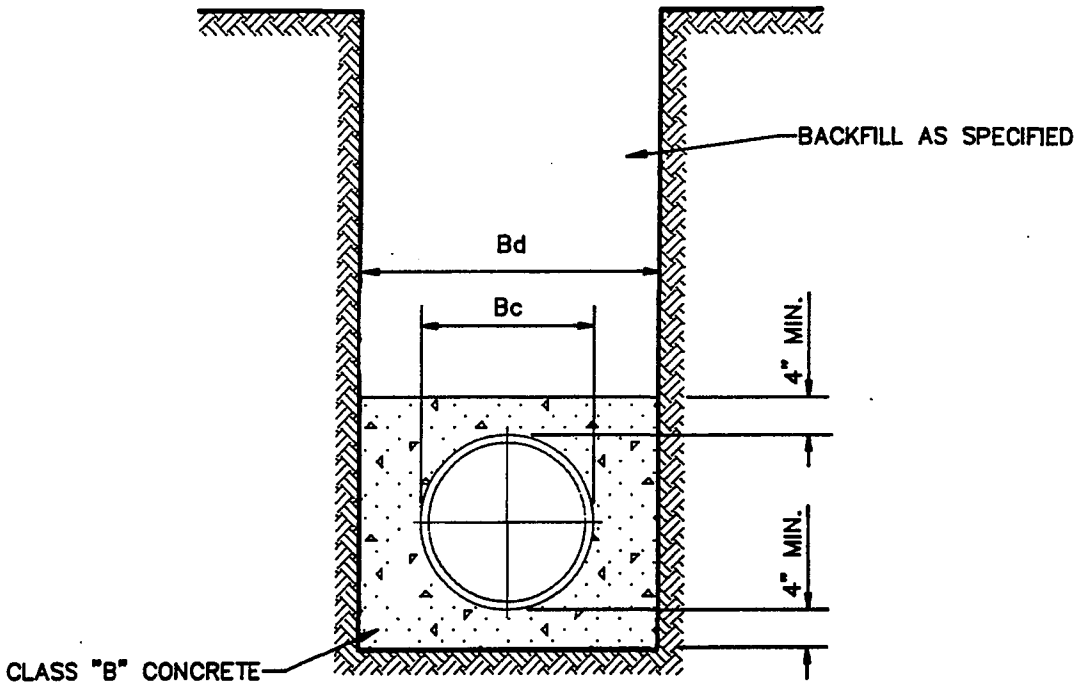
(2) GRANULAR MATERIAL (SAND) COMPACTED TO 95% STANDARD PROCTOR DENSITY.

(3) SELECT MATERIAL FREE OF ROCKS, CLUMPS OR DEBRIS LARGER THAN 6" IN GREATEST DIMENSION. COMPACT TO 90% STANDARD PROCTOR DENSITY. UNDER STRUCTURES, ROADWAYS AND PAVEMENT, COMPACT TO 95% STANDARD PROCTOR DENSITY.

SIZE OF PIPE IN INCHES DIA.	KIND OF PIPE	EXTERNAL DIA. (Bc) IN INCHES	TRENCH WIDTH (Bd) IN INCHES
6"	PVC WATER PIPE	6.28	24
8"	PVC WATER PIPE	8.16	24
10"	PVC WATER PIPE	10.2	26

CLASS "C" EMBEDMENT

PVC WATER PIPE

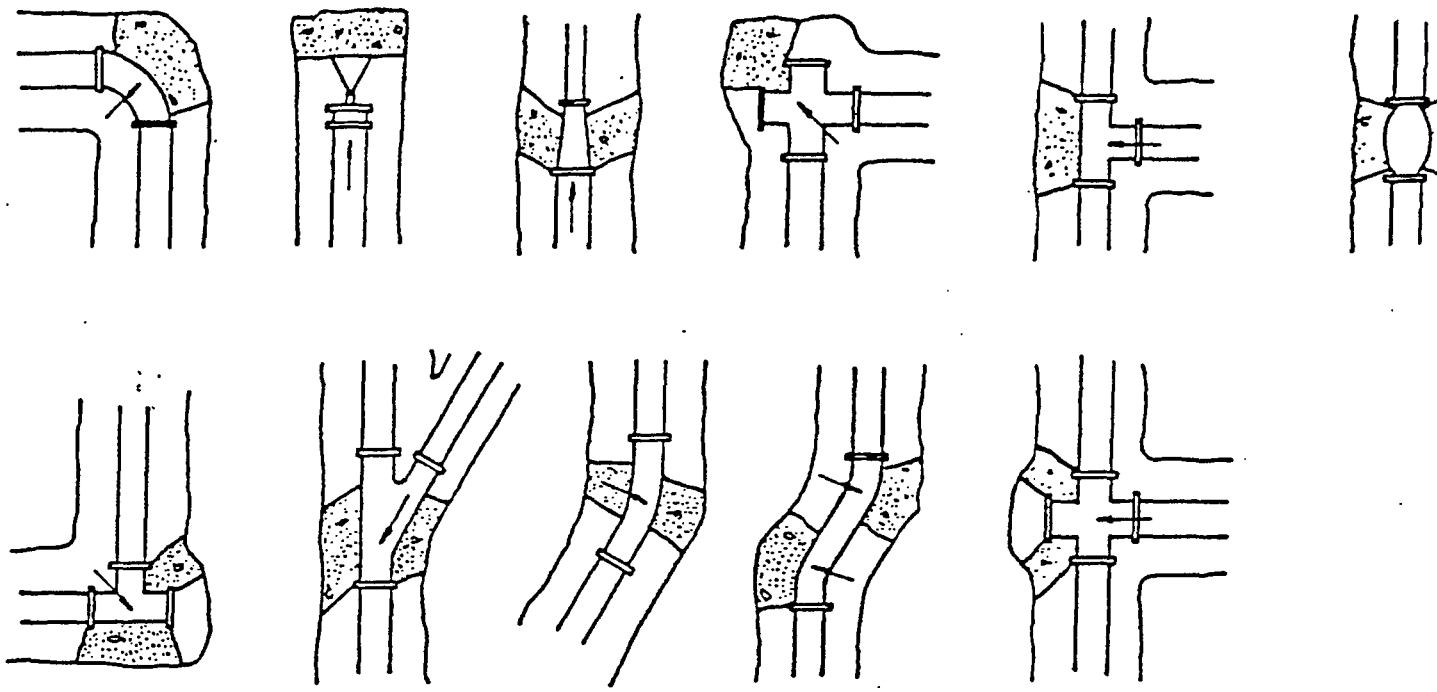


SIZE OF PIPE IN INCHES DIA.	KIND OF PIPE	EXTERNAL DIA. (Bc) IN INCHES	TRENCH WIDTH (Bd) IN INCHES
6"	PVC WATER PIPE	6.28	24
8"	PVC WATER PIPE	8.16	24
10"	PVC WATER PIPE	10.2	26

NOTE:
THE 4" MIN. SHALL APPLY
TO THICKNESS AROUND
PIPE AND OVER TOPS OF BELLS.

EMBEDMENT CLASS "G"

CONCRETE ENCASEMENT



TYPICAL THRUST BLOCKING DETAILS

NOTES:

1. The Earth Bearing Surface Shall Be Undisturbed Material. Keep All Joints Free From Concrete. Thrust Block To Be Constructed Of 1,500 P.S.I. (28 Day) Concrete And Placed As Shown On "Typical Thrust Blocking Details" Above.

2. It Shall Be The Responsibility Of The Contractor To Install Adequate Thrust Blocking. The HORIZONTAL BLOCKING TABLE Shows The Minimum Thrust Blocking Area Required (In Square Feet) Bearing Against Undisturbed Trench Wall.

3. All Fittings Shall Be Blocked Regardless Of The Angle Or Direction, Except As Noted In The Chart

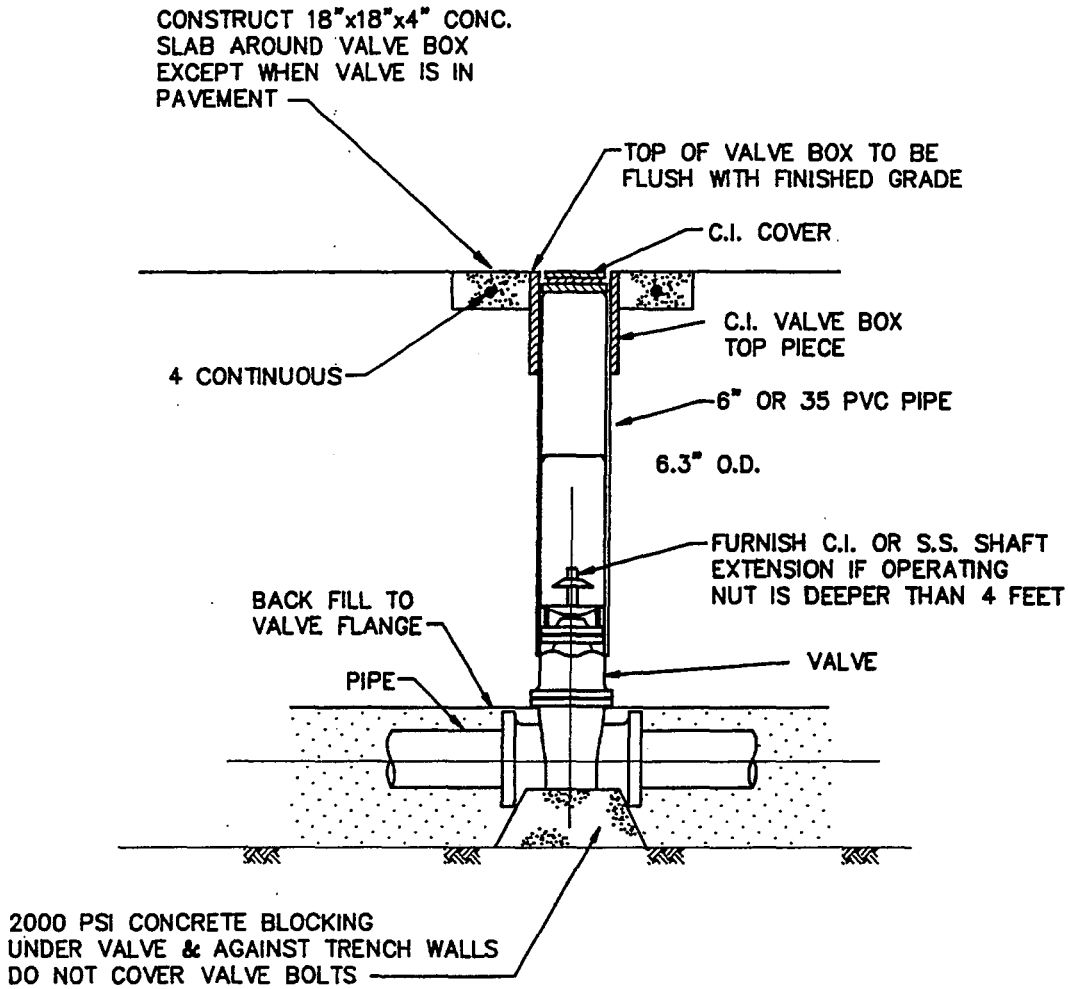
4. Soil Bearing Strength Is Assumed. To Be 2000 P.S.F. Site Conditions May Vary Which Will Require Modifications To The Blocking Calculations.

HORIZONTAL BLOCKING TABLE

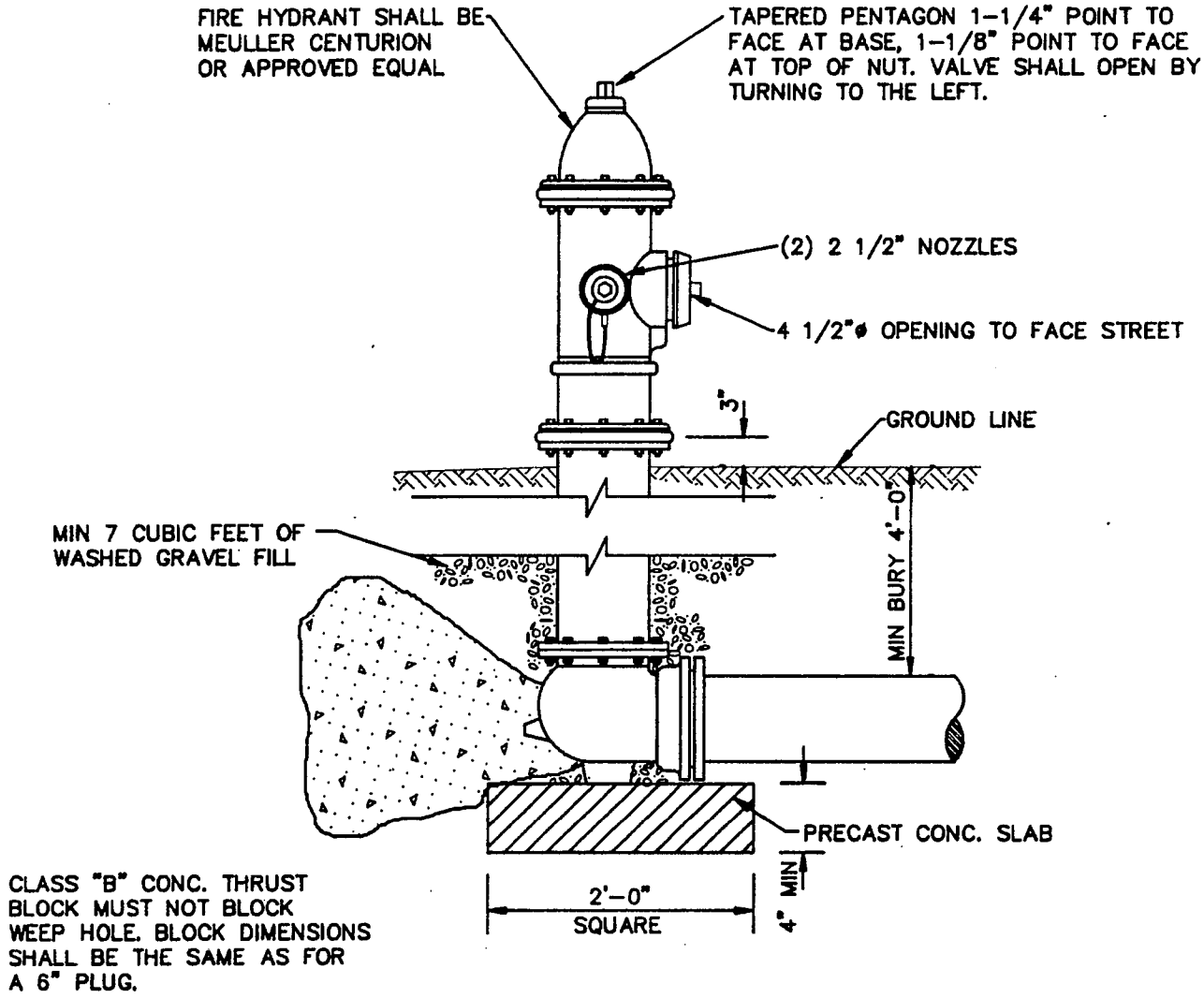
AREA REQUIRED (IN SQUARE FEET) BEARING AGAINST UNDISTURBED TRENCH WALL

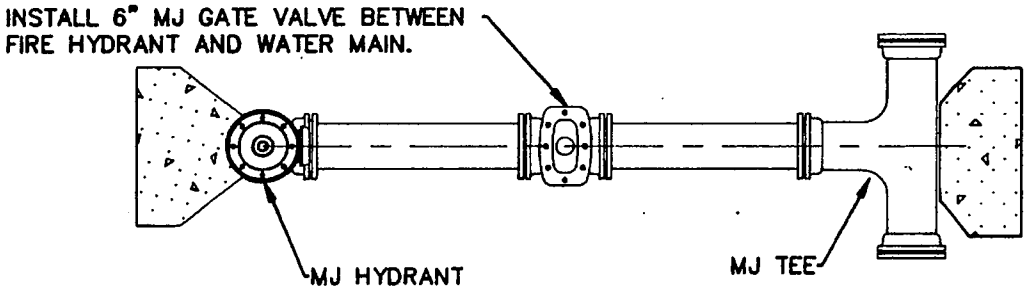
PIPE SIZE (IN.)	THRUST (POUNDS) DEAD END AND TEE	BLOCKING (SQUARE FEET)					
		DEAD END AND TEE	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	5° DEFLECT.
4	2,450	1.23	1.73	0.94	0.50	0.50	0.50
6	5,513	2.76	3.90	2.11	1.08	0.54	0.50
8	9,802	4.90	6.93	3.75	1.91	0.96	0.50
10	15,315	7.66	10.83	5.86	2.99	1.50	0.67
12	22,054	11.03	15.59	8.43	4.30	2.16	0.96

BASED ON 2,000 P.S.F. SOIL BEARING CAPACITY AND 195 P.S.I. LINE PRESSURE (150 P.S.I. WORKING PRESSURE PLUS 30% FOR WATER HAMMER).



VALVE INSTALLATION DETAIL

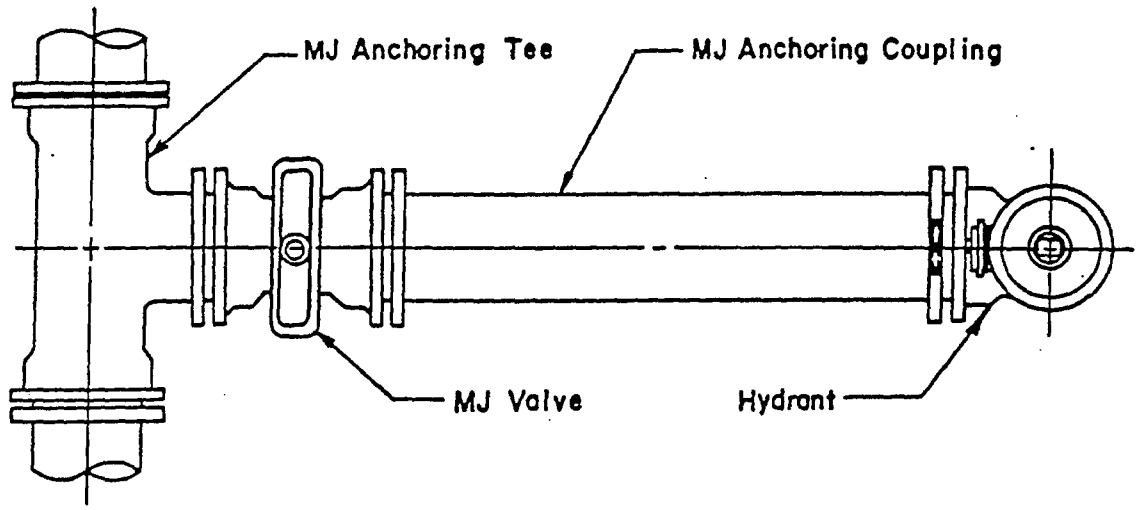


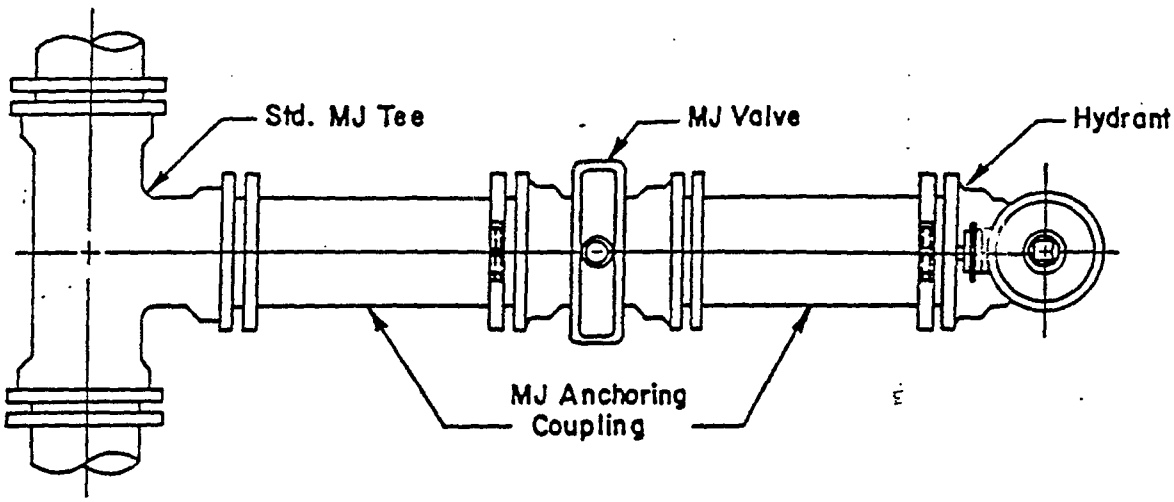


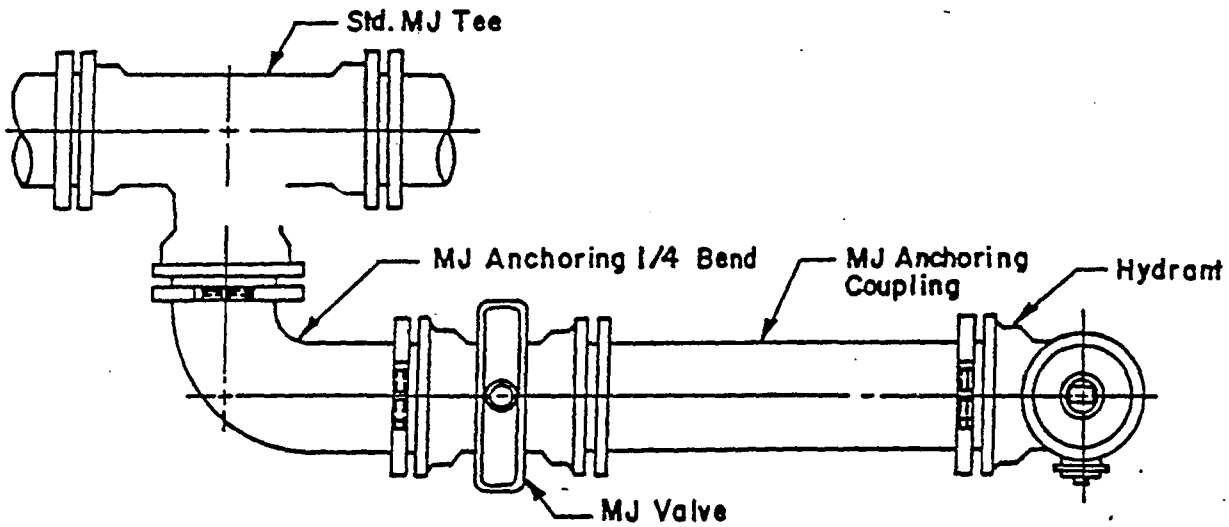
FIRE HYDRANT ASSEMBLY DETAIL

BLOCKED INSTALLATION

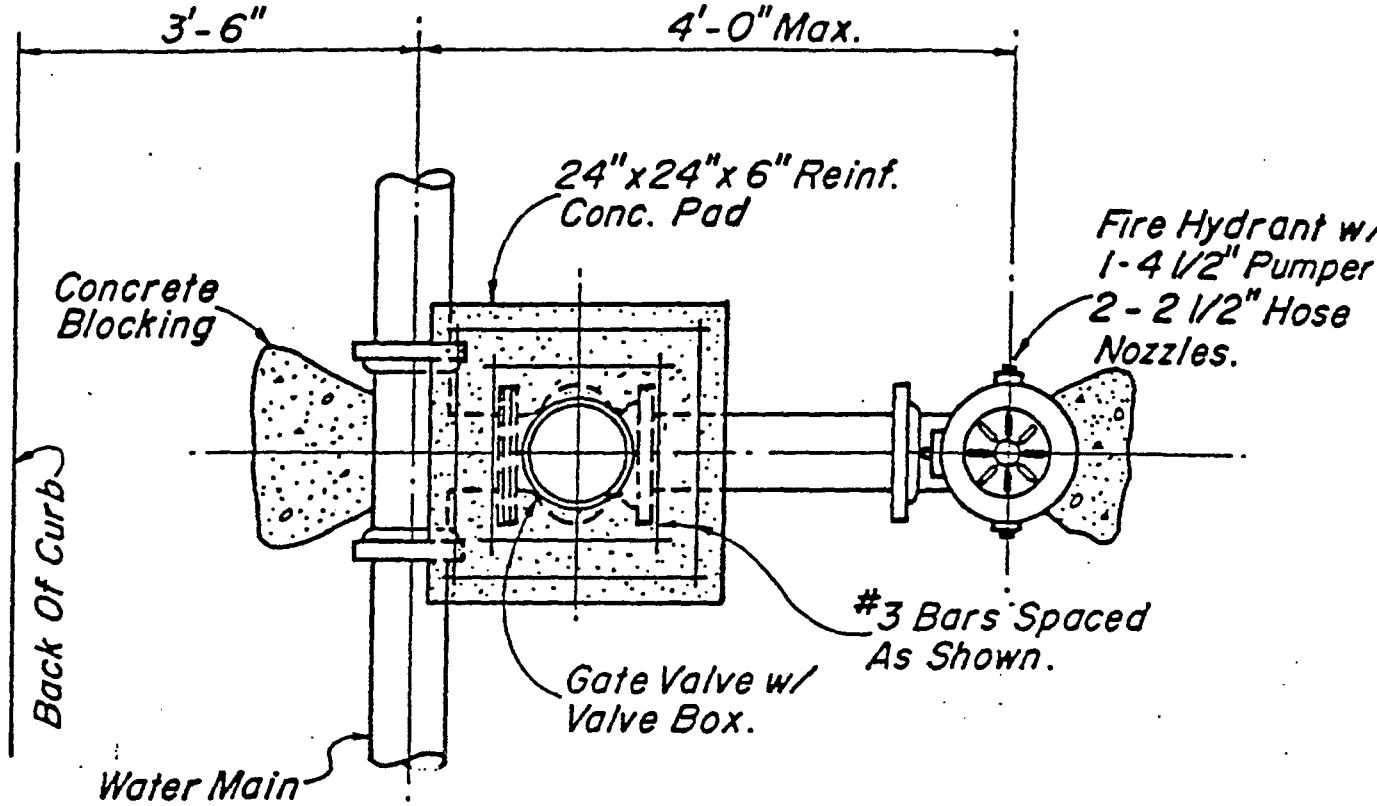
NOTE: ALL MATERIALS SHOWN ON THIS DETAIL SHALL BE INCLUDED IN THE UNIT PRICE FOR A FIRE HYDRANT ASSEMBLY. NO SEPARATE PAYMENT WILL BE MADE FOR VALVES, PIPE, FITTINGS ETC.







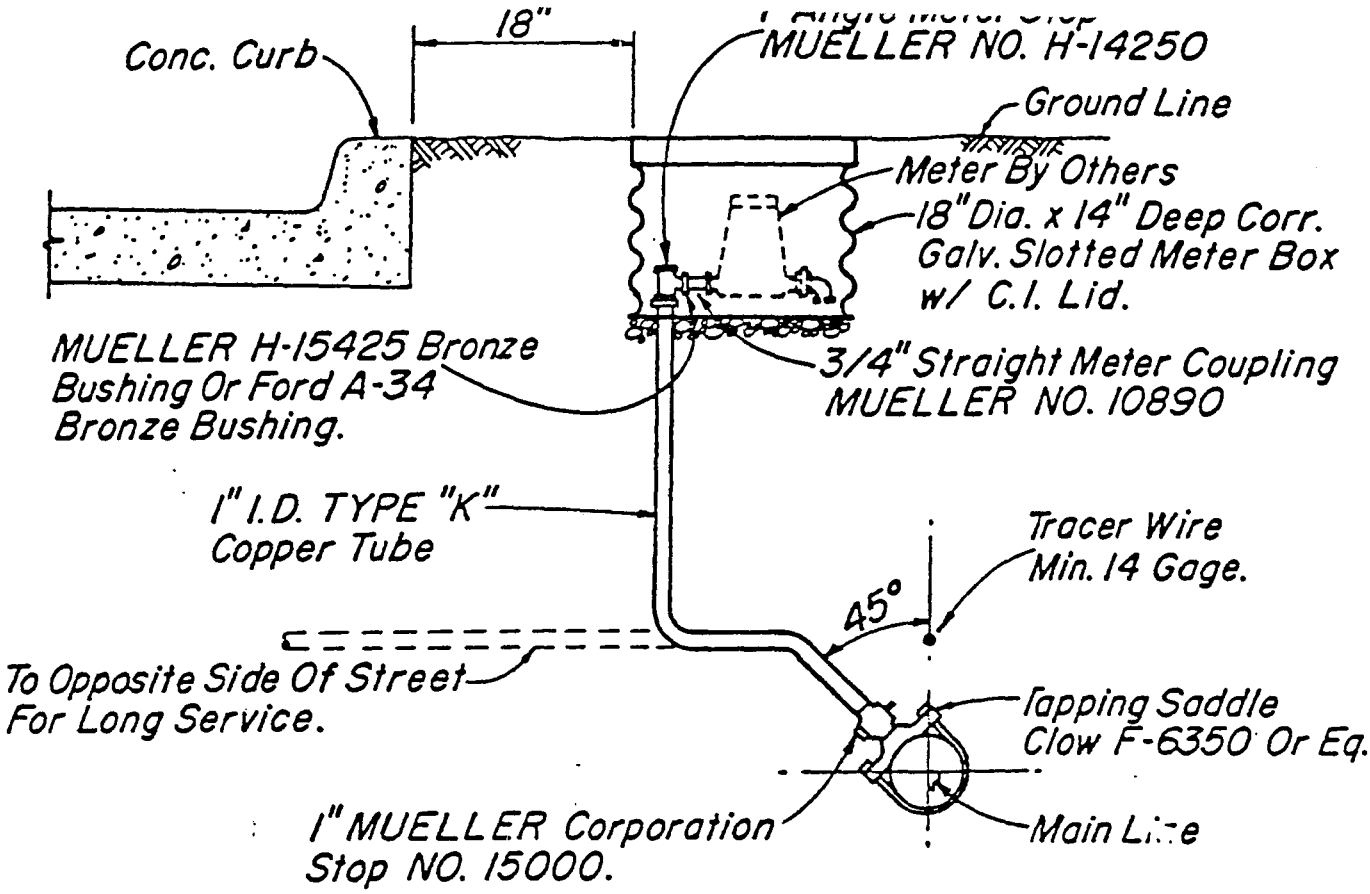
TYPICAL VALVE & HYDRANT INSTALLATIONS USING SPECIAL MJ ANCHORING FITTINGS



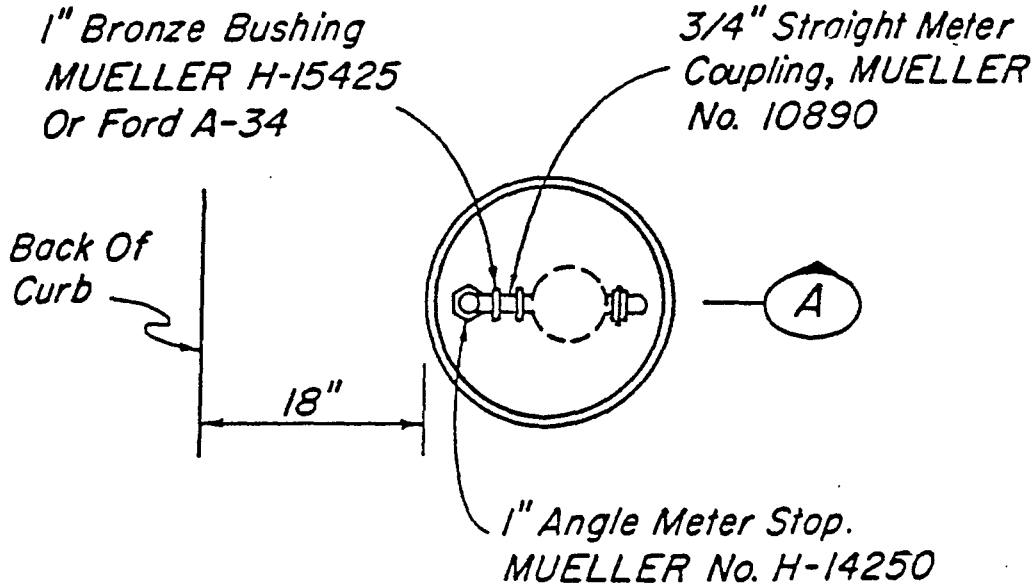
PLAN

TYPICAL FIRE HYDRANT INSTALLATION

Not To Scale



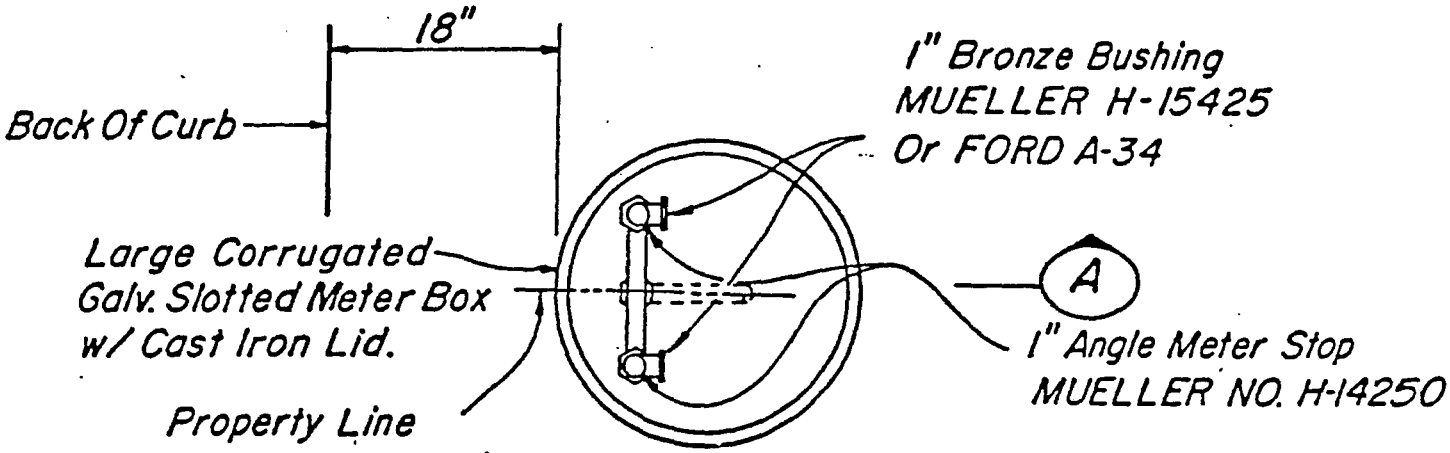
SECTION (A)



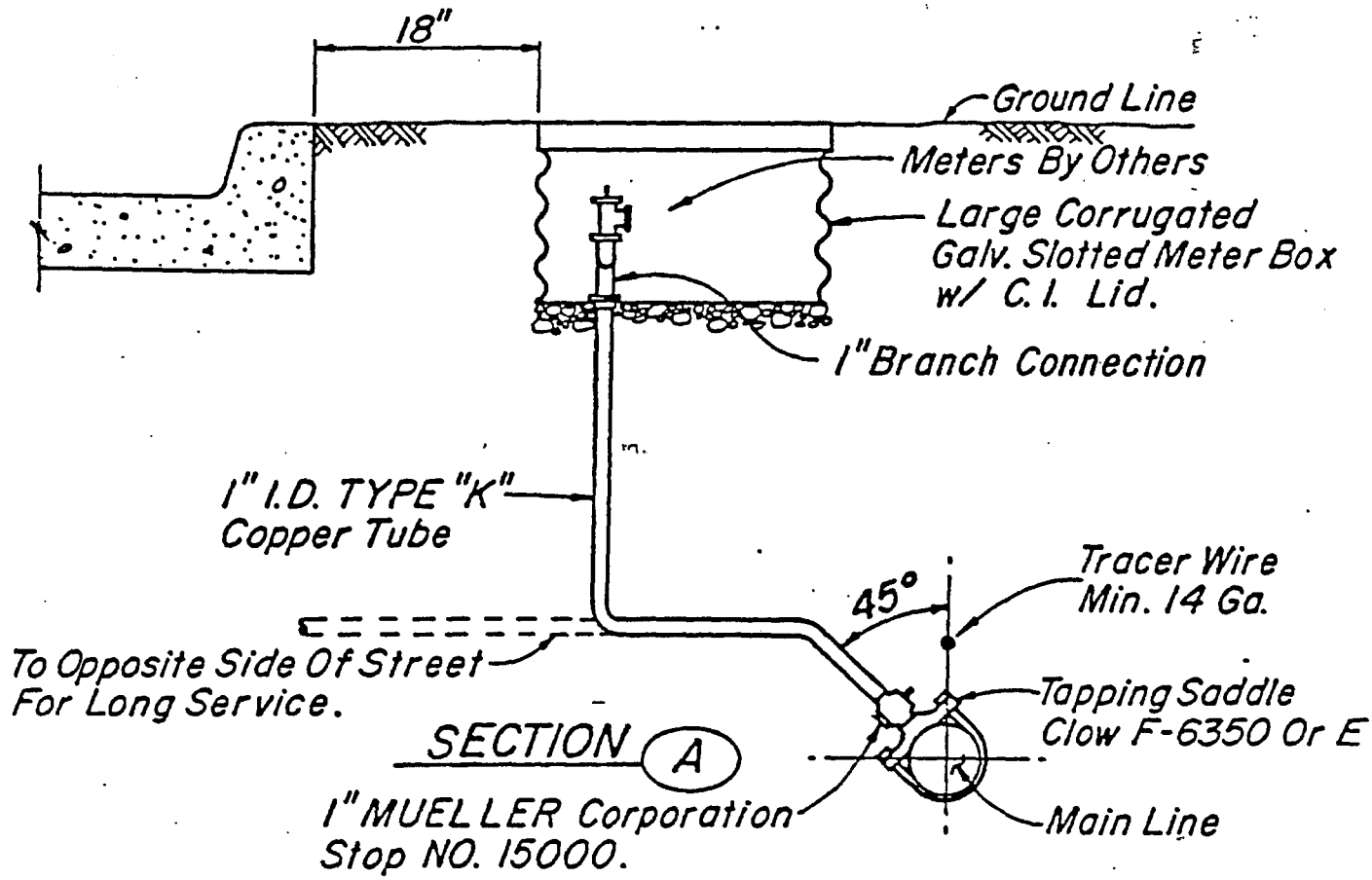
PLAN

SINGLE SERVICE CONNECTION

Not To Scale

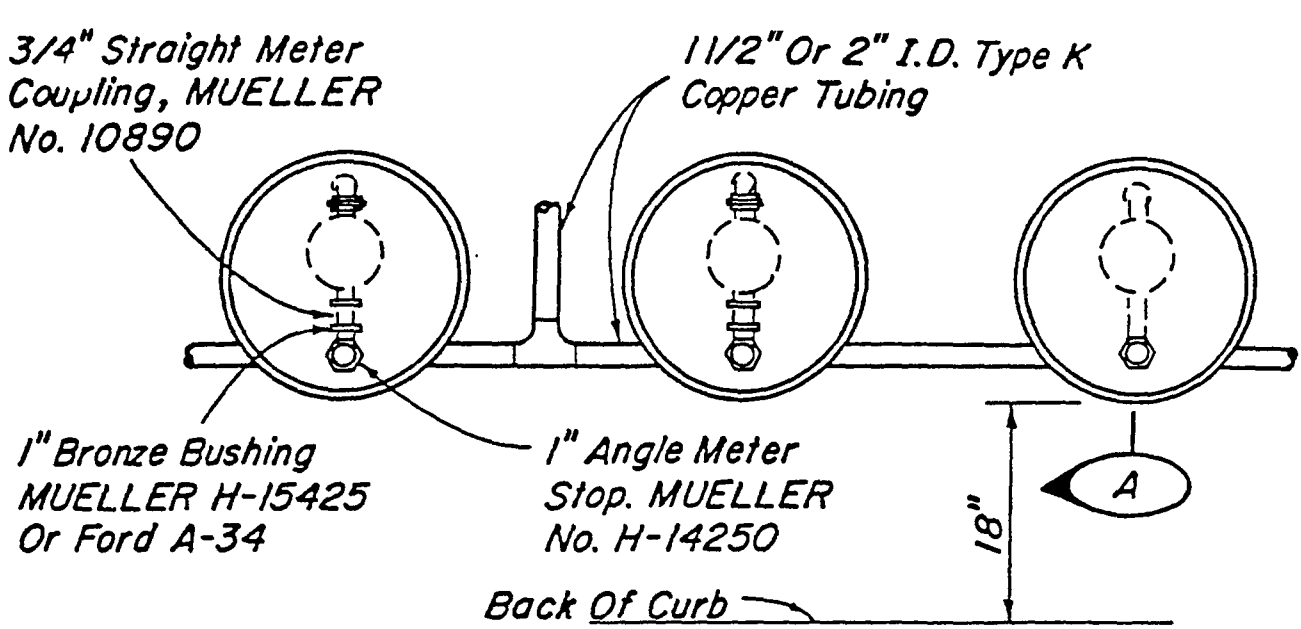


PLAN

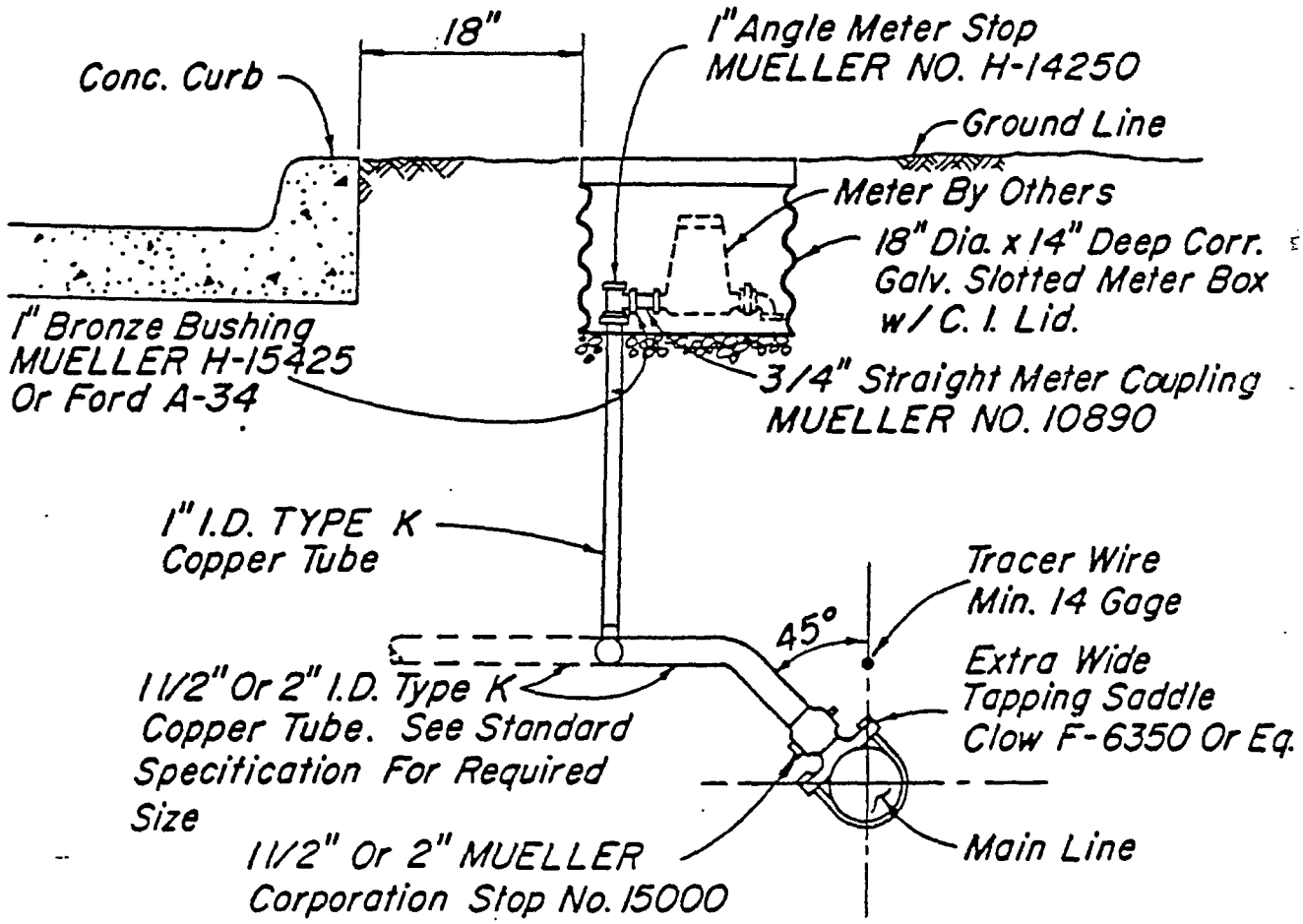


DOUBLE SERVICE CONNECTION

Not To Scale



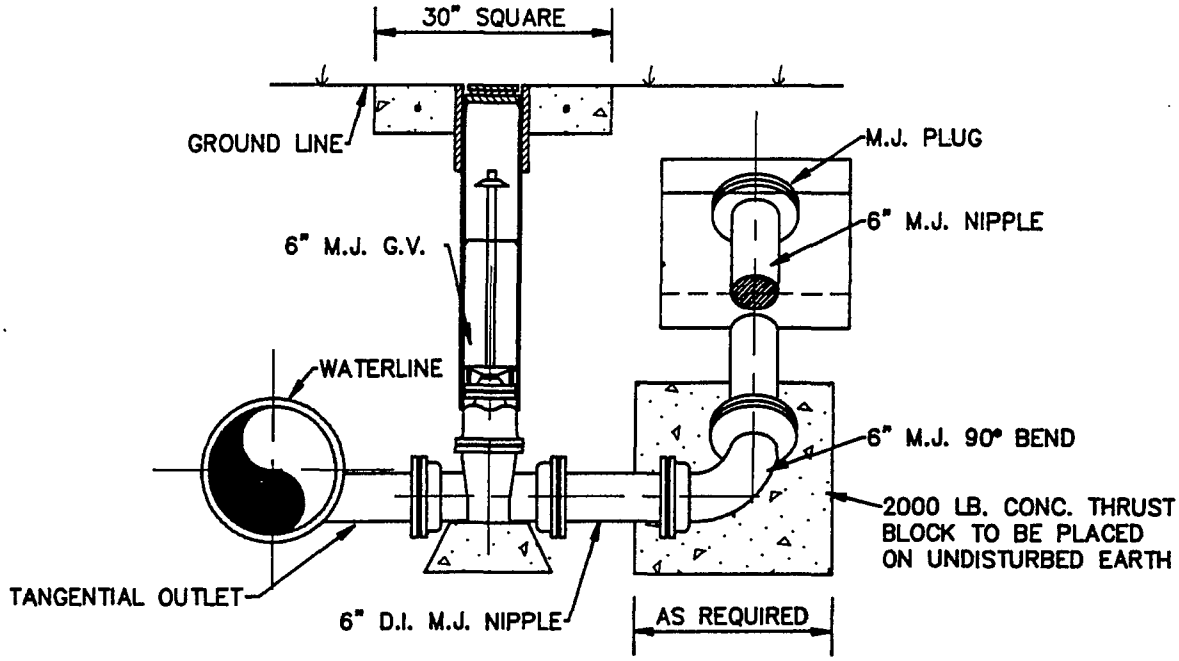
PLAN

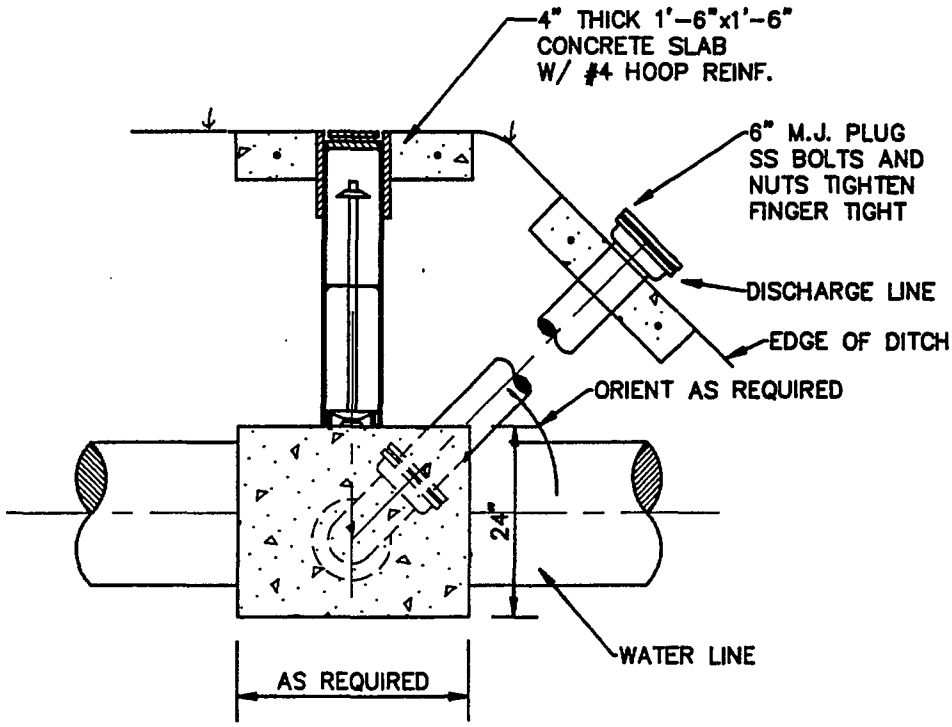


SECTION A

MULTIMETER SERVICE CONNECTION

Not To Scale





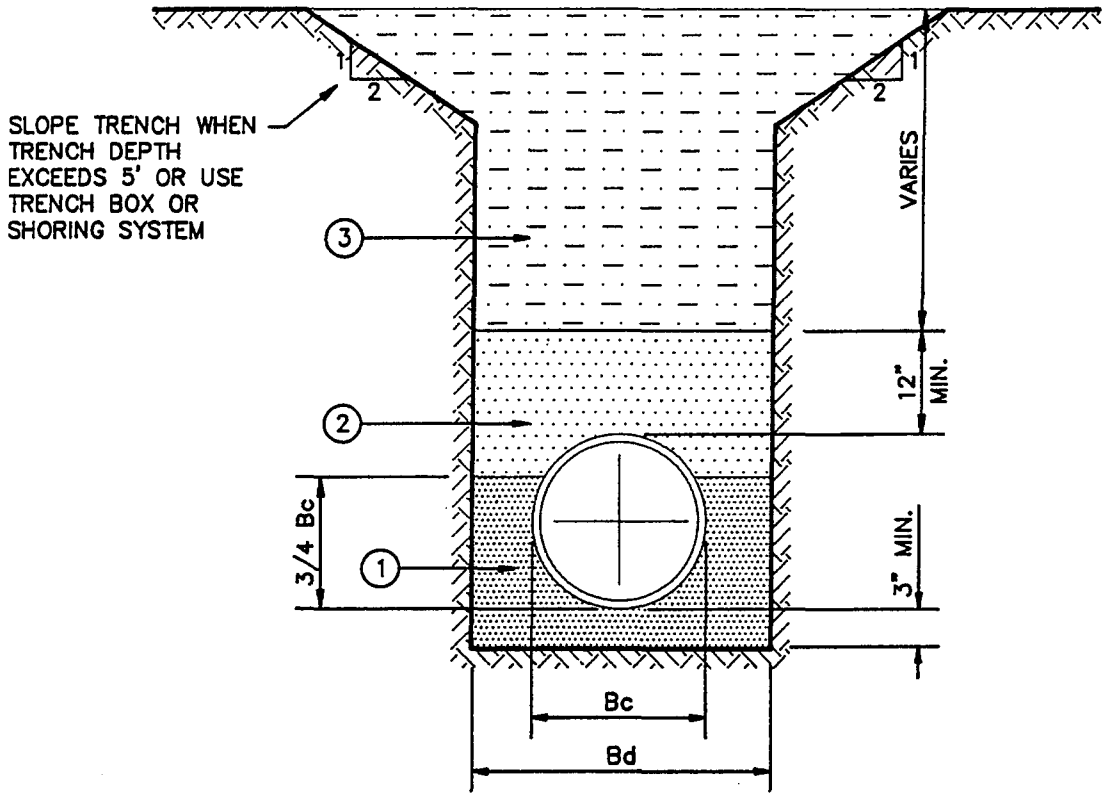
NOTES:

1. BLOW-OFF TO BE CONSTRUCTED USING A TANGENTIAL OUTLET OFF OF MAIN LINE. IF MAIN LINE IS D.I.P., USE A D.I. TEE IN LIEU OF TANGENTIAL OUTLET.

2. BLOW-OFF GATE VALVE SHALL BE FURNISHED WITH A STAINLESS STEEL OR CAST IRON EXTENSION STEM. OPERATING NUT SHALL BE 12" BELOW VALVE BOX COVER. EXTENSION SHALL BE CONNECTED TO VALVE OPERATOR WITH A STAINLESS STEEL PIN.

BLOW-OFF VALVE INSTALLATION DETAIL

SANITARY SEWER DETAILS



(1) FINE GRADATION CRUSHED STONE – TOP LAYER IS TO BE PLACED TO GRADE TO PROVIDE UNIFORM SUPPORT OF PIPE BARREL. EXCAVATE BELL HOLES.

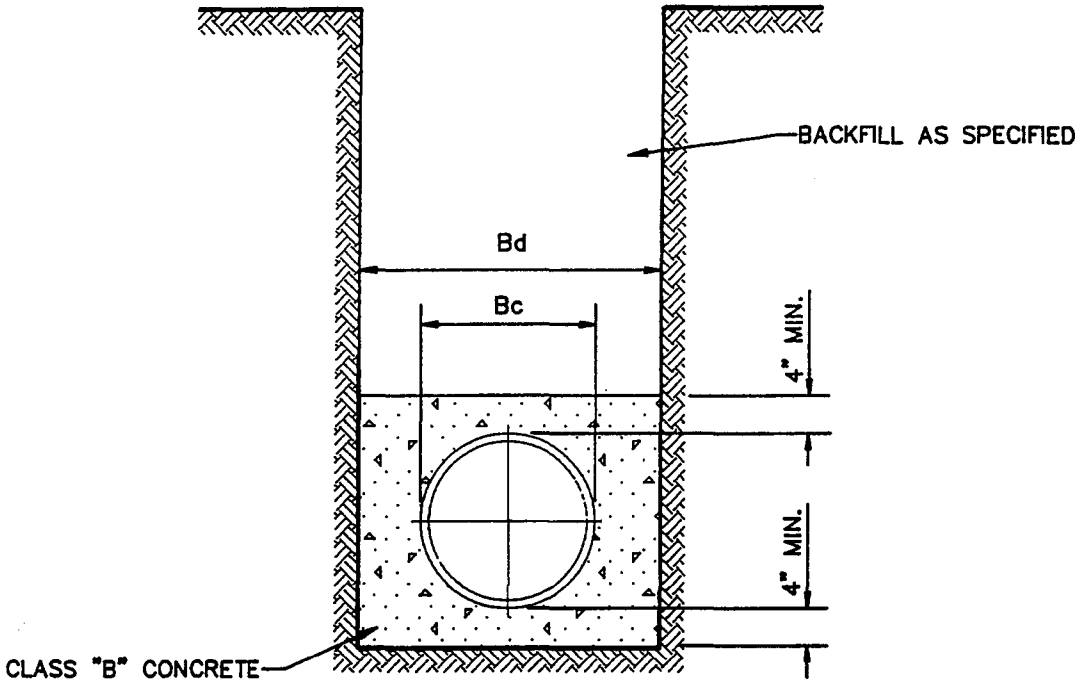
(2) GRANULAR MATERIAL (SAND) COMPACTED TO 95% STANDARD PROCTOR DENSITY.

(3) SELECT MATERIAL FREE OF ROCKS, CLUMPS OR DEBRIS LARGER THAN 6" IN GREATEST DIMENSION. COMPACT TO 90% STANDARD PROCTOR DENSITY. UNDER STRUCTURES, ROADWAYS AND PAVEMENT, COMPACT TO 95% STANDARD PROCTOR DENSITY.

SIZE OF PIPE IN INCHES DIA.	KIND OF PIPE	EXTERNAL DIA. (Bc) IN INCHES	TRENCH WIDTH (Bd) IN INCHES
6"	PVC SEWER PIPE	6.28	24
8"	PVC SEWER PIPE	8.16	24
10"	PVC SEWER PIPE	10.2	26

CLASS B–2 EMBEDMENT

PVC SEWER PIPE

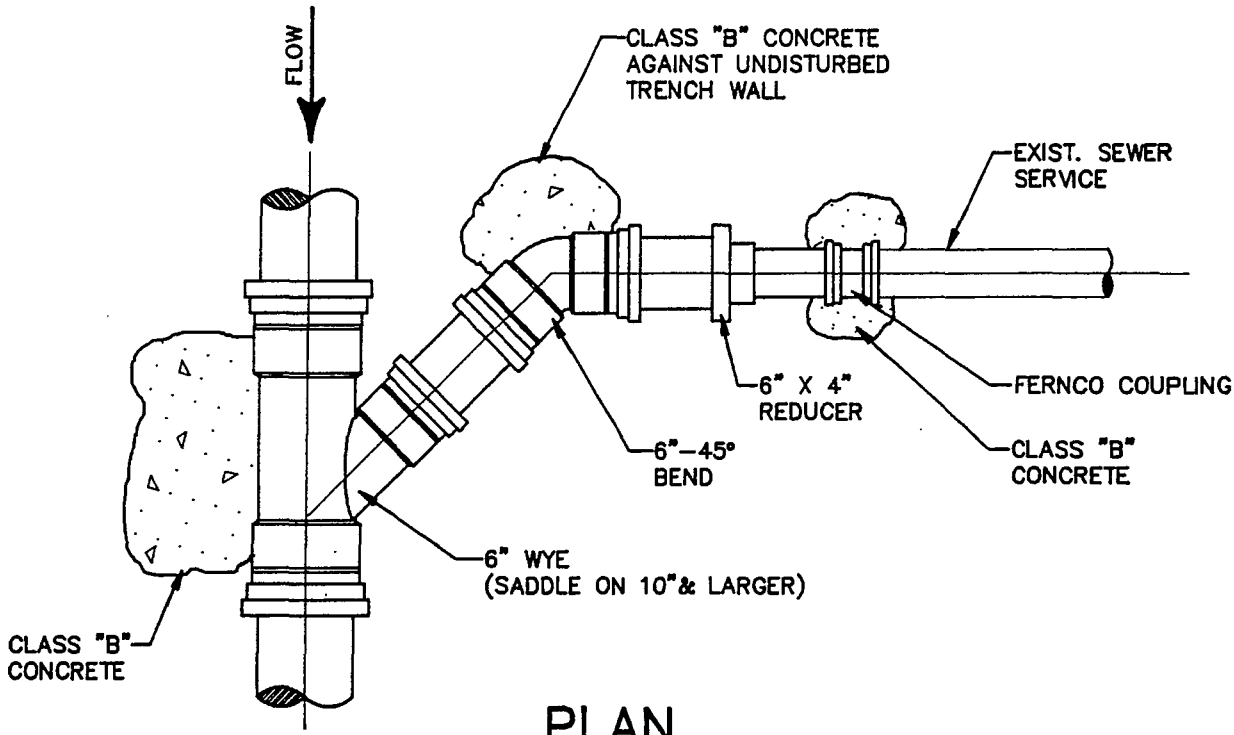


SIZE OF PIPE IN INCHES DIA.	KIND OF PIPE	EXTERNAL DIA. (Bc) IN INCHES	TRENCH WIDTH (Bd) IN INCHES
6"	PVC SEWER PIPE	6.28	24
8"	PVC SEWER PIPE	8.16	24
10"	PVC SEWER PIPE	10.2	26

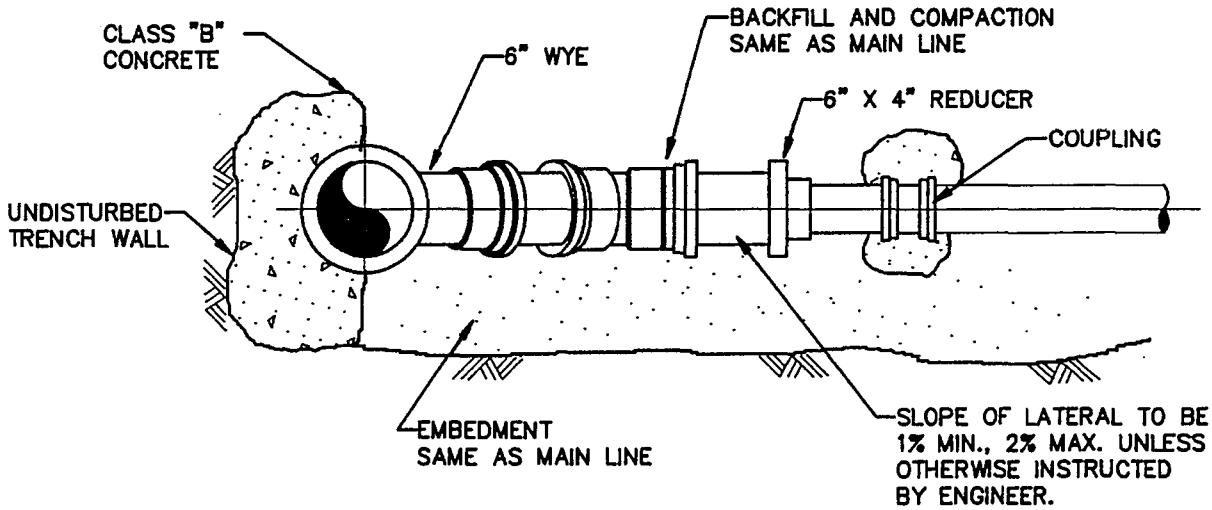
NOTE:
THE 4" MIN. SHALL APPLY
TO THICKNESS AROUND
PIPE AND OVER TOPS OF BELLS.

EMBEDMENT CLASS "G"

CONCRETE ENCASEMENT



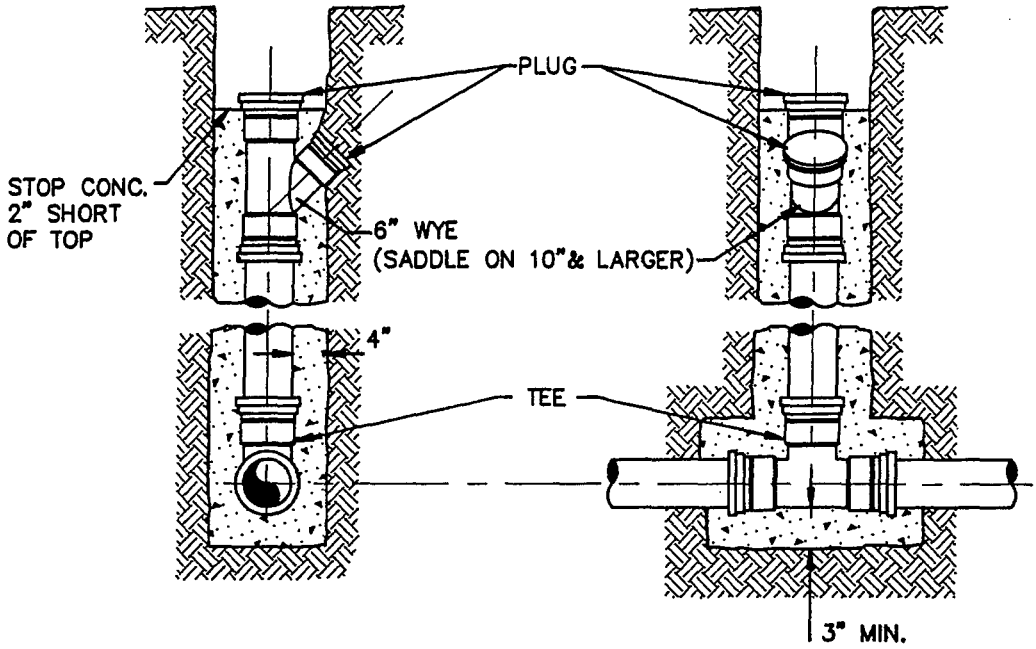
PLAN



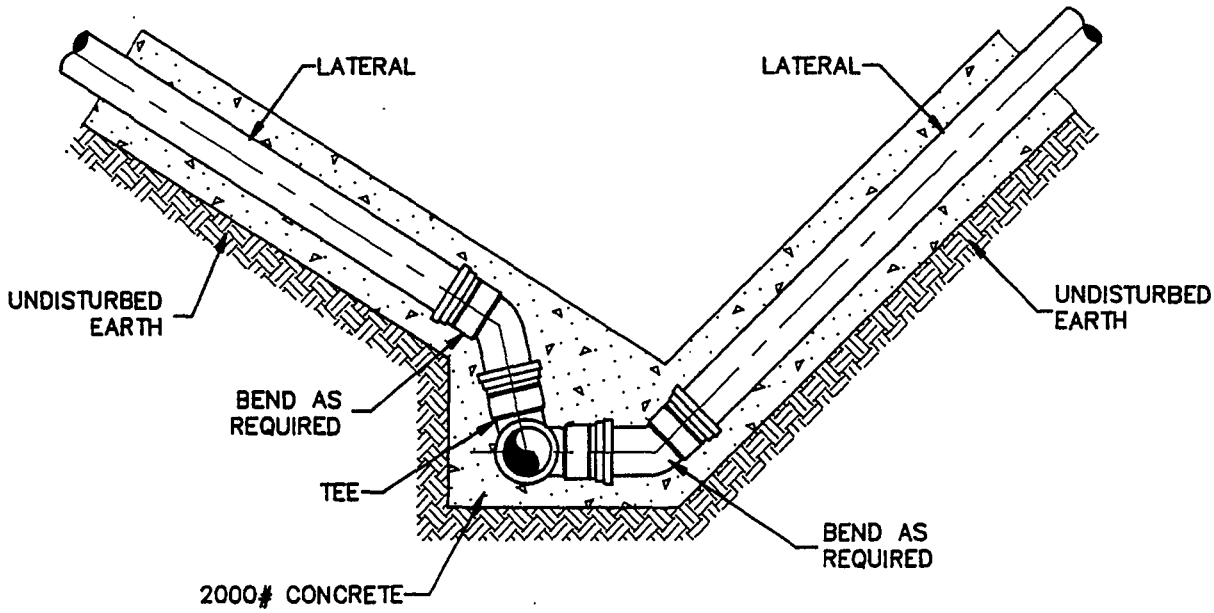
SECTION

DETAIL SANITARY SEWER SERVICE

NO SCALE

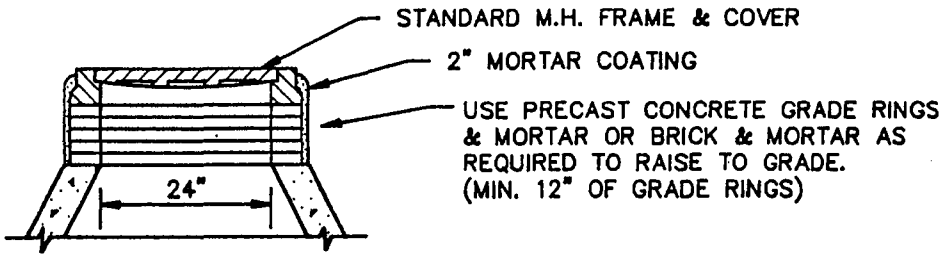


DEEP CUT CONNECTION USING P.V.C. PIPE

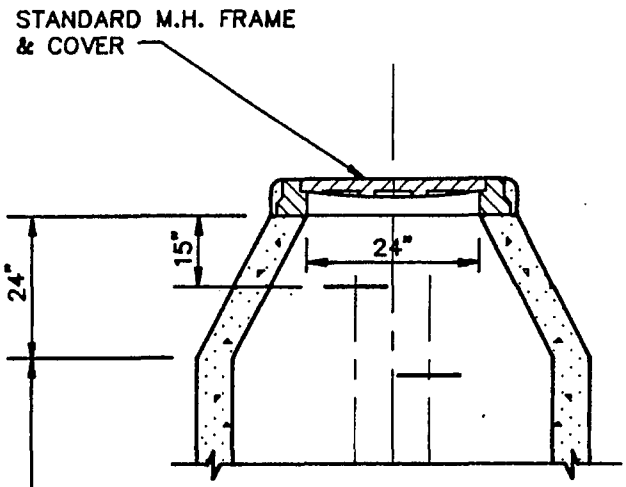


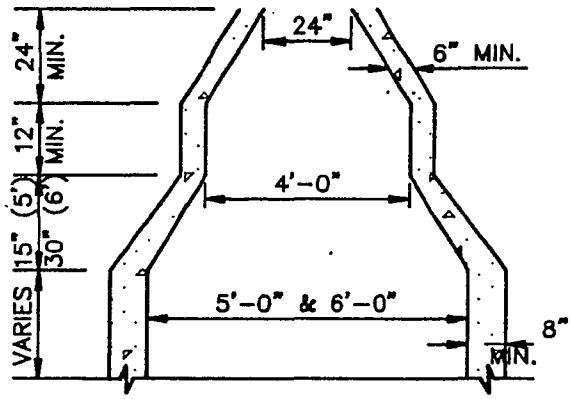
LATERAL CONNECTION FOR DITCHES WITH SLOPING SIDES USING PVC PIPE

ADJUSTABLE FRAME

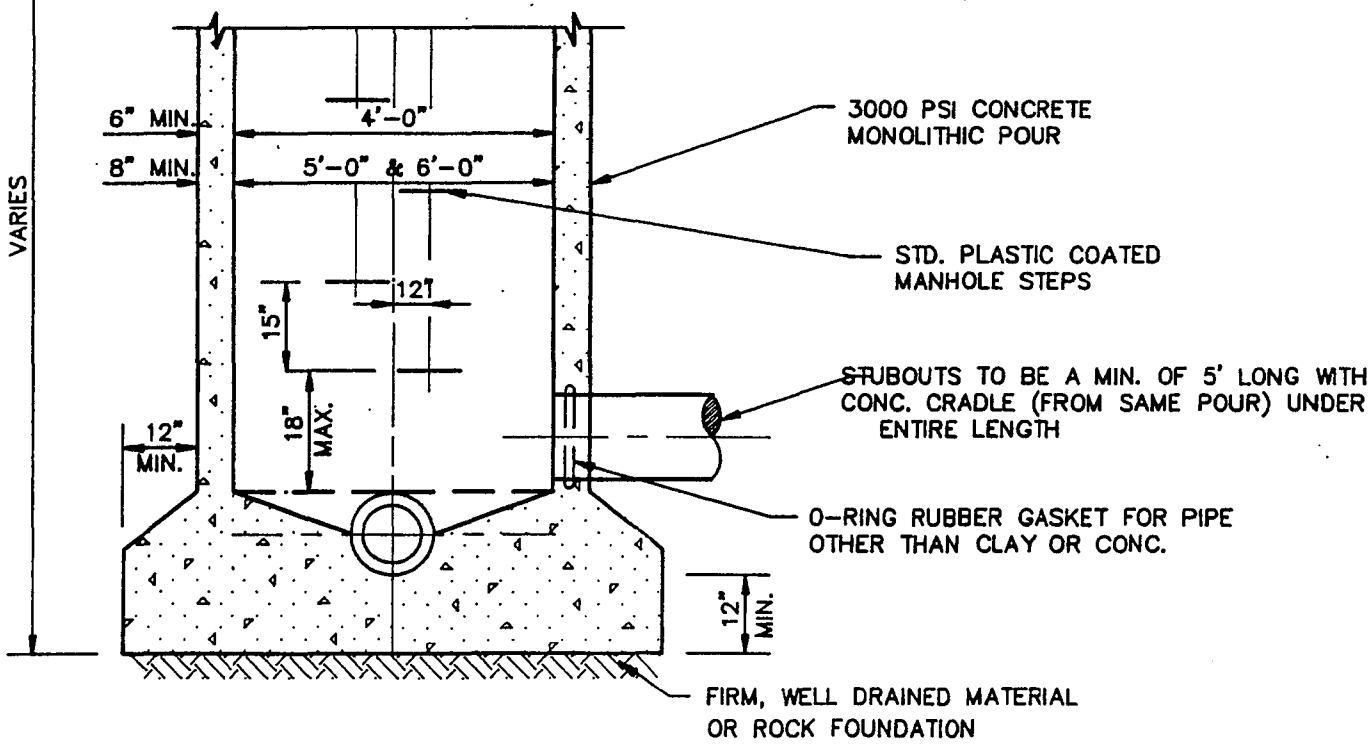


REQ'D. IN STREETS

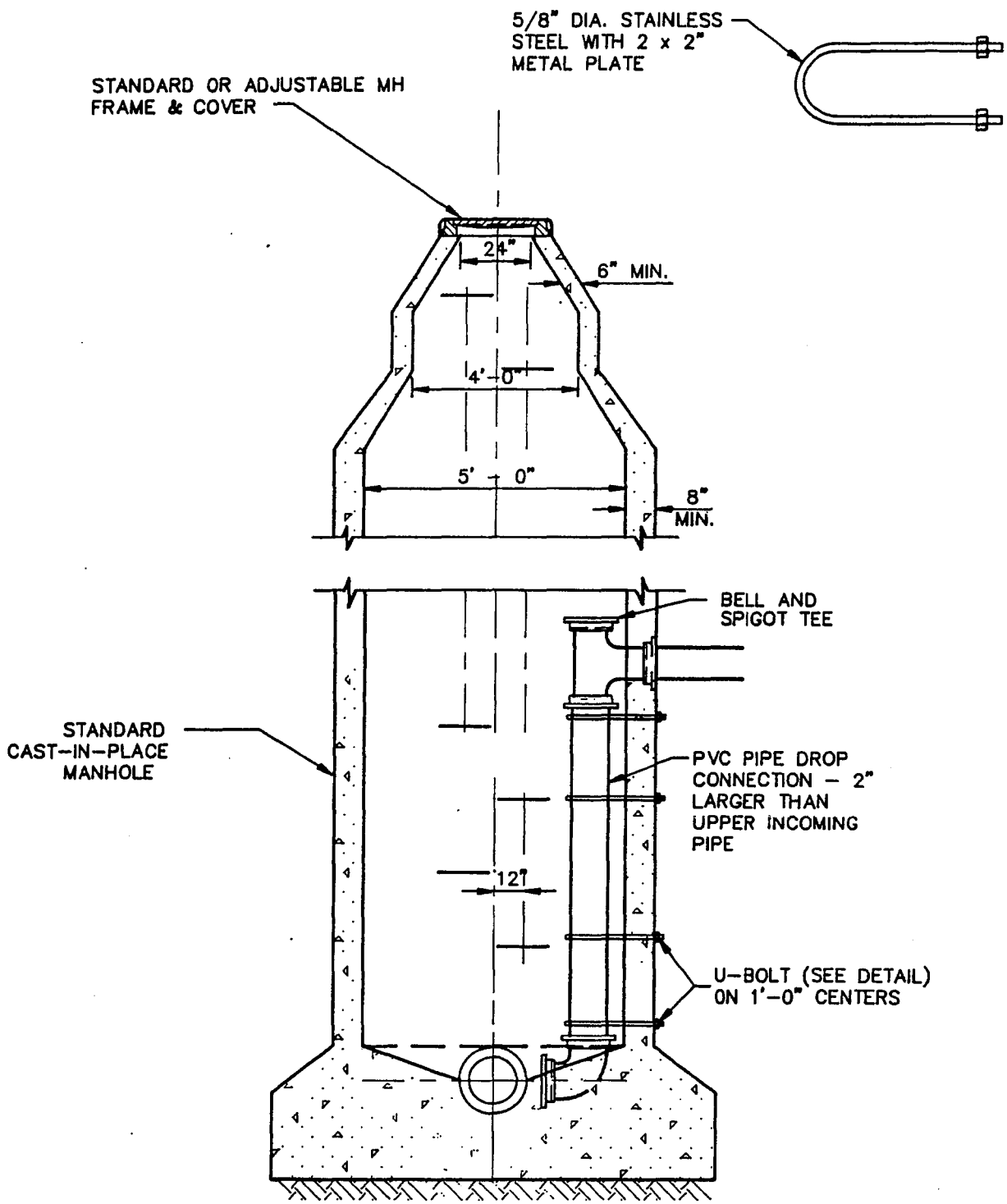




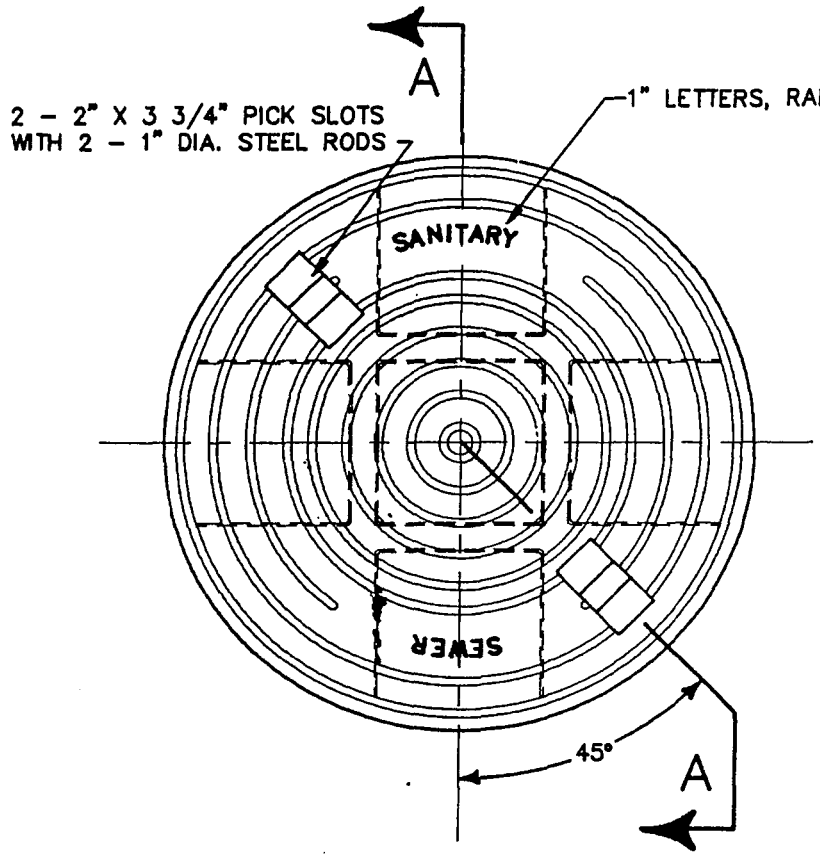
TRANSITION DETAIL FOR 5' & 6' M.H.'S



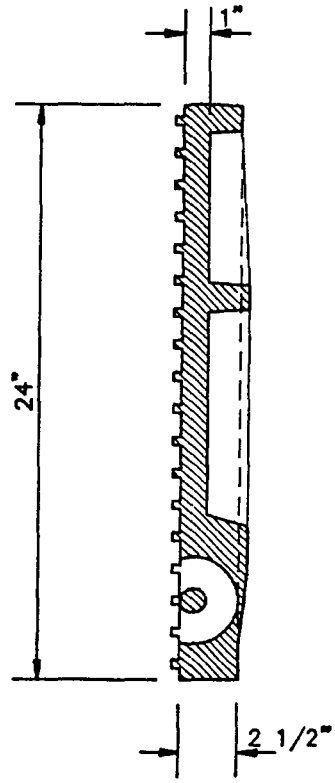
STANDARD CAST-IN-PLACE MANHOLE



STANDARD 5' DROP MANHOLE CONNECTION

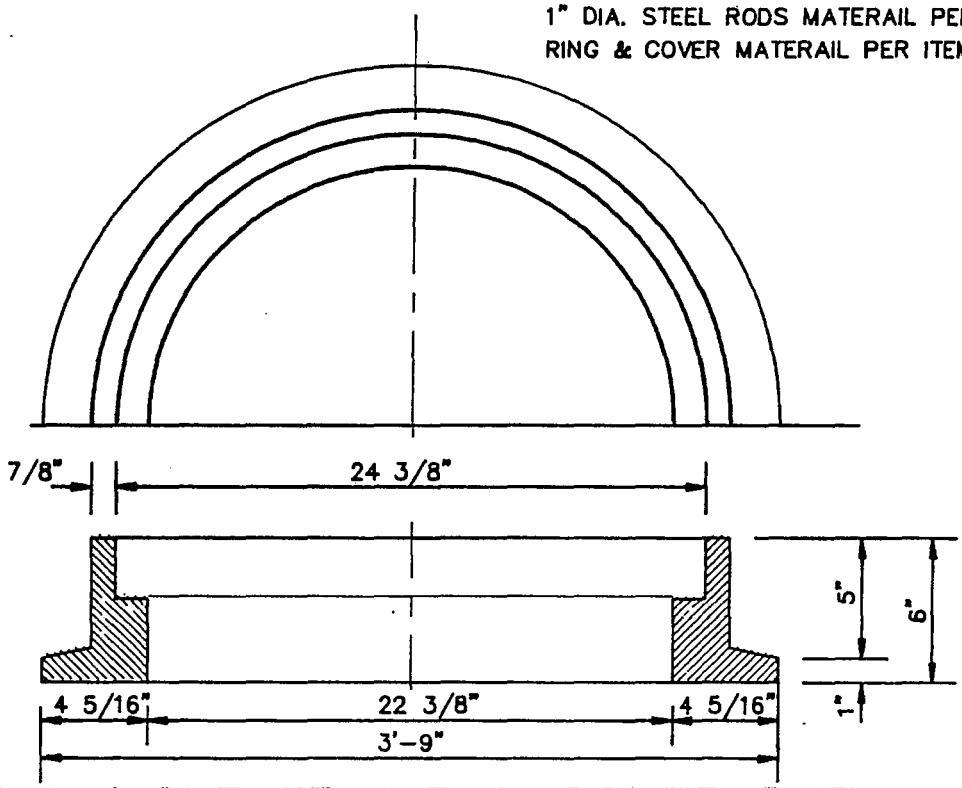


PLAN OF COVER

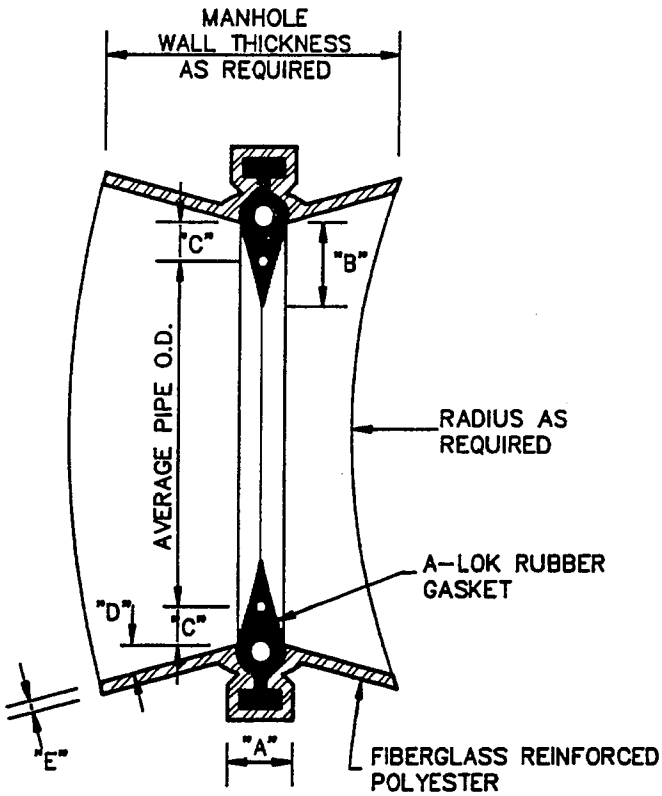


A–A

1" DIA. STEEL RODS MATERAIL PER ITEM 2.11.5 (b) (2)
RING & COVER MATERAIL PER ITEM 2.11.5 (c)



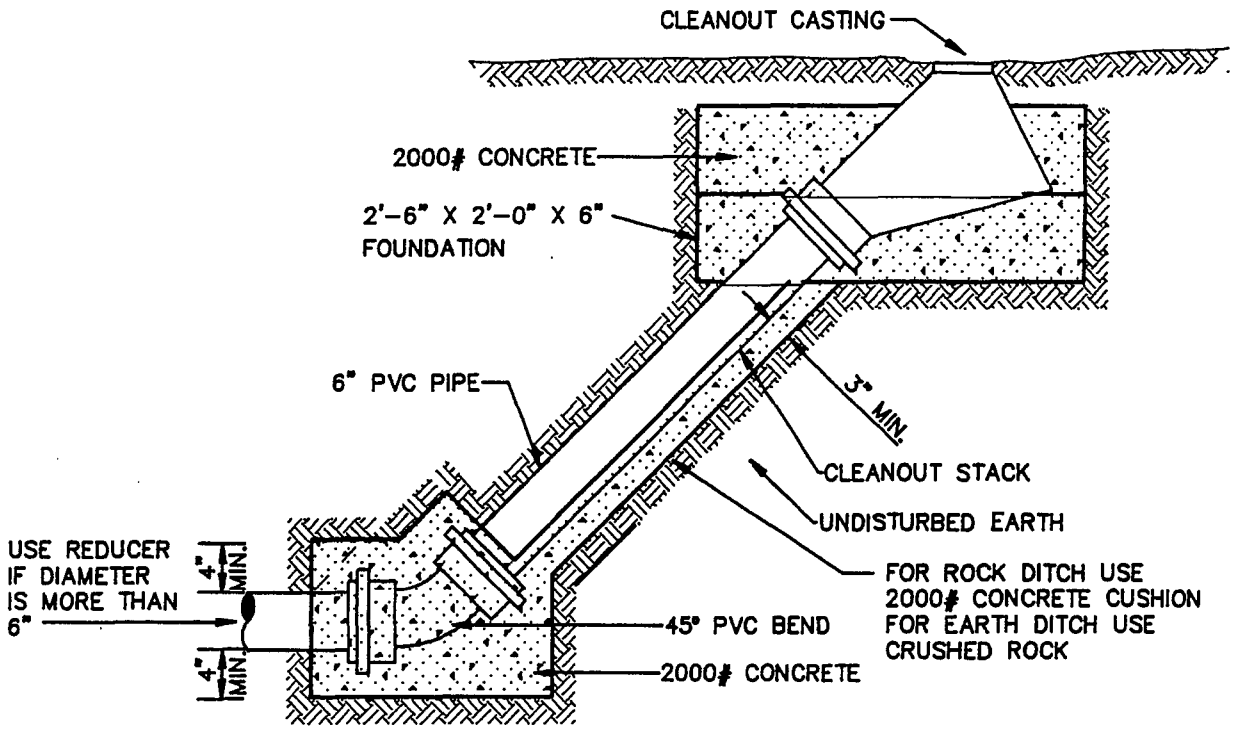
MANHOLE FRAME & COVER DETAIL



DIMENSIONS FOR MANHOLE PIPE CONNECTOR A.S.T.M. 0-923

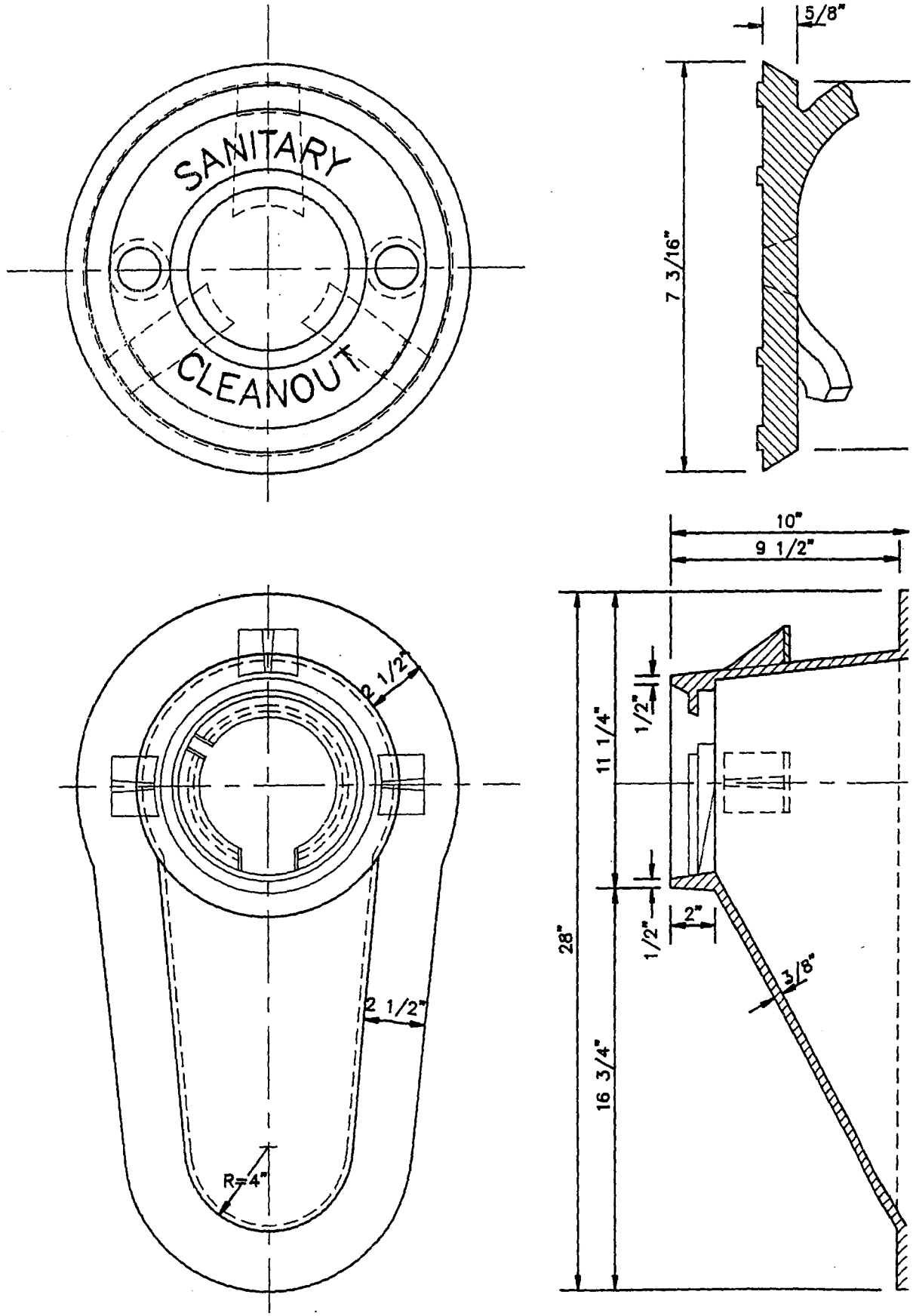
PIPE SIZE	A	B	C	D	E
4"-6"	1 1/2"	7/8"	3/8"	10°	0.10±
8"-24"	2 1/8"	1 3/8"	5/8"	10°	0.10±
24"-60"	2 3/8"	1 3/4"	3/4"	10°	0.25±

MANHOLE PIPE CONNECTOR
(FOR ALL CAST-IN-PLACE MANHOLES)



DETAIL
SANITARY SEWER CLEANOUT

NO SCALE



CLEANOUT FRAME AND COVER DETAIL

NO SCALE

Exhibit "B"
Engineering Standards of Design and Standard Details
1991 Standards

This replaces Section 3 Storm Drainage System in the Heath 1991 Engineering Standards of Design and Standard Details (adopted 9-28-2021)

Section 3 Storm Drainage Systems

The City of Heath has adopted the North Central Texas Council of Governments Integrated Stormwater Management (iSWM) Technical Manual, latest edition, to be used for design and construction of drainage facilities. Manuals adopted include: Planning, Water Quality, Hydrology, Hydraulics, Site Development Controls, Construction Controls, Construction Control Standard Details, Landscape, and Revisions to Manuals. Questions related to the use of the design methods to be used shall be determined by the City Engineer. These manuals are available from NCTOG at http://iswm.nctcog.org/.

Drainage facilities shall be designed and constructed at such locations and of such size and dimensions to adequately serve the development and the contributing drainage area above the development. The developer shall provide all the necessary easements and rights-of-way required for drainage structures including detention ponds, storm drains and open channels, lined or unlined. Easement widths for storm drain pipelines shall not be less than fifteen (15') feet, and easement widths for open channels shall be at least twenty-five (25') feet wider than the top width of the channel. In all cases, easements shall be of an adequate size to allow proper maintenance, including unobstructed access to the easements. Detention facilities will be maintained by the HOA or developer in accordance with the development agreement for the project.

The design, size, type and location of all storm drainage facilities shall be subject to the approval of the City Engineer. The requirements set forth herein are considered minimum requirements. The developer and his engineer shall bear the total responsibility for the adequacy of design. The approval of the facilities by the City Engineer in no way relieves the developer of this responsibility.

The developer shall be responsible for the necessary facilities to provide drainage patterns and drainage controls such that properties within the drainage area, whether upstream or downstream of the development, are not adversely affected by storm drainage from facilities on the development.

The design flows for the drainage system shall be calculated in accordance with the iSWM methods referenced in this document. Curbs, inlets, manholes, etc., shall be designed and constructed in accordance with the Standard Details. Materials and construction procedures shall conform with the requirements of the Standard Specifications for Construction.

Detention will be required to prevent adverse impact up and downstream of new projects. The methods outlined in iSWM will be used to evaluate the impact and necessary detention. In addition, to demonstrate no adverse impact, iSWM methods will be followed for those determinations.

The evaluation of adverse impacts to be detained will include a comparison of existing conditions to developed conditions for increased frequency of smaller undetained storms as well as larger storm events. At a minimum, the impact of the development to pre-existing conditions on the 10 and 100-year storm events will be detained where adverse impacts are identified. In addition, the erosive impacts of the increased frequency of the 1, 2, and 5-year storms shall be evaluated for impacts to the receiving stream (increased frequency, erosive velocities, and water quality) and those storms will be detained where adverse impacts are identified.

Storm drainage released from the site will be discharged to a natural water course of an adequate size to control the peak runoff expected after development.

CITY OF HEATH

GENERAL NOTES (Adopted 9-28-2021)

GENERAL

1. All materials for construction shall be manufactured in the United States in accordance with the City of Heath purchasing policy.

2. All construction shall be in accordance with the North Central Texas Council of Governments Standard Specifications for Public Works Construction". (NCTCOG Standards) latest Edition unless modified by city of Heath Engineering Design Standards, notes, and details. Where the City has modified the NCTCOG Standards the City modifications shall be used.

3. Before beginning construction, the contractor shall prepare a construction sequence schedule. The construction sequence schedule shall be such that there is the minimum interference with traffic along or adjacent to the project.

4. Construction may not begin earlier than 7:00 A.M. on weekdays nor continued after dark or 8:00 PM, whichever occurs first, without permission from the City of Heath. Construction on Saturday may not begin before 8:00 A.M. nor continue after dark or 8:00 PM, whichever occurs first and work on Sunday is prohibited without special permission.

5. The contractor is responsible for verifying the location of all underground utilities and structures and protecting them from damage during construction.

6. Work may not be backfilled or covered until it has been inspected by the City.

7. Material testing shall be performed by an independent testing laboratory and paid for by the Contractor or Owner.

8. All excavation on the project is unclassified.

9. Access to driveways, garbage collection, and mail service shall be maintained at all times during the construction project.

10. Temporary erosion control shall be used to minimize the spread of silt and mud from the project on to existing streets, alleys, drainage ways and public and private property. Temporary erosion controls may include straw bales, berms, dikes, swales, strips of undisturbed vegetation, check dams and other methods as required by the City of Heath.

11. Finished Slopes on public rights-of-way and easements shall not be steeper than 4:1. All slopes steeper than 6:1 shall be hydro mulched, watered and maintained by the contractor until grass covers all parts of the slope with at least 70% coverage and a height of 2 inches.

12. The contractor shall maintain two-way traffic at all times along the project.

13. Remove, salvage and replace all street and traffic control signs, which may be damaged by the construction of the project.

14. All trenching and excavation shall be performed in accordance with OSHA standards.

15. All backfill and reconditioned pavement subgrade will be compacted to a moisture content of +2% or higher of optimum moisture (ASTM D-698) where ASTM D-698 is the applicable method. TEX 113-E and 114-E may be used for granular materials.

16. A two-year (from City acceptance) 110% maintenance bond shall be provided to the City to guarantee the performance and repair of all public facilities upon completion and acceptance of the project by the City.

17. The minimum geotechnical material testing requirements will be those identified in NCTCOG with the exception of the following: for utility and other trenches (public and private) under pavement, backfill shall be tested at 100-foot spacing in each lift. For manholes and junction boxes the spiral testing method shall be utilized; however, two tests per lift, 180 degrees apart will be taken. Trenches outside the pavement can be tested at the recommended frequency in NCTCOG.

18. No granular fill to be placed above rock, stone or crushed concrete in trenches.

GRADING

1. Top soil shall not be removed from residential lots or used as spoil, but shall be stripped and redistributed so as to provide at least six (6) inches of cover on the lots, parkways, and medians. Permanent erosion control measures shall be provided throughout the development prior to final acceptance of the improvements.

2. Temporary erosion control shall be used to minimize the spread of silt and mud from the project on to existing streets, alleys, drainage ways and public and private property. Temporary erosion controls may include silt fences, straw bales, berms, dikes, swales, strips of undisturbed vegetation, check dams and other methods as required by the City Engineer and as specified in the North Central Texas Council of Governments Construction BMP Manual.

3. All street rights-of-way, regardless of slope, all finished grade slopes that are steeper than 6H:1V, and the flow lines of all drainage ditches and swales shall be seeded and completely covered with erosion control matting as specified in the North Central Texas Council of Governments Construction BMP Manual.

4. Grass shall be established on the slopes of all drainage channels. Grass shall meet the requirements of the Standard Specifications of the NCTCOG.

5. Finished slopes on public rights-of-way and easements shall not be steeper than 4H:1V. All slopes steeper than 6H:1V shall be hydro mulched, **watered and maintained by the Contractor until grass covers all parts of the slope**. Grass must be lush, green, vigorous and growing. No bare spots over one square foot will be allowed. All ruts from erosion must be filled and grassed.

6. **All permeable surfaces within the development shall be graded to a smooth and uniform appearance that can be easily mowed with a small residential riding lawn mower**.

7. If franchise utilities are installed after planting grass, any areas disturbed by the installation of the franchise utilities shall be repaired and grass re-established before acceptance of the improvements.

8. Where retaining walls are required as part of the lot grading plan, the walls are to be constructed at the same time as the public improvements. The Final Plat shall contain wall maintenance easements and indicate the ownership and maintenance responsibility for the walls.

9. No lot-to-lot drainage allowed unless in limited cases where no adjacent owners are negatively impacted and the drainage is contained in private drainage easement maintained by others than the City of Heath. Allowed only on a case-by-case basis per the Subdivision Ordinance.

PAVING

1. All embankment shall be compacted to 95% Standard Proctor Density at a moisture content of +2% or higher of optimum moisture content.

2. Unless excessive sulfate content is found during subgrade testing, all streets and alleys shall be placed on lime stabilized subgrade with a lime content of not less than 6% and a PI<15. For small projects where the cost of lime stabilization is prohibitive, two additional inches of concrete may be substituted for the lime treated subgrade.

3. The minimum 28-day compressive strength of concrete street paving shall not be less than 3,600 PSI and shall be air entrained. Water may not be applied to the surface of concrete paving to improve workability.

4. Concrete used for pavement shall be NCTCOG Class C, six sack mix with a minimum 28-day strength of 3,600 psi.

5. Fly ash will not be allowed in place of cement.

6. All curb and gutter shall be integral with the pavement.

7. All street pavement must be cross-sloped or constructed on a parabolic crown section.

8. Streets and alleys shall be constructed with sidewalk ramps at all intersections.

9. All reinforcing rebar to be minimum No. 4 on 18-inch spacing each way.

DRAINAGE

1. Storm sewer pipe shall be reinforced concrete, Class III unless otherwise noted.

2. Storm sewer embedment to be: Class B+.

3. All structural concrete shall be Class “C” (3,600 PSI compressive strength at 28 days), air entrained.

4. No granular fill to be placed above rock, stone or crushed concrete in trenches.

5. The contractor shall install plugs in storm sewer lines or otherwise prevent mud from entering the storm sewer system during construction.

6. Storm sewer and laterals shall be videotaped before acceptance and again at least six months prior to expiration of the two-year maintenance bond. Defects shall be repaired by the Contractor.

WATER AND SANITARY SEWER

1. Water mains shall be AWWA C-900 DR-18 PVC Class 235 unless otherwise noted. Minimum cover for waterlines is 48” or as required to clear existing utilities, whichever is greater.

2. Marking tape shall be installed over PVC water lines.

3. Fittings for PVC water lines shall be full body ductile iron and be encased in a polyethylene sheath.

4. Valves shall be resilient seat gate valves.

5. All direct burial valves shall be provided with cast iron valve boxes with PVC stacks. Valve stacks shall be vertical and concentric with the valve stem. Stainless steel valve extensions are required on all valves where the operating nut is greater than 4 feet below finished grade.

6. Fire hydrants shall be field painted per City of Heath specifications and the largest outlet shall be fitted with a STORZ connection.

7. All exposed bolting on any buried equipment or material shall be stainless steel. Included are:
   a. Bonnet and stuffing box bolts on valves
   b. Shoe bolts on Fire Hydrants
   c. Flange bolts

   “Cor-ten” mechanical joint “T” bolts are acceptable for direct burial service.

8. Meter boxes shall be as approved by the City of Heath. Contact the Director of Public Works for specifications.

9. Water service connections to be seamless 200 psi blue colored polyethylene ASTM D2737 SDR9, CTS water service pipe, NSF61 approved.

10. Sanitary sewer mains shall be a minimum of SDR 26 PVC.

11. A geotextile fabric shall be placed below all new manholes.

12. All sanitary sewer service connections between the main and ROW line to be six (6) inches in diameter.

13. All sanitary sewer mains and service connections to be videotaped prior to acceptance and again at least six months prior to expiration of the maintenance bond. Defects shall be repaired by the Contractor.

14. The Contractor shall install and maintain water tight plugs in all connections to the City's sanitary sewer system until the project is accepted by the City.

15. All sanitary sewer lines and manholes shall be leak tested before the project is accepted. Deflection testing of PVC sewer lines is required.

16. All sanitary sewer manholes shall be made with ConShield or approved equal additive to concrete.

17. All sanitary sewer manholes shall have joints protected with Gator Wrap or approved equal.

18. All fittings for pressure pipe to be full body.

19. No meter boxes, cleanouts, or service connections will be allowed in sidewalks or driveways.

20. Mega-lugs required on all MJ fittings.

21. The following types of backfill are required at a minimum:

    a. Water Line and Sewer Force Main: B-4
    b. Sanitary Sewer: Class B+ modified to have fine gradation crushed stone 6" above the pipe.

    Use of other materials will be considered upon proper engineering justification.

22. Design must meet all applicable requirements of TCEQ Chapters 290 and 217.

23. No granular fill to be placed above rock, stone or crushed concrete in trenches.

CONSTRUCTION ENGINEERING

1. The Design Engineer will be responsible for previewing and approving all submittals for Materials used for public improvements on the project. After review and approval, the Design Engineer will forward one copy to the City of Engineer for concurrence. After the material submittals are approved, the Developer can request a preconstruction conference. At a minimum, the Design Engineer, Developer Representative, member of each construction discipline, and a representative of the Geotechnical Materials Testing Laboratory shall attend the preconstruction conference. Copies of the approved plans, approved material submittals, and permits such as NOI will be distributed at the meeting.

2. The Contractor and Design Engineer will be responsible for reviewing all Geotechnical test results to ensure the proper number of passing tests are taken.

3. Upon completion of the project, prior to acceptance of the public improvements, the Design Engineer shall prepare and submit the final project report including record drawings, project material submittals, geotechnical test results, maintenance bonds, documentation for the maintenance bond amount, records of video results of sanitary sewer and storm sewer, and a letter from the design engineer stating that he has reviewed the testing information and material submittals and the results demonstrate the project meets the minimum city of Heath requirements.