

DESIGN STANDARDS MANUAL



Effective
November 6,
2008



RESOLUTION R-1136-08

WHEREAS, the City Council of the City of Burleson has, on October 23, 2008, adopted Subdivision and Development Ordinance B-783-08, for the purpose of establishing platting and development standards appropriate to meet the changing conditions in the community, incorporating revisions to state statutes, and providing for orderly development of the City and its extraterritorial jurisdiction in accordance with the City's Comprehensive Plan; and

WHEREAS, the City Council has found that in order for Ordinance B-783-08 to achieve its intended purpose, appropriate standards for the construction of streets, utilities, drainage facilities and other public improvements must be provided; and

WHEREAS, the Public Works Department has developed a City of Burleson Design Standards Manual establishing appropriate standards for the construction of the aforementioned public improvements.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF BURLESON, TEXAS:

Section 1: That the Design Standards Manual establishes appropriate minimum standards for the design and construction of public improvements within the city limits and in the extraterritorial jurisdiction of the City of Burleson; and

Section 2: That the Design Standards Manual shall be considered to be an appendix to Ordinance B-783-08; and

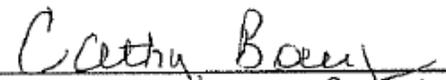
Section 3: That the design and construction standards established by the Design Standards Manual shall be binding minimum standards applied to all development governed by provisions of Ordinance B-783-08; and

Section 4: That the design and construction standards established by the Design Standards Manual shall become applicable on November 6, 2008, the effective date that has been established for Ordinance B-783-08.

RESOLVED AND ENTERED on this 23rd day of October, 2008.


MAYOR

ATTEST:


CITY SECRETARY - Deputy

CITY OF BURLESON DESIGN STANDARDS MANUAL

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION

Section 1.1 Overview	1-1
Section 1.2 Chapter Description.....	1-1

CHAPTER 2 DEFINITIONS & ABBREVIATIONS

Section 2.1 Definitions	2-1
Section 2.2 Abbreviations	2-4

CHAPTER 3 MISCELLANEOUS

Section 3.1 Easements	3-1
A. Public vs. Private	3-1
B. Acquisition	3-1
C. Filing.....	3-1
Section 3.2 Abandonment of Easements or Right-of-Way.....	3-2
Section 3.3 Easement and Right-of-Way Use Agreements.....	3-3
Section 3.4 Monitoring Wells	3-3
Section 3.5 Submittal to Other Agencies.....	3-4
A. Texas Department of Transportation.....	3-4
B. Utility Companies.....	3-5
C. U.S. Army Corps of Engineers	3-5
D. FEMA.....	3-5
E. Texas Department of Licensing and Regulation.....	3-5
Section 3.6 Floodplain Development Permit	3-5

Section 3.7 Traffic Study	3-6
A. Purpose	3-6
B. Responsibility	3-6
C. Determination of Need.....	3-6
D. Study Requirements	3-8
Section 3.8 Franchise Utilities	3-15
Section 3.9 Construction Requirements	3-17
A. Public Infrastructure.....	3-17
B. Release for Early Grading	3-17
C. Standard Specifications.....	3-18
D. Typical Details	3-18
Section 3.10 Contractor Requirements	3-18
A. Contract Requirements.....	3-18
B. Inspection Requirements.....	3-19
C. Permits	3-19
D. Traffic Control Plan.....	3-19
E. Trench Safety Requirements.....	3-19
Section 3.11 Items Available on Website	3-20

CHAPTER 4 RESIDENTIAL SUBDIVISIONS

Section 4.1 Introduction	4-1
Section 4.2 Construction Plan Submittal	4-1
Section 4.3 Environmental Management	4-2
A. Storm Water Management Site Plan (SWMSP) – Permanent Controls.....	4-2
B. Storm Water Pollution Prevention Plan (SWPPP)– Temporary Controls during Construction.....	4-5
Section 4.4 Water and Sanitary Sewer	4-11
A. Horizontal and Vertical Control.....	4-11
B. Design Requirements - Water	4-11
C. Design Requirements – Sanitary Sewer.....	4-15
D. Utility Easements (Water and Sanitary Sewer)	4-21
Section 4.5 Streets	4-22
A. Master Thoroughfare Plan (MTP).....	4-22
B. Street Lighting Standards	4-22
C. Gated Entry	4-22
D. Intersection Geometric Design	4-23
E. Sight Distance Criteria.....	4-23
F. Residential Driveway Design Criteria	4-23
G. Right-of-Way.....	4-25

H.	Horizontal and Vertical Control.....	4-26
I.	Street Design Requirements	4-26
J.	Private Facilities	4-32
Section 4.6	Drainage.....	4-33
A.	Peak Runoff.....	4-33
B.	Roughness Coefficients and Permissible Velocities.....	4-35
C.	Street Capacity Design.....	4-35
D.	Closed System Design	4-36
E.	Open System Design.....	4-37
F.	FEMA Designated Floodplain.....	4-39
G.	Flood Study Submittal Requirements	4-40
H.	Drainage Easements	4-43
I.	Bridges and Culverts	4-43
J.	Storage (Detention/Retention).....	4-43
K.	Positive Overflow.....	4-44
L.	Flumes.....	4-44
M.	Concentrated Runoff from Development.....	4-44
N.	Site Grading.....	4-45
O.	Minimum Finish Floor Elevations.....	4-45
P.	Miscellaneous.....	4-46
Section 4.7	Fire Access Requirements.....	4-47
A.	Construction Requirements	4-47
B.	Hose Lay Distance	4-47
C.	Unusual Conditions	4-47
D.	Surface	4-47
E.	Vertical Clearance	4-47
F.	Width	4-47
G.	Turning Radius	4-47
H.	Grade.....	4-48
I.	Bridges	4-48
J.	Gates.....	4-48
K.	Turn-Around Areas	4-48
L.	Obstruction	4-48
M.	Striping	4-49
N.	Signs.....	4-49
O.	Maintenance	4-49
Section 4.8	Construction Requirements.....	4-50
A.	Fill.....	4-50
B.	Construction Responsibility	4-50
C.	As-Built Plans	4-50
D.	Private Facilities	4-51

CHAPTER 5 COMMERCIAL SITES

Section 5.1 Introduction	5-1
Section 5.2 Plan Submittal	5-1
A. Development Assistance Committee Submittal.....	5-1
B. Private Improvement Plan Submittal	5-1
C. Public Improvement Plan Requirements	5-2
D. Building Permit Plan Requirements.....	5-2
Section 5.3 Environmental Management	5-2
A. Storm Water Management Site Plan (SWMSP) – Permanent Controls.....	5-2
B. Storm Water Permit Required for Industrial Operations	5-5
C. Storm Water Pollution Prevention Plan (SWPPP) – Temporary Controls during Construction.....	5-5
Section 5.4 Water and Sanitary Sewer	5-11
A. Horizontal and Vertical Control	5-11
B. Design Plan Information	5-11
C. Design Requirements - Water	5-11
D. Design Requirements – Sanitary Sewer.....	5-14
E. Utility Easements (Water and Sanitary Sewer)	5-19
F. Certificates of Occupancy.....	5-20
Section 5.5 Streets.....	5-21
A. Master Thoroughfare Plan (MTP).....	5-21
B. Street Lighting Standards	5-21
C. Intersection Geometric Design	5-21
D. Sight Distance Criteria.....	5-21
E. Parking Lot/Site Layout Design Criteria.....	5-22
F. Commercial Driveway Design Criteria.....	5-22
G. Right-of-Way.....	5-27
H. Horizontal and Vertical Control.....	5-27
I. Paving Plan Design Requirements.....	5-28
J. Private Facilities	5-32
Section 5.6 Drainage.....	5-32
A. Peak Runoff.....	5-32
B. Roughness Coefficients and Permissible Velocities.....	5-35
C. Street Capacity Design.....	5-36
D. Closed System Design	5-36
E. Open System Design.....	5-37
F. FEMA Designated Floodplain.....	5-39
G. Flood Study Submittal Requirements	5-40
H. Drainage Easements	5-43
I. Storage (Detention/Retention).....	5-43
J. Positive Overflow.....	5-44
K. Flumes.....	5-44
L. Concentrated Runoff from Development.....	5-44

M.	Site Grading.....	5-44
N.	Minimum Finish Floor Elevation	5-45
O.	Temporary Tie-ins to County-type Roads.....	5-45
Section 5.7 Fire Safety.....		5-46
A.	Fire Protection	5-46
B.	Fire Lane Requirements	5-47
Section 5.8 Construction Requirements.....		5-51
A.	Construction Responsibility	5-51
B.	As-Built Letter/Plans	5-51

APPENDICES

A	SWMSP Checklist
B	SWPPP Checklist (small sites)
C	SWPPP Checklist (large sites)
D	Master Thoroughfare Plan Map
E	Gated Entry Layouts
F	Intersection Geometric Layouts
G	Sight Distance Criteria
H	TP-40
I	Flow Velocity
J	HUD Figures
K	Parking Lot/Site Layout Design Criteria
L	Easement/Right-of-Way Use Agreement
M	Easement/Right-of-Way Abandonment Application
N	Standard Construction Notes
O	Letter of Permission
P	TXDOT Utility Permit Questionnaire
Q	Floodplain Development Permit
R	Standard Details

THIS PAGE INTENTIONALLY LEFT BLANK.

CHAPTER 1 INTRODUCTION

1.1 OVERVIEW

This Design Standards Manual contains the various design and construction criteria that are minimum City of Burleson requirements for the design and construction of community facilities in both the City and the City's extraterritorial jurisdiction (ETJ). The manual is primarily intended for use by developers and engineers as a reference for City requirements.

The developer and the developer's engineer shall be responsible for the applicability of the information contained in this manual relative to the particular development. The developer and the developer's engineer shall also be responsible for the accuracy of the information furnished in the design of all facilities as it pertains to both the development and other affected properties. Concurrence by the City in the design shall not be construed to relieve the owner or the owner's engineer of any responsibility.

In the event that specific circumstances dictate additional requirements, it shall be the responsibility of the developer's engineer to provide the necessary details for construction to be approved by the City's reviewing engineer.

1.2 CHAPTER DESCRIPTION

The following is a brief description of the contents of each chapter:

Chapter 2 - Definitions and Abbreviations

This chapter contains definitions and abbreviations used in the manual.

Chapter 3 - Miscellaneous

This chapter contains miscellaneous sections that may be applicable to various types of development or projects.

Chapter 4 - Residential Subdivisions

This chapter is intended for use with developments with multiple lots that require construction of public improvements prior to obtaining building permits for the individual lots. The information included in this chapter is applicable to the plan preparation for the public improvements required for subdivisions.

Chapter 5 - Commercial Sites

This chapter is intended for use with development of individual lots that are primarily commercial in nature and consists of both private and/or public improvements. These types of developments will be submitted when requesting a building permit. The information included in this chapter is applicable to the plan preparation for public improvements required for commercial sites.

Appendices

This section provides information supplemental to the body of the manual, such as checklists, diagrams, maps and charts.

CHAPTER 2

DEFINITIONS AND ABBREVIATIONS

SECTION 2.1 DEFINITIONS

For the purposes of this manual, certain words, terms and abbreviations shall be defined as follows:

Acceptance.

Initial: The acceptance of the public improvements for a development subject to the maintenance bond period during which the City is not responsible for maintenance. For private improvements, initial acceptance shall mean that the infrastructure is complete and a letter has been received from the engineer/architect stating that the improvements were constructed in accordance with the plan or as-built plans have been forwarded to the City if the project was not constructed to original plans.

Final: The acceptance of the public improvements for maintenance by the City upon expiration of the maintenance bond and repair of any public facilities as required by the City.

Arterial. Any existing or future roadway classified as a principal or minor arterial on the Roadway Classification Map contained in the Burleson Master Thoroughfare Plan. For purposes of this manual, a freeway frontage road shall be classified as an arterial roadway.

Auxiliary Lane. A separate right turn lane, left turn lane, deceleration lane or acceleration lane.

Best Management Practices (BMP). A physical, chemical, structural, or managerial practice or device that prevents, reduces, or treats contamination of storm water, prevents or reduces soil erosion, and/or reduces or minimizes storm water runoff. A BMP may be temporary to protect water during construction or permanent to protect water from the long-term effects of development.

City. The City of Burleson, Texas, a municipal corporation, authorized and chartered under the Texas State Statutes, acting by and through its governing body or its City Manager or the duly authorized representatives of the City Manager.

Community Facilities. For the purpose of this manual, community facilities are streets, storm drainage systems, water lines, sanitary sewer lines, sidewalks or other similar improvements constructed within public rights-of-way, drainage easements, or utility easements. Typically, the City maintains community facilities after expiration of any applicable maintenance bonds. This manual may also refer to community facilities as public improvements.

Continuous Deceleration Lane. A deceleration lane that serves two or more driveways, public streets or combination thereof.

Deceleration Lane. A lane, including tapered areas, in advance of a driveway or public street used to allow turning vehicles to exit the through traffic lane and slow before making the turn.

Detention. The practice of storing storm water runoff by collection as a temporary pool of water and providing for its gradual (attenuated) release, thereby controlling peak discharge rates and allowing for sedimentation of pollutants.

Development. For the purposes of this manual, development refers to the project being developed or designed.

Driveway Throat Width. The shortest distance between the parallel edges of a driveway.

Engineer. A person who is licensed by the Texas Board of Professional Engineers to engage in the practice of engineering in the State of Texas.

Floatables. Litter and other pollutants that float on the surface of water. Examples are plastic bottles, aluminum cans, cigarette butts, and plastic grocery bags.

Floodplain. The area of land subject to inundation by the 100-year storm.

Floodway. The channel of a watercourse and the adjacent land areas that must be reserved for the passage of the 100-year flood without cumulatively increasing the water surface more than one foot.

Flow Line. The flow line of a pipe shall be the lowest interior portion of the pipe.

General Permit. An authorization to discharge storm water issued by the Environmental Protection Agency (EPA) or the Texas Commission on Environmental Quality (TCEQ) and its successor agencies for business sector and classes of activities based on meeting specified operating conditions and submitting a Notice of Intent to operate under the General Permit.

Impervious surface. Pavement, rooftops, and similar construction and modified areas that prevent the percolation of water into the soil and provide almost 100 percent runoff volumes.

Improved Open Channel. A creek or area of concentrated drainage modified as a feature to convey drainage.

Intersection sight distance. Adequate sight distance based upon stopping sight distance (SSD) as determined by AASHTO.

Large Construction Project: For Environmental Management purposes only, a construction activity, including clearing, grading, and excavation, that disturbs five acres or more, or a construction activity that disturbs less than five acres and is part of a larger

common plan of development or sale with the potential to cumulatively disturb five acres, such as single family home construction in a subdivision of five acres or more.

Level of Service. Qualitative measures describing operational conditions within a traffic stream.

Local Street. All streets, primarily residential in nature, in which the pavement is less than or equal to 31 feet in width.

Major Collector Street. Any current street or street shown on the Roadway Classification Map contained in the Burleson Master Thoroughfare Plan as a 4-lane undivided roadway.

Major Street Facility. Any roadway with a classification of Minor Arterial or above.

Master Thoroughfare Plan. A comprehensive plan of current and future roadway locations and classifications. This plan offers the framework for orderly development and is responsive to present and future traffic needs within the community.

Minor Arterial. Any current street or street shown on the Roadway Classification Map contained in the Burleson Master Thoroughfare Plan as a 4-lane divided or 5-lane undivided street.

Minor Collector Street. Any current street or street shown on the Roadway Classification Map contained in the Burleson Master Thoroughfare Plan having a pavement width of 41 feet.

Municipal Separate Storm Sewer System (MS4). The system of conveyances (including roads with drainage systems, municipal streets, inlets, curbs, gutters, ditches, man-made channels, or storm drains) owned and operated by the City and designed or used for collecting or conveying storm water.

Natural Creek. An existing drainage channel that has not been graded, modified, cleared, or created by equipment.

Notice of Intent (NOI). The Notice of Intent that is required by the Construction General Permit, the Multi-Sector General Permit, or other General Permit for the discharge of storm water issued by the Environmental Protection Agency (EPA), or the Texas Commission on Environmental Quality (TCEQ) and its successor agencies.

Notice of Termination (NOT). The Notice of Termination that is required by the Construction General Permit, the Multi-Sector General Permit, or other General Permit for the discharge of storm water issued by the Environmental Protection Agency (EPA), or the Texas Commission on Environmental Quality and its successor agencies.

Owner. For the purposes of this manual, owner refers to the person responsible for developing a particular site or project.

Principal Arterial. Any current street or street shown on the Roadway Classification Map contained in the Burleson Master Thoroughfare Plan as a 6-lane divided or 7-lane undivided street or freeway frontage road.

Qualified Personnel. Persons who possess the appropriate competence, and ability (as demonstrated by sufficient education, training, experience, and/or, when applicable, any required certification or licensing) to perform a specific activity in a timely and complete manner consistent with the applicable regulatory requirements and generally accepted industry standards for such activity.

Reportable Quantity. The amount of a material that may be harmful to human health and the environment if spilled or otherwise released, thus requiring notification of federal officials upon a release per the Clean Water Act (40 CFR 110 and 117) and the Emergency Planning and Community Right-to-Know Act (40 CFR 302).

Retention. The practice of storing storm water runoff by collection as a permanent pool of water without release except by means of evaporation, infiltration, or attenuated release when runoff volume exceeds storage capacity of the permanent pool.

Shared Driveway. A driveway constructed on or near a common property line between two or more properties and providing access to all such properties.

Small Construction Project. For Environmental Management purposes only, a construction activity, including clearing, grading, and excavation that disturbs less than five acres and is not part of a larger common plan of development or sale with the potential to cumulatively disturb five acres or more.

Stabilization. Covering of disturbed soil with vegetation, geotextile products, mulch, rock, soil modifiers, or pavement to prevent erosion and soil loss.

Tree Canopy. The geographic area covered by the horizontal projection of the drip line, or outer branches of a tree or group of trees, in a woodland tract.

Visibility triangle/easement. An easement located at the intersection of a public street with another public street, a driveway, an access easement or an alley, which must remain unobstructed by permanent or temporary objects at heights between two and seven feet above ground level or top of curb, whichever is more critical.

SECTION 2.2 ABBREVIATIONS

AASHTO	American Association of State Highway Transportation Officials
BMP	Best Management Practice
CLOMR	Conditional Letter of Map Revision
DPW	Department of Public Works
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency

FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
fps	Feet per second
gpm	Gallons per minute
HCM	Highway Capacity Manual
HGL	Hydraulic grade line
HMAC	Hot mix asphalt concrete
ITE	Institute of Transportation Engineers
LOMR	Letter of Map Revision
MTP	Master Thoroughfare Plan
MFF	Minimum Finished Floor
mph	Miles per hour
MS4	Municipal Separate Storm Sewer System
NAD 83	North American Datum of 1983
NAVD 88	North American Vertical Datum of 1988
NCTCOG	North Central Texas Council of Governments
NOI	Notice of Intent
NOT	Notice of Termination
RCP	Reinforced concrete pipe
PI	Plasticity Index
psi	Pounds per square inch
PVC	Polyvinyl Chloride
SWMSP	Storm Water Management Site Plan
SWPPP	Storm Water Pollution Prevention Plan
TCEQ	Texas Commission on Environmental Quality
TDLR	Texas Department of Licensing and Regulation
TIA	Traffic Impact Analysis
TMUTCD	Texas Manual on Uniform Traffic Control Devices
tpd	Trips per day
TxDOT	Texas Department of Transportation

THIS PAGE INTENTIONALLY LEFT BLANK.

CHAPTER 3 MISCELLANEOUS

SECTION 3.1 EASEMENTS

A. Public vs. Private

Generally, underground facilities, such as water, sanitary sewer, and storm sewer, that cross property lines are considered public infrastructure. As such, appropriate easements shall be granted to the City for the maintenance of the facility by the City. At the point where these underground facilities enter into a single property, they shall become private facilities maintained by the property owner.

The City may require that facilities be placed within a private easement. Private systems are those which either serve one lot or are systems for which a private entity has maintenance obligations. Private systems are owned and maintained by a private entity. The City shall be permitted access to facilities within the private drainage easement if the owner fails to adequately maintain the facilities and the system fails or has diminished function that may jeopardize the public's health, safety, or welfare. The owner of the facilities shall reimburse the City for any costs associated with the maintenance of the facility.

B. Acquisition

Easements not shown on a plat shall be procured by separate instrument. The procurement of any easement is the owner's responsibility. If the owner cannot obtain a required offsite easement, the owner may request assistance from the City. Prior to requesting assistance, the owner shall provide a written offer to the property owner based on fair market value. The City's assistance does not relieve the owner of the cost of purchasing the easement. In addition, the owner shall reimburse the City for all costs associated with the acquisition.

C. Filing

The following is the process for filing an easement by separate instrument.

1. The owner shall submit the written metes and bounds description and drawing of the easement sealed, signed and dated by a surveyor. This information along with the ownership information shall be submitted to the appropriate department.
2. The dedication statement will be prepared on City forms.
3. A fee will be determined for preparing and filing the documents. Upon payment of the fee, the easement will be returned to the owner for signatures. The signed documents are then returned to the City.

4. The City will file the easement in the deed records at the appropriate county courthouse.
5. A copy of the filed easement will be forwarded to the owner.

SECTION 3.2 ABANDONMENT OF EASEMENTS OR RIGHTS-OF-WAY

Abandonment of rights-of-way or easements is processed by separate instrument or by plat. In either case, signature sheets shall be required from the public utility companies and the adjacent affected property owners indicating either agreement or disagreement to the proposed abandonment. Right-of-way and easements proposed to be abandoned that do not contain improvements shall be processed administratively. If improvements are present, the abandonment request will be forwarded to the City Council for approval. Abandonments that are opposed by the affected property owners will also be forwarded to the City Council for approval. Right-of-way and easements granted to entities other than the City shall be abandoned by that entity.

A request for the abandonment of right-of-way or easements by separate instrument can be initiated by submitting the following to the DPW:

- An application form (available from the DPW or on the website)
- Parcel drawing and written metes and bounds description
- Non-refundable application fee
- Utility relocation cost, if applicable
- Utility company signatures on standard forms
- Affected property owners signatures on standard forms

Upon approval of the abandonment by the City, the applicant shall pay the County filing fees.

Rights-of-way or easements can also be abandoned by Final Plat, Combination Plat, Replat, or Minor Plat (except an Amended Plat). The right-of-way or easement shall be shaded and labeled "Abandoned by the filing of this Plat." There is no application fee specifically for the abandonment by plat. The following shall be submitted prior to filing the plat:

- Utility relocation cost, if applicable
- Utility company signatures on standard forms
- Affected property owners signatures on standard forms

If costs were incurred by the City to acquire the right-of-way or easement, funds shall be paid to the City for reimbursement.

SECTION 3.3 EASEMENT & RIGHT-OF-WAY USE AGREEMENTS

The City allows permitting of certain improvements within easements and rights-of-way with the execution of an *Easement & Right-of-Way Use Agreement*. The agreement states that the City is not responsible for the maintenance or reconstruction of any improvements located in the easement or right-of-way and that the owner must remove the improvement at the request of the City. The *Easement & Right-of-Way Use Agreement* is processed by Engineering Services. Forms and instructions are included in Appendix L or on the City's website.

Generally, any structure that is permanent in nature requires the execution of an *Easement & Right-of-Way Use Agreement*. The following list identifies examples of items that require the agreement:

- Masonry fences or any part of a fence that is masonry
- Retaining walls greater than 3 feet or, if the wall supports a structure, less than 3 feet
- Private storm drains or area drains
- Swimming pool decks
- Wood decks, patios, and gazebos
- Buildings, signs, or other permanent improvements

Other improvements, including those listed below, may be allowed without the execution of an *Easement & Right-of-Way Use Agreement* at the appropriate Director's discretion:

- Paving or flatwork
- Wooden or chain-link fences
- Retaining walls less than three feet in height that do not support a structure or infringe on the required visibility triangles.

A site plan shall be submitted and accepted prior to issuance of a permit for the construction of the improvements. The agreement will be reviewed by the Public Works Department.

SECTION 3.4 MONITORING WELLS

The installation of monitoring wells within City right-of-way shall only occur when there is no other alternative location. For approval of monitoring wells in right-of-way, the following shall be submitted to the DPW:

- Justification letter
- Water gradient profile
- Map showing the proposed location of the monitoring well

The request will be evaluated and a written response provided within ten working days. Upon approval of a request, the following additional items shall be required prior to installation:

- Right-of-Way Use Agreement
- Waiver Liability, Indemnification, Release and Hold Harmless Agreement
- Certificate of Insurance naming the City as additional insured
- Traffic control plan

A permit from the Fire Department is required for the installation of monitoring wells on private property.

SECTION 3.5 SUBMITTALS TO OTHER AGENCIES

Depending on the location and nature of the development, it may be necessary to submit elements of the plans to various county, state or federal agencies or utility companies. Following is a list of agencies that may require submittals. This list is not all-inclusive. The developer and developer's engineer are responsible for determining which agencies are affected by the development and for obtaining all necessary permits and approvals.

A. Texas Department of Transportation

1. Driveway, Street Access, Auxiliary Lane Permits

A permit from TxDOT is required when constructing facilities within state right-of-way. Form 1058 may be obtained from TxDOT's website, www.dot.state.tx.us. Five copies of the completed application form and five additional sets of 11" x 17" plans shall be submitted to the DPW. The DPW will forward the forms and the plans to TxDOT for approval. The permit must be approved prior to commencing construction.

For public street connections to TxDOT facilities and associated auxiliary lanes, the City will sign the permit form as applicant. The developer must complete the form and submit it to the City for signature.

For private drive connections to TxDOT facilities and associated auxiliary lanes, the developer must sign the permit form as applicant.

2. Utility Permits

A permit from TxDOT is required when constructing utility improvements within state right-of-way. The TxDOT utility permit is obtained through an on-line system. There are two methods for obtaining a TxDOT permit for utility work:

- a. The developer may complete a TxDOT utility permit questionnaire (included in Appendix P) and submit a copy of the plans in .pdf format. The City will complete

the on-line permitting process and coordinate with the developer when comments or approval are received.

- b. The City may give the developer authorization to access the TxDOT permit system and may submit the permit directly to TXDOT using the on-line permit system. If the developer chooses this option, the City must be notified of the permit submittal.

B. Utility Companies

The owner shall submit construction plans to the utility companies when facilities are proposed along perimeter streets or as offsite facilities serving the development to determine any conflicts. A list of utility companies and contact names may be obtained from the City's website.

C. U.S. Army Corps of Engineers

When work is proposed within waters of the United States, it may be necessary to obtain a 404 permit from the Corps of Engineers. It is the owner's responsibility to determine whether a 404 permit will be required or whether the project is permitted under a nationwide permit or whether the project does not fall within Corps of Engineers jurisdiction. The City may require documentation of the determination prepared by a qualified professional.

D. FEMA

For work within the floodplain, the owner may be required to submit a flood study to FEMA in accordance with the requirements in Chapters 4 and 5.

E. Texas Department of Licensing and Regulation

The owner is responsible for submitting all pertinent information with regard to sidewalk and access ramps to the Texas Department of Licensing and Regulation (TDLR) prior to construction as required. It is the owner's responsibility to determine if the submittal to TDLR is required.

SECTION 3.6 FLOODPLAIN DEVELOPMENT PERMITS

The development permit ensures that all development activities proposed within the Special Flood Hazards Area (SFHA or Floodplain) will be in compliance with the Flood Hazards Ordinance of the City Code. A plan shall be submitted that shows the existing and proposed contours and all proposed uses of the property. This permit is intended for all development activities not governed by the Subdivision and Development Ordinance or Chapters 4 and 5 of this manual. A fee is charged for this permit.

SECTION 3.7 TRAFFIC STUDY

A. Purpose

The purpose of a traffic study is to assess the effects of specific development activity on the existing and planned roadway system. It is the intent of these requirements to make traffic access and circulation planning an integral part of the development process.

B. Responsibility

When required, the owner shall submit at the owner's expense a traffic study that assesses the traffic impacts associated with a proposed development. The study must be prepared under the direction of a licensed professional engineer with experience in Transportation Engineering sufficient to assess traffic impacts.

C. Determination of Need

The DPW will determine the necessity of a traffic study within five working days after receiving the following information:

- Existing or proposed zoning categories
- Tract location map
- Tract size in acres
- Existing and proposed land use (if known)
- Proposed types and locations of new roadways
- Location of proposed access points and signalization, if applicable

Generally, a traffic study shall be required for any development expected to generate traffic volumes that will significantly impact the capacity or safety of the street system.

A Traffic Impact Analysis (TIA) is a comprehensive study of all aspects of a development's probable impacts on the transportation system. This study will analyze how traffic generated by a development relates to traffic on internal and adjacent roadways. The following provides specific situations where a traffic study may be required:

1. Zoning

- *Over 100 trips during the peak hour.* A traffic impact analysis shall be required for a zoning proposal when the expected traffic generation exceeds 100 trips during the peak hour of the development (typically a.m., noon, p.m., and/or weekend) or the current zoning trip generation is exceeded by 1,000 trips per day or more.
- *Over 1000 trips per day.* Developments expected to generate more than 1,000 trips per day, but less than 100 trips during the peak hour may be required to submit a traffic impact analysis at the City's discretion.

- The TIA requirement will be waived if increased traffic generation from the property being zoned has been previously considered in development of the MTP.

2. Platting

- A TIA shall be required for a development when the expected traffic generation is greater than 100 trips during the peak hour.
- Developments expected to generate less than 1,000 trips per day may be required to submit a TIA.
- A TIA will not be required for developments generating less than 500 tpd unless the peak hour generation is greater than 100 trips.

3. Annexation

A TIA shall be required when the trip generation of the fully developed land use scenario of the annexed land exceeds 100 trips during the peak hour. This requirement will be waived if the Master Thoroughfare Plan has adequately considered this traffic generation or if the City has initiated the annexation.

4. Master Thoroughfare Plan Amendment

TIA may be required to support a request for amendment to the Master Thoroughfare Plan. If the City initiates a Master Thoroughfare Plan amendment, the City will be responsible for the necessary traffic study.

5. Building Permit, Driveway Permit or Development Plan

A TIA may be required for any building permit, driveway permit or development plan. This requirement includes permits for sites with existing driveways.

6. Certificate of Occupancy

A TIA may be required prior to the issuance of a certificate of occupancy on an existing structure if the new use is expected to increase traffic by more than 500 tpd or if the site's existing driveways create operational or safety problems.

7. Special Circumstances

A traffic study may be required for a development if the DPW determines that one or more of the following conditions exist:

- Traffic generated from a non-residential development will significantly impact adjacent residential neighborhoods.

- Traffic operational impacts such as problems with driveways, left or right turns, signal timing, median openings or sight distance are anticipated. In such cases, the study will only be required to answer questions related to the specific impacts.
- Existing traffic problems on adjacent streets are expected to worsen due to traffic generated from the new development.
- Implementation of the Master Thoroughfare Plan in the area will not occur prior to development of the property.
- The proposed land use differs significantly from that contemplated in the adopted Comprehensive Plan.
- The internal street or access system is not anticipated to accommodate the expected traffic generation.
- A traffic study may be required at any stage of development at the discretion of the DPW, City Council or the Planning and Zoning Commission.

8. Waiver

A request for waiver of the traffic study may be submitted to the DPW. The waiver letter must include sufficient information documenting the justification for the waiver.

9. Study Update

Any previous traffic study relating to a development that is more than two years old shall be updated unless the DPW determines that conditions have not changed significantly. If an updated study is necessary, additional information will be required to:

- Update changes in the proposed development
- Update or refine assumptions made in a prior submittal
- Provide specific information not available at the time of previous submittal

D. Study Requirements

1. Preliminary Meeting

A meeting shall be held between the engineer and the DPW to discuss the development project prior to beginning the study. Topics for discussion at the meeting include:

- trip generation
- directional distribution of traffic
- trip assignment

- definition of the study area
- intersections requiring critical lane analysis (all major intersections within one-half mile of the site, subject to the approval of the DPW)
- methods for projecting future volumes and conditions to be analyzed
- special site related issues
- auxiliary lanes

2. Study Submission and Review

A study shall be submitted to the DPW in accordance with the following:

a. Zoning cases

The traffic study shall be submitted no later than the submission of the zoning case application.

b. Subdivision plats

The traffic study shall be submitted no later than the submission of the first plat application.

c. City Council agenda

The final traffic study shall be submitted 20 working days prior to the City Council meeting to consider approval of the zoning case.

d. Fee

A fee will be charged for the review of the traffic study in accordance with the fee schedule.

e. Others

For development proposals not involved in a formal hearing process, DPW will review a traffic study within ten working days of the submittal or will notify the applicant in writing if additional review time is required.

Longer review periods may be necessary if TxDOT is involved. The DPW will be responsible for processing the traffic study through TxDOT.

Revisions to the traffic study shall be provided to address comments required by the DPW. If study revisions are required, they will be reviewed within five working days of submittal.

3. Traffic Impact Analysis Contents

All TIAs shall be prepared under the direction of an engineer with experience in Transportation Engineering. In order to provide consistency and to facilitate staff review of traffic studies, the following format shall be used:

a. Introduction

The introduction shall clearly state the purpose of the study.

b. Land Use, Site and Study Area Boundaries

A brief description of the size of the land parcel, general terrain features and the location within the City and the region shall be included in this section. In addition, roadways that provide site access and are in the study area shall be identified.

The limits of the study area shall be based on existing and future traffic conditions surrounding the site and will be determined at the preliminary meeting. A vicinity map that shows the site and the study area boundaries, in relation to the surrounding transportation system, shall be included.

c. Existing and Proposed Site Uses

The existing and proposed zoning of the site shall be identified. In addition, the specific use for the site shall be identified if known, since a variety of uses may be permitted under a zoning category. The traffic study shall address traffic impacts for the most intensive use allowed by zoning.

d. Existing and Proposed Uses in Study Area

A complete description and map of the existing land uses and zoning in the study area shall be included. In addition, a complete description and map of the assumed future land use shall be provided. Generally, this information can be obtained from the Department of Community and Economic Development.

e. Existing and Proposed Roadways and Intersections in Study Area

A complete description and map of the existing roadways and intersections including geometrics, traffic signal control, and volumes shall be included. It shall also identify improvements contemplated by government agencies and provide the following details:

- The nature of the improvement project
- Limits
- Implementation schedule
- The agency or funding source responsible

f. Sight Distance

Visibility triangles as shown in Appendix G must be maintained at all 90-degree intersections on straight roadway sections. For street or driveway connections onto curved street segments, a sight distance analysis must be provided. The sight distance requirements may be obtained from AASHTO's A Policy on the Geometric Design of Highways and Streets.

g. Trip Generation and Design Hour Volumes

A summary table shall be provided listing each type of existing and proposed land use, building size, average trip generation rates (total daily traffic and a.m./p.m. peaks), and the resultant total trips.

Trip generation shall be calculated for the maximum uses allowed under the existing and proposed zoning based on the latest edition of the ITE Trip Generation Manual. In the event that data is not available for the proposed land use, the City shall approve estimated rates. All sources must be cited in the report.

The calculation of design hour volumes used to determine study area impacts shall be based on:

- Peak hour trip generation rates as published in the ITE Trip Generation Guidelines and explained in the ITE publication, "Using the ITE Trip Generation Report."
- "Site Impact Traffic Evaluation Handbook," FHWA Report PL/85/004, U.S. DOT, June 1985.
- Traffic volume counts for similar existing uses, if no published rates are available.
- Additional sources from other jurisdictions or publications, if acceptable to the City. Possible sources include:
 - a) "Development and Application of Trip Generation Rates," FHWA Report PL/85/003, U.S. DOT, January 1985.
 - b) "San Diego Traffic Generators," San Diego Association of Governments.
 - c) ITE Journal articles.

Passerby factors are to be used to reduce the estimated additional total daily traffic to the street serving a proposed development. They are not to be applied directly to reduce trip generation and turning movement volumes at driveways serving the proposed development. The percentage rates for passerby traffic may be obtained from the latest ITE Trip Generation Manual.

Internal trip reductions and modal split assumptions will require analytical support to demonstrate how the figures were derived. Other documented rates to account for passerby traffic may be used upon approval by the City.

City studies indicate that daily trip generation from office/commercial mixed use developments can be accurately predicted by the application of ITE rates to each individual use. The City may allow reduction of the p.m. peak trip generation to eight to ten percent of the total daily generation.

h. Trip Distribution

The estimates of percentage distribution of trips from the proposed development to destinations in the metro region shall be clearly stated in the report. Market studies and information concerning origin of trips to the proposed development may be used to support these assumptions. A map showing the percentage of trips on each street shall be provided, clearly showing the percentage distribution through each studied intersection.

i. Trip Assignment

The direction of approach for site-generated traffic via the area's street system shall be presented in this section. The technical analysis, basic methods, and assumptions used in this work shall be clearly stated. The assumed trip distribution and assignment shall represent the most logically traveled routes for drivers accessing the proposed development. These routes can be determined by observation of travel patterns to existing land uses in the study area.

j. Existing and Projected Traffic Volumes

The specific time frames to be studied will depend on the individual development. Near term analysis shall be based on the anticipated earliest completion of the development. The analysis must account for traffic growth from existing volumes and roadway system changes during development of the site. The near term impacts are intended to reveal expected impacts of the development when it is ready for occupancy.

The long-term impacts shall be analyzed when the area is fully developed or 20 years from present, depending on the development location and available information.

An interim condition may also be requested in areas where the roadway system is not fully developed or ultimate improvements are not scheduled. These time frames will be determined at the preliminary meeting.

Graphics shall be provided showing the following traffic impacts for private access points, intersections and streets:

- A.M. peak hour site traffic (in and out) including turning movements.

- P.M. peak hour site traffic (in and out) including turning movements.
- A.M. peak hour total traffic including site generated traffic (in and out). These volumes should include through and turning movement volumes for near term and long term conditions.
- P.M. peak hour total traffic including site generated traffic (in and out). These volumes shall include through and turning movement volumes for near term and long term conditions.
- Any other peak hour which is critical to site traffic and the street system in the study area shall be included in the graphics and with the same information provided for the a.m./p.m. peak hours.
- Actual counts of existing total daily traffic for the street system in the study area at the time the study is prepared.
- Projected existing and long-term total daily traffic for the street system in the study area based on traffic from the proposed development and counts of existing daily traffic. The component of the existing daily traffic attributable to the existing uses shall be identified as well as the increase in total daily traffic from the proposed development.

All raw traffic count data (including average daily volumes and peak hour turning movements) and analysis worksheets shall be provided in the appendices of the report.

Volume projections for background traffic growth will be provided by the DPW, or a method for determining these volumes will be recommended by the DPW.

All total daily traffic counts shall be actual machine counts and not based on factored peak hour sampling. Latest available machine counts from TxDOT, the City and other agencies may be acceptable if less than two years old.

k. Capacity Analysis

A capacity analysis for appropriate peak periods shall be conducted for all public street intersections impacted by the proposed development and for all private property access points to streets within the study area. Capacity calculations shall include both near term and long-term projections. At each location studied, storage requirements shall be calculated for each vehicular movement.

Capacity calculations for near term conditions must be based on the operational analysis techniques contained in the most current edition of the Highway Capacity Manual (HCM). Long-term capacity calculations may be based on the planning analysis techniques in the latest edition of the HCM or the planning and operations procedures included in Transportation Research Circular No. 212. The technique used to calculate capacity will be discussed at the preliminary meeting.

All capacity analysis work sheets or computer print outs shall be included in the appendices of the report.

I. Auxiliary Lanes

In general, auxiliary lanes are required or allowed in accordance with the criteria included in the TXDOT Access Management Manual and the TXDOT Roadway Design Manual. The DPW may allow variances from the TXDOT manual upon adequate justification included within the TIA.

m. Traffic Signals

The need for new traffic signals shall be based on warrants contained in the Texas Manual on Uniform Traffic Control Devices. A minimum spacing of one-half mile for all signalized intersections shall be maintained, except as allowed by the DPW. This spacing is desirable to achieve optimum speed, capacity, and signal progression.

To ensure optimum two-way signal progression, a traffic signal analysis shall be performed to properly locate all access points that may require signalization. The analysis shall include all current and future signalized intersections within the affected area.

The progression pattern calculations must use a cycle consistent with current signal timing policies of the City. A desirable bandwidth of 50% of the signal cycle must be used where existing conditions allow. Where intersections are expected to have signals in the future, a 60% mainline and 40% cross street cycle split should be assumed. Cycle split assumptions must relate to volume assumptions in the capacity analysis for the intersection. Adequate pedestrian clearance shall be provided in the signal cycle split assumptions. Where computerized progression analysis techniques are used, turning and pedestrian movement volume data shall be considered. The City may require proposed signalized intersections to remain unsignalized and have turning movements limited by access design or median islands if the optimum bandwidth is reduced.

n. Traffic Accidents

Traffic accident data may be required for affected street corridors. The study period is typically three years. Accident data summaries may be obtained from the DPW. Estimates of increased or decreased accident potential shall be evaluated for the proposed development.

o. Level of Service Determination

A table indicating the level of service for near-term and long-term traffic projections for all streets within the study area shall be included. Level of Service "C" is the design objective for all movements. Under no circumstances shall the Level of Service be less than "D" unless deemed acceptable for site and non-site traffic.

p. Conclusions

This chapter of the report must include a summary of the study findings regarding impacts of the proposed development on the existing and proposed street system.

q. Recommendations

In the event that the analysis indicates unsatisfactory levels of service or safety problems, a detailed description of proposed improvements to remedy deficiencies shall be included. Assumptions regarding future capacity recommendations shall be approved by the City. The recommendation section shall include a sketch of each improvement showing pertinent geometric features.

SECTION 3.8 FRANCHISE UTILITIES

All electric, telecommunications, and cable television utility lateral lines shall be placed underground and in dedicated easements or rights-of-way throughout new subdivisions for which final plats are approved or have had community facilities agreements executed and subject to the following conditions:

- A. Any transmission or feeder lines shall be placed in accordance with the following:
 - 1. Except in the Transit Oriented Development (TOD) District, all electrical transmission lines, meaning those electrical lines operated at normal voltages of 60,000 volts or higher, may be placed overhead. The placement of the electrical line shall be coordinated with the City. The intent of this provision is to minimize overhead utilities along the City's arterial roadways.
 - 2. Except in the Transit Oriented Development (TOD) District, any feeder lines shall be placed in accordance with the following:
 - a. The lines shall be placed underground; or
 - b. The lines shall be placed underground within 150 feet of each entry to the subdivision. In areas beyond 150 feet from the entry, a landscape buffer of at least 20 feet from right-of-way shall be provided. Landscaping shall be provided by the developer in accordance with the Oncor Electric Delivery publication "Plan Before You Plant" and the Public Utility Commission publication "All About Trees and Power Lines." The developer or homeowner's association shall irrigate and maintain the landscaping; or
 - c. The lines may be placed overhead if a landscape buffer of at least 20 feet from right-of-way is provided. Landscaping shall be provided by the developer in accordance with the Oncor Electric Delivery publication "Plan Before You Plant" and the Public Utility Commission publication "All About Trees and Power Lines." The developer or homeowner's association shall irrigate and maintain the landscaping; or

- d. The utility may be placed overhead if an alternate route outside of the City's road right-of-way is provided by the City or developer. The route shall be acceptable to the City and to the franchised utilities. Paved access adjacent to the utility line shall be provided; and
 - e. Poles used to support any overhead construction shall be armless construction when it is feasible from construction and operational perspectives.
3. All utilities in the Transit Oriented Development District shall be placed underground.
- B. Lateral utility/service lines, meaning those lines that emanate from feeder lines and are used for distribution to smaller areas of consumers, must be placed underground in the interior of all residential subdivisions. Lateral lines may be placed overhead in nonresidential developments upon approval by the City Manager or a designated representative. The plat shall provide that utility/service companies shall have the right of ingress and egress to perform maintenance on their lines.
 - C. Underground utilities, or adequate underground utility conduit located in or crossing streets shall be placed under or across all streets after the rough grades are made, but prior to the paving being placed. Paving operations will not be allowed to start until all underground utility work is completed and accepted by the City. Otherwise, underground utilities may cross streets only by boring without open cutting of pavement.
 - D. Temporary service during construction may be provided by overhead facilities prior to activation of the underground service. As soon as possible following activation of the underground permanent service, the temporary overhead service shall be removed.
 - E. Each of the utility service companies shall be responsible for developing administrative policies and cost reimbursement procedures for the installation and extension of their underground utilities. Nothing prohibits or restricts utility/service company from recovering the difference in cost of overhead facilities and underground facilities from the owner or developer in accordance with the provisions of the utility service company's approved rate. No utility service company shall be required to begin construction of underground facilities unless and until the owner or developer of the subdivision has made arrangements satisfactory to the utility service company for the payment of the difference between the cost of overhead facilities and underground facilities.
 - F. The City shall not be held financially responsible for any portion of the cost to establish utility service lines, service connections, landscaping, or irrigation in compliance with this section.
 - G. All electrical, telecommunications, and cable television support equipment (transformers, amplifiers, switching devices, etc.) necessary for underground installation shall be pad-mounted (except for common above ground buried telecommunications line closures/risers) or placed underground, and the difference in cost of the facilities shall be paid to the installing utility service company in accordance with provisions established under paragraphs (E) above.

- H. In special or unique circumstances or to avoid undue hardship, the City Council may authorize exception from these requirements in conjunction with final plat approval.
- I. The provisions of this section do not require any existing overhead facilities to be placed underground or to prohibit the upgrading, reconstruction or reconductoring of any existing overhead facilities with overhead construction
- J. The provisions of this section do not alter the requirements of any utility service company franchise agreement in effect on the effective date of this section.

SECTION 3.9 CONSTRUCTION REQUIREMENTS

A. Public Infrastructure

The owner shall construct all public infrastructure required for the development, including any necessary offsite facilities. The owner shall also acquire necessary offsite rights-of-way or easements. All City participation requests for offsite and/or oversized facilities must be authorized by City Council before beginning construction. All public infrastructure shall be in place and accepted by the City prior to the issuance of a building permit for residential development. For commercial sites, the public infrastructure may be installed concurrently with the private improvements. A Certificate of Occupancy for a commercial building will not be issued until the DPW has issued a letter of initial acceptance of the public improvements.

In accordance with the Subdivision and Development Ordinance, the City will not allow construction of any public improvement or issue permits for any construction activity until the plat is approved. Upon written request from the owner, the Director may allow the construction of public improvements prior to the plat being filed with accepted plans and inspection. Should the City allow the development of public improvements prior to plat filing, the improvements will not be accepted until a plat is filed of record. No grading, clearing or fill shall commence without a SWPPP and prior approval of the Public Works Department.

B. Release for Early Grading

In accordance with the Subdivision and Development Ordinance, the City will not allow construction of any public improvement or issue permits for any construction activity until the Community Facilities Contract is executed, except that the DPW may allow early grading upon written request from the owner. In order to receive permission for early grading, the following must occur:

1. A preliminary plat must be approved by the Planning and Zoning Commission and City Council.
2. The following items must be submitted to the DPW:
 - a. Notification of Grading Form,

- b. Erosion Control Plan,
 - c. Copy of the SWPPP,
 - d. Copy of the NOI (if applicable), and
 - e. A detailed grading plan if public or private streets are proposed.
3. All erosion control BMPs shall be installed prior to starting the grading operation.
4. Following is the policy when fill is placed within public or private streets:
- a. The contractor must notify the DPW at least 48 hours prior to starting the grading operation,
 - b. The City inspector will test densities of all fill areas,
 - c. The City will pay for the initial density testing, and
 - d. The contractor will be billed for all failed tests.

C. Standard Specifications

Public facilities shall be constructed in accordance with the most recent Standard Specifications for Public Works Construction as issued by the North Central Texas Council of Governments (NCTCOG), which is commonly referred to as the standard specifications or NCTCOG specifications.

D. Typical Details

Typical details for public infrastructure are contained in the Appendix of this manual and are also available on the City's website.

SECTION 3.10 CONTRACTOR REQUIREMENTS

A. Contract Requirements

A Community Facilities Contract executed by the owner, contractor, and the City are required for construction of all infrastructure improvements. The contract shall provide for 100-percent performance, payment and maintenance bonds, except when the contract is less than \$25,000. When the contract is less than \$25,000, only a maintenance bond is required. The bonds shall not be executed prior to the date of execution of the contract. An insurance certificate with coverage approved by the City is also required with the contract documents. The expiration date of the insurance policy shall not be prior to the completion of the project. Additionally, an administration and inspection fee as established by the City shall be paid prior to commencing construction. A trench safety plan sealed, signed, and dated by an engineer shall also be submitted with the contract. A copy of the Community Facilities Contract (CFC) is included in the Appendix of the Subdivision and Development Ordinance.

B. Inspection Requirements

The contractor shall notify the DPW at least 48 hours prior to the start of any construction of public facilities. The contractor shall also ensure that, when applicable, proper authorities with TxDOT, franchised utility companies, railroads, or any other affected entities are notified.

C. Permits

No building permits for residential lots will be issued until all infrastructure is initially accepted. Building permits for commercial and multi-family development may be issued prior to the acceptance of the public infrastructure. A certificate of occupancy will not be issued until all public infrastructure has been constructed and accepted by the City. There may be conditions placed on the issuance of a building permit based on the type of public construction required for the development. In general, no construction may occur above the slab unless required fire hydrants and fire lanes have been installed and hydrants are operational.

D. Traffic Control Plan

When construction impacts existing roadways, a detailed traffic control plan shall be submitted with the CFC. All traffic control plans shall be in accordance with the Texas Manual on Uniform Traffic Control Devices. The site specific plan shall be submitted to the DPW for approval at least 10 working days prior to beginning construction.

E. Trench Safety Requirements

1. A trench safety system must be provided for all trench excavations according to current OSHA requirements.
2. On all public projects bid by the City or private projects to be constructed within right-of-way or easements to be conveyed to the City, compliance with the current minimum Occupational Safety and Health Administration (OSHA) or other governmental agencies standards for trench safety will be required as part of the plans and specifications. Prior to start of construction a detailed trench safety system must be provided to the City by the contractor. This detailed trench safety system must meet all requirements by OSHA or other governmental agencies, and be designed and certified by a professional engineer licensed in the State of Texas.
3. A pay item shall be included in the plans and specifications for the trench safety system. Payment will be on a linear-foot basis and will be full compensation for labor, tools, materials, equipment and incidentals necessary to complete the work, including the removal of the trench safety system and back-filling the trench.

SECTION 3.11 ITEMS AVAILABLE ON WEBSITE

The following items are available on the City's website, www.burlesontx.com:

- Subdivision Design Checklist
- Commercial Plan Design Checklist
- Easement/Right-of-Way Use Agreement Application
- Easement/Right-of-way Abandonment Form
- Early Grading Notification
- Utility Contact List
- Floodplain Development Permit
- Standard Construction Details in .pdf and .dwg format
- Community Facilities Contract
- Subdivision and Development Ordinance
- Design Standards Manual (this document)

CHAPTER 4

RESIDENTIAL SUBDIVISIONS

SECTION 4.1 INTRODUCTION

The purpose of these guidelines is to provide information required to prepare construction plans for residential subdivisions (single-family, two-family and townhome). Design standards for apartment developments may be found in Chapter 5 – Commercial Subdivisions.

SECTION 4.2 CONSTRUCTION PLAN SUBMITTAL

The following plans shall be submitted to the Public Works Department:

- Cover Sheet
- Storm Water Management Site Plan (scale no smaller than 1" = 100')
- Storm Water Pollution Prevention Plan – During Construction (scale no smaller than 1" = 100')
- Storm Water Pollution Prevention Plan – Post Construction (scale no smaller than 1" = 100').
- Water and Sanitary Sewer Plan
- Sewer Profiles (horizontal scale 1" = 20' or 1" = 40', vertical scale 1" = 4')
- Water Profiles, as required (horizontal scale 1" = 20' or 1" = 40', vertical scale 1" = 4')
- Paving Plan and Profile (horizontal scale 1" = 20' or 1" = 40', vertical scale 1" = 4')
- Median Opening/Auxiliary Lane Plans, as required
- Drainage Area Map (scale no smaller than 1" = 100')
- Drainage Plan and Profile (horizontal scale 1" = 20' or 1" = 40', vertical scale 1" = 4')
- Streetlight Plan (scaled no smaller than 1" = 200')
- Subdivision Grading Plan (scale no smaller than 1" = 100')
- Signal Plan, as required
- Plat
- Pavement Marking Plan, as required
- Sidewalk Connectivity Plan, as required (scale no smaller than 1" = 100')
- Applicable Details

Preliminary submittals shall include three sets of full size plans (22" x 34") for distribution within the City. Once the plans have been reviewed and accepted by the City, the engineer shall submit two full size and four half size sets of the plans released for construction. The plans must be prepared by a licensed civil engineer.

SECTION 4.3 ENVIRONMENTAL MANAGEMENT

A. Storm Water Management Site Plan (SWMSP) – Permanent Controls

1. General Requirements

A Storm Water Management Site Plan (SWMSP) shall be prepared for projects that meet the following conditions:

- disturb a surface area of 12,000 SF or more, and
- create or add 5,000 SF or more of impervious surfaces

The SWMSP shall identify permanent site features and controls that will be included in the design and constructed with the project to minimize and mitigate the project's long-term effects on storm water quality and quantity. A preliminary SWMSP shall be submitted with the plat in accordance with Section 6.2 of the Subdivision and Development Ordinance. The SWMSP shall be submitted with the paving and drainage plans.

The SWMSP shall be developed and coordinated with the site drainage plan and may be shown on the same sheet. It shall also be coordinated with the landscaping plan to prevent conflicts and assure compatible land use. The SWMSP shall meet all criteria of the SWMSP Checklist found in Appendix A and be sealed by an engineer.

2. Permanent Best Management Practices (BMPs)

It is the responsibility of the engineer to design BMPs that address site specific conditions using appropriate design criteria for the North Central Texas region. The NCTCOG Best Management Practices shall be referenced in the SWMSP, unless another source of design criteria has been specifically approved by the Public Works Director.

The following minimum number of BMPs shall be provided:

BMP Requirements*

<u>Area Disturbed</u>	<u>No. of BMPs (minimum)</u>
12,000 SF ≤ Disturbed Area < 5 acres	1
5 acres ≤ Disturbed Area < 10 acres	2
10 acres ≤ Disturbed Area < 20 acres	3
≥ 20 acres	4

*Subdivisions with paved alleys, private access easements, or private streets shall provide at least one BMP above the minimum.

The following items are acceptable permanent BMPs for subdivisions:

- a. Preservation of natural creeks – Refer to Article 6, Drainage and Environmental Standards, in the Subdivision Regulations for requirements when preserving natural creeks.
- b. Site layout – Site layouts should be designed to require the least modification to existing topography and drainage. Factors to be considered are lots oriented and designed to minimize change in grade, drainage systems designed to minimize change in time of concentration, and street layouts designed to minimize extent of pavement.
- c. Retaining walls - When the final grade at a site is steeper than three horizontal to one vertical, up to two BMP credits will be given for retaining walls that are used for slope stabilization. To receive credit, the retaining walls shall be constructed before completion of the paving and drainage improvements and prior to the issuance of a building permit to qualify for credit.
- d. Vegetated swales – Vegetated swales may be used if drainage design criteria are met. Consideration will also be given for the use of vegetated bar ditches for local rural streets. When designed as a permanent BMP, vegetated swales shall be designed with a trapezoidal cross section and a gentle slope that yields a maximum velocity of 2 fps for the 2-year storm event. The engineer shall evaluate flow depths to verify no upstream flooding is caused by the vegetated swale during larger events.
- e. 100-year drainage easement – Dedication of the unaltered, 100-year, fully-developed flood plain as a drainage easement with the creek left in its natural condition will receive two BMP credits. This BMP credit is only available when no credit is being given for dedication of a linear park. Additionally, no credit will be given for preservation of a natural creek when credit is given for this item.

- f. Cluster design – The subdivision shall concentrate residential density in one portion of the site in exchange for other areas permanently dedicated to open green space, passive or active recreational amenities, or similar use. Credit will not be given for drainage and utility easements or space set aside for future development. Depending on minimum lot size, this BMP may require a Planned Development (PD) or utilization of the “D” option as outlined in the Zoning Ordinance.
- g. Detention - Detention may be achieved by surface ponds or subsurface structures. The first half-inch of runoff from the drainage area shall be detained and slowly released over at least 24 hours and preferably 40 hours or more. Detention ponds and structures shall be evaluated for the 5- and 100-year storm events to verify that no structure flooding will be caused by the detention. Outfalls for detention ponds shall be designed to prevent clogging of the intake. The pond shall also be designed in accordance with other criteria in this chapter.
- h. Retention ponds – Retention ponds may be used if the engineer can show that daily flows, ground water seeps, or other water sources are available to maintain a permanent pool with a healthy aquatic community. A water balance shall be submitted with the plan. Retention ponds shall be a minimum of 4 feet deep, have a 10H:1V slope for areas that are 1 foot deep or less, and be designed to prevent short-circuiting. Fountains, cascades, or other means of aeration shall be provided to prevent the pond from becoming stagnant. The pond shall be evaluated for its effect on the 5- and 100-year storm events to verify that the pond will not induce flooding.
- i. Preservation of existing tree canopy – This BMP is only available when the existing tree canopy covers more than 50% of the site. A minimum of 75% of the critical root zone shall be preserved at natural grade, with natural ground cover. The Storm Water Pollution Prevention Plan for construction activities must contain fencing requirements at the tree’s drip line to ensure preservation of the trees. In addition, the grading and utility plans shall result in no soil disturbance or change of grade within the drip line edge of the preserved trees. BMP credits will be given in accordance with the following:

<u>Percent of Existing Canopy Preserved</u>	<u>No. of BMP Credits</u>
25% - 49%	1
50% - 65%	2
> 65%	3

- j. Dedication of a linear park - Dedication of a linear park will count for two BMP credits. If the linear park encompasses the unaltered, 100-year flood plain, with the creek left in its natural condition, three BMP credits will be granted.

- k. Semi-pervious pilot channel paving – Alternative manufactured channel linings may be used instead of concrete paving in accordance with Article V, Drainage and Environmental Standards, in the Subdivision Regulations.
- l. Mixed use BMPs – For subdivisions that will support mixed use, refer to Chapter 5, Commercial Sites, of this manual for additional BMPs that may be used on the commercial list.
- m. Other BMPs – Other BMPs and innovative designs will be considered when submitted to the DPW with supporting calculations and references.

3. Construction and Maintenance

The owner shall construct all permanent BMPs and is permanently responsible for maintenance of the BMPs, except where the BMP falls within a public drainage easement or right-of-way.

B. Storm Water Pollution Prevention Plan (SWPPP) – Temporary Controls During Construction

1. Applicable Regulations and Ordinances

Construction activities shall comply with the SWPPP requirements in Ordinance B-652 (Storm Water Pollution Control Ordinance) and the Environmental Protection Agency (EPA) and Texas Commission on Environmental Quality (TCEQ) regulations. When the ordinance and applicable regulations are in conflict, the most stringent requirements shall apply.

2. General Requirements

Projects that disturb less than 1 acre shall have a SWPPP that complies with the requirements in the Checklist for Small Projects. Projects that disturb 1 acre or more shall comply with the requirements in the Checklist for TCEQ Regulated Construction Projects. These checklists are in Appendices B and C, respectively. Residential projects that disturb less than 12,000 SF and are not part of a larger plan of development are exempt from these requirements.

The SWPPP shall be sealed by an engineer and submitted with the paving and drainage plans for review and acceptance.

3. Best Management Practices (BMPs) During Construction

Structural BMPs shall comply with details and specifications in the latest edition of the NCTCOG BMP Manual titled “*Storm Water Quality Best Management Practices for Construction Activities*” and this manual. When the NCTCOG Manual and this manual are in conflict, this manual shall govern.

The SWPPP shall provide a series of changing BMPs that are appropriate for each phase of construction. The SWPPP shall also identify which

owner/operator is responsible for installing, inspecting and maintaining each BMP during the different phases of construction. All temporary BMPs must be removed after final stabilization is achieved.

The following items are acceptable temporary BMPs for use during construction:

- a. Preservation of existing vegetation - This is a preferred BMP. When areas of existing vegetation are to be preserved, the areas shall be delineated on the plans, and the plans shall include notes stating that temporary chain-link fencing shall be installed to protect the vegetation.
- b. Vegetated buffer strips – Buffer strips may consist of preserved or planted vegetation. The strip shall be at least 10 feet wide, identified on the SWPPP, and flagged or otherwise designated in the field to prevent disturbance. Wider strips shall be specified when the slope is steeper than 10H:1V. If existing vegetation is used, it may be removed at the end of the project for establishment of permanent landscaping. The following design criteria shall be met when using vegetated buffer strips:
 - 1.) The drainage area shall not exceed 0.25 acres per 100 feet length of vegetation.
 - 2.) The maximum distance of flow to the vegetated buffer shall be 100 feet or less.
 - 3.) The up-slope grade perpendicular to the vegetated buffer shall not exceed 5H:1V.
- c. Staked hay bales - This BMP is only acceptable as a perimeter control for sheet flow on the down-slope side of the construction site. The ends of the line of bales shall be turned up-slope, perpendicular to the contours, to form a sediment trap. Bales shall not be placed across swales or other areas of concentrated flow or be placed in front of curb inlets. The following design criteria shall be met when using staked hay bales:
 - 1.) The drainage area shall not exceed 0.25 acres per 100 feet of bale length.
 - 2.) For slopes of 3H:1V and flatter, the maximum distance of flow to the staked hay bales shall be 100 feet or less.
 - 3.) For slopes of 3H:1V and steeper, the maximum distance of flow to the staked hay bales shall be 20 feet.
 - 4.) The up-slope grade perpendicular to the line of bales shall not exceed 1H:1V.
- d. Soil retention blankets – Soil retention blankets shall be anchored per the manufacturer's recommendations. On lots with slopes of 3H:1V or flatter, the blanketed area shall be at least 8 feet wide. Greater widths and additional BMPs shall be specified on steeper slopes. The blankets shall be seeded if used for temporary stabilization before start of home construction. Soil retention blankets used in channels shall meet TxDOT requirements for Type E-H blankets, as appropriate.

- e. Silt fence - Silt fences shall have wire mesh backing and be supported by metal posts. When used as a perimeter control, they shall only be placed down-slope from the construction activity, with the ends turned up-slope, perpendicular to the contours, to form a sediment trap. Silt fences may be used for concentrated flows up to a maximum design flow rate of 0.5 cfs. The following design criteria shall be met when using silt fence:
 - 1.) The drainage area shall not exceed 0.25 acres per 100 feet of fence length.
 - 2.) For slopes between 50H:1V and 3H:1V, the maximum distance of flow to the silt fence shall be 100 feet.
 - 3.) For slopes of 3H:1V and steeper, the maximum distance of flow to the silt fence shall be 20 feet.
 - 4.) The up-slope grade perpendicular to the fence line shall not exceed 1H:1V.
- f. Curb inlet protection – Inlet protection is allowed only as a last resort to site stabilization. Temporary inlet inserts are the only allowable method for inlet protection and are only permitted with specific approval by the DPW.
- g. Temporary inlet inserts – Commercially available or fabricated inserts shall be used when inlet protection is the only viable BMP. Inlet inserts must be configured to pass the inlet’s design flows without causing flooding and are only permitted with specific approval by the DPW.
- h. Temporary detention structure - If 10 acres or more drain to a common drainage point, the SWPPP shall require the low area to be excavated as a temporary detention structure while the drainage facilities are being constructed. This practice is advisable on smaller drainage areas where practicable.
- i. Rock check dams - Rock check dams are appropriate for areas of concentrated flow such as swales and ditches and at the outfall for a subdivision. Rock shall be contained within wire mesh. Check dams shall be placed at a spacing that sets the top elevation of a dam at the toe elevation of the next upstream dam, with the top of the furthest upstream dam set at the invert of the last stabilized portion of the swale or ditch. When check dams are used as an outfall control, the first check dam shall be at least 10 feet from the outfall, but no further than 50 feet from the outfall.
- j. Earthen berms - Earthen berms may be used as a perimeter control to divert runoff from adjacent sites away from the development or to retain runoff within the development. Earthen berms shall be stabilized within 14 days of their construction. The engineer shall analyze the impact of these diversion berms on adjacent sites.
- k. Fibrous mulch – Fibrous mulch may be used as an erosion control to limit the runoff from disturbed areas within the development. Mulch shall be at least 3 inches thick and cover all disturbed areas. When used on slopes of

3H:1V or steeper and in critical areas such as waterways, mulch matting must be anchored with netting to hold it in place.

- l. Hydromulch - Hydromulch stabilization may be used as an alternative to seeding for erosion control when all disturbed area is covered by the hydromulch. A strip of hydromulch is not acceptable unless additional structural controls are provided.
- m. Stabilized construction entrance - All construction entrances shall be stabilized with rock or other non-erodable material. If rock is used, the minimum effective diameter shall be 3 inches. Entrances shall be placed at high points or other areas where runoff from the construction site will not be directed to the entrance. The construction entrance shall not extend into the street or block flow in the gutter.
- n. Other BMPs - It is the responsibility of the engineer to design appropriate BMPs for each site. If the most appropriate BMP is not in the NCTCOG BMP Manual, the engineer shall submit calculations and references for design of the BMP to the DPW.

4. Waste and Hazardous Material Controls

Covered containers shall be provided for waste construction materials and daily trash. Hazardous materials shall be stored in a manner that prevents contact with rainfall and runoff. Onsite fuel tanks and other containers of motor vehicle fluids shall be placed in a bermed area with a liquid-tight liner or be provided with other secondary containment and spill prevention controls.

The SWPPP shall require federal, state and local reporting of any spills and releases of hazardous materials greater than the regulated Reportable Quantity (RQ) and reporting to the DPW of all spills and releases to the storm drainage system.

5. Temporary Stabilization

Portions of a site that have been disturbed but where no work will occur for more than 21 days shall be temporarily stabilized as soon as possible, and no later than 14 days after work temporarily ceases.

Temporary stabilization shall consist of providing a protective cover, without large bare areas, that is designed to reduce erosion on disturbed areas. Temporary stabilization may be achieved using the following BMPs: temporary seeding, soil retention blankets, fibrous mulches, hydro-mulches and other techniques that cover 100 percent of the disturbed areas until either final stabilization can be achieved or until further construction activities take place.

Perimeter BMPs such as silt fence, vegetated buffer strips or other similar perimeter controls are intended to act as controls when stabilization has not occurred. Perimeter BMPs may remain in place during temporary stabilization, however, they are not acceptable as final stabilization.

If the site has not been finally stabilized, temporary stabilization measures shall be in place prior to initial acceptance of the public infrastructure.

6. Final Stabilization

Final stabilization consists of soil cover such as vegetation, geotextiles, mulch, rock, chemical modification of the soil, or placement of pavement. For vegetative stabilization, perennial vegetation must cover all disturbed areas without large bare areas and with a density of 70 percent of the native background vegetative cover. Vegetated buffer strips are not allowed unless designed and credited as a permanent BMP. All non-vegetative stabilization must cover 100 percent of the disturbed area.

For stabilizing vegetated drainage ways, sod or seeded soil retention blankets shall be used. Hydromulch will not be allowed in vegetated swales, channels or other drainage ways. BMPs may remain in place during stabilization, however, BMPs shall be removed after stabilization is achieved.

The plan for final stabilization shall be coordinated with the permanent BMPs in the SWMSP and with the landscaping plan, if applicable.

7. Notice of Intent (NOI)

On projects 5 acres in size or larger, the owner and each contractor, including each builder in a residential subdivision, shall submit a copy of the NOI to the DPW at least 2 days prior to construction. When a contractor is acting as the owner's agent and has the ability to direct changes to the plans and specifications, only the contractor needs to submit a copy of the NOI.

8. TCEQ Site Notice

On projects that are 1 acre and larger but smaller than 5 acres, the owner and each contractor shall complete the Construction Site Notice provided in the TCEQ's New General Permit for Construction and submit a copy of it to the DPW at least two days prior to commencement of construction activities. A signed copy of each Construction Site Notice must be posted at the construction site in a location where it is readily viewed by the general public during all construction activity. When a contractor is acting as the owner's agent and has the ability to direct changes to the plans and specifications, only the contractor must submit and post the Construction Site Notice.

9. Notice of Termination (NOT)

All parties that submitted a NOI shall submit a NOT within 30 days after final stabilization is established. When the owner of a residential subdivision transfers ownership of individual lots to builders before final stabilization is achieved, the SWPPP shall include controls for each individual lot in lieu of final stabilization. These controls shall consist of stabilization of the right-of-

way and placement of structural BMPs at the low point of each individual lot or equivalent measures to retain soil on each lot during construction. Additionally, the builder must submit a valid NOI before an NOT can be submitted by the owner.

10. Inspection and Maintenance during Construction

The owner shall construct all BMPs and other controls required by the SWPPP. The owner shall have qualified personnel inspect the BMPs at least every two weeks during construction and within 24 hours after a storm event of 0.5 inches or greater. Alternately, inspections may be performed every 7 days with no additional inspections after rain events. Certified inspection reports shall be retained as part of the SWPPP. Within 7 days of the inspection, BMPs identified as damaged or deteriorated shall be repaired or replaced, as appropriate. BMPs shall also be cleaned to maintain adequate capacity.

If a discharge of soil or other pollutant occurs, the BMPs shall be evaluated. Changes or additions shall be made to the BMPs within 7 days to prevent future discharges. In addition, the owner shall implement procedures to remove discharged soil from all portions of the Municipal Separate Storm Sewer System (MS4) that received the discharge, including streets, gutters, inlets, storm drains, channels, creeks, and ponds.

Notes requiring the inspection and maintenance shall be placed on SWPPP drawings. The SWPPP shall identify the responsible party for inspecting and maintaining each BMP. If no party is identified, each owner and operator that submitted a NOI for the site shall be fully responsible for implementing all requirements of the SWPPP.

Inspectors for the City will not allow construction of public improvements to start, nor will they grant final acceptance of public improvements, until the SWPPP is implemented and maintained.

SECTION 4.4. WATER AND SANITARY SEWER

A. Horizontal and Vertical Control

1. Horizontal Control

All plans submitted to the City shall be prepared using the NAD83 State Plane Grid Coordinate System. The City has established horizontal control monumentation that is tied to this coordinate system. Monumentation data is available in the map room or on the City's web page.

2. Vertical Control

Vertical control shall be tied to NGVD 29. The City has established vertical control throughout the City. This information is available in the map room or on the City's web page.

B. Design Requirements – Water

1. Pipe Sizing

- a. Water mains shall be sized for fully developed conditions based on the current Water and Wastewater Master Plan. In addition, 12-inch water mains shall be installed on a ½ mile grid pattern unless fire flow or domestic services require larger lines. Water lines shall be a minimum of 8 inches throughout the distribution system.
- b. Water lines shall be designed based on 1 gpm for each unit or residence up to 100 and 0.60 gpm for each unit or residence over 100. This criteria shall be used to determine the size of the water lines required to serve a development and eligibility for oversized participation.

2. Line Placement

If street improvements are proposed, the water line placement shall be coordinated with the street plans.

a. Vertical

- 1.) The following note shall appear on the water layout plan sheets:

“There shall be a minimum cover of 42 inches over the water pipe as measured from the top of the pipe to the existing ground. Existing ground may be the flow line of the bar ditch, natural ground on the low side of a county-type road, or the proposed finished grade, whichever is lowest.”

- 2.) Water lines along unimproved streets shall have a minimum depth of 5 feet below the lowest ditch elevation to the top of pipe to provide grade for future street improvements.
- 3.) A profile drawing shall also be provided for all water mains 12 inches and larger.
- 4.) When a water main crosses over a sanitary sewer main and the vertical separation is less than nine feet, then the sanitary sewer shall have one joint (20 feet) of PVC pipe conforming to ASTM D-3034, SDR 26 installed centered on the water line. In addition, the joint shall have a minimum of 12 inches of cement stabilized (2:27) backfill directly above the sanitary sewer pipe.
- 5.) When a water main must cross under a sanitary sewer main, the minimum separation shall be 24 inches. In addition, the sanitary sewer shall have installed one joint (20 feet) of ductile iron pipe centered on the water line.

b. Horizontal

- 1.) Water lines shall be located 4.5 feet behind the proposed curb. Lines shall be located to clear the back of curb inlets by at least 2 feet by deflecting the pipe or using bends.
- 2.) The minimum radius to be used for PVC water pipe is as follows:

<u>Diameter (Inches)</u>	<u>Minimum Allowable Radius (Feet)</u>
8	200
10	250
12	300

For pipe sizes larger than 12 inches, the minimum radius shall be: $300 \times D$ (where D = pipe diameter in feet) unless the manufacturer requires a greater radius.

- 3.) When a water line falls between two lots, the water line shall be located entirely within one lot. Water mains adjacent to federal, state, or county roads shall be constructed outside the right-of-way in a separate utility easement.
- 4.) The minimum horizontal separation between any water main and a storm drain facility shall be 2.5 feet or one-half the depth of the water line, whichever is greater.
- 5.) Dead end systems shall be avoided where possible, but if necessary, shall not exceed 2000 feet.

- 6.) The minimum horizontal separation between any water main and a sanitary sewer facility shall be nine feet from the outside edge of pipe to outside edge of pipe.

3. Gate Valves

Gate valves shall be installed at pipe intersections to allow for the isolation of lines for repairs. Valves shall also be placed such that no more than 35 lots will be out of service when a line is out of service. When installed at street intersections, main line valves shall be installed 4.5 feet behind the back of the curb at the point of tangency for the curb return. Valves installed between intersections shall align with common lot lines. Gate valves shall be used on all fire hydrant leads.

The number of gate valves installed shall be one less than the number of leads into the intersection.

4. Fire Hydrants

- a. For all single family detached and duplex residences, excluding townhouses and apartments, fire hydrants shall be spaced to have a fire hose laying distance of no greater than 500 feet. The fire hose laying distance is measured by the laying of fire apparatus hose lines along the right-of-way or access easements from the nearest water supply on a street to the main entrance of the building.
- b. The Fire Marshal may waive the requirement for the lay of hose distance or the installation of a hydrant for subdivisions of 2 lots or less when the existing water supply in the area will not support a hydrant. Appeals to the Fire Marshal's decision shall be made to the Planning and Zoning Commission and City Council. If the development is within 100 feet of an 8" water main, the owner must extend the main to and through the development and provide a fire hydrant.
- c. The minimum fire flow requirements for one- and two-family dwellings having a fire-flow calculation area which does not exceed 3,600 square feet shall be 1,500 gallons per minute. Fire flow and flow duration for dwellings having a fire-flow calculation area in excess of 3,600 square feet shall not be less than that specified in Table B105.1 of the *2003 International Fire Code*.
- d. All fire hydrants must provide a minimum of 35 psi static pressure and a 20 psi residual pressure.
- e. A fire hydrant shall be installed at the end of mains on cul-de-sacs. Other fire hydrants shall be located at street intersections and shall align with common lot lines. Additional fire hydrants may be required between intersections to meet the minimum spacing requirements.

- f. When the street is designated on the Master Thoroughfare Map as an arterial or larger, fire hydrants shall be required on the same side of the street that the building is to be constructed. All streets with medians shall have a fire hydrant on the same side of the street that the building is to be constructed.
- g. Fire hydrants shall be located in accessible protected areas. They shall be located a minimum of 3 feet and no more than 8 feet behind the back of curb. They shall not be located in the sidewalk.
- h. Fire hydrants shall be located outside curb returns and at least 4 feet from a driveway.
- i. A clear space of three feet shall be maintained around all fire hydrants.
- j. Fire hydrant mains shall be placed between 4 feet and 6 feet in depth. Offsets or bends shall be used to bring the fire hydrant up to allowable depths.
- k. Private fire protection systems and private fire hydrant locations shall be approved by the Fire Marshal prior to construction. A fire hydrant shall be installed no more than 150 feet from the fire department connection for an automatic sprinkler system.

5. Automatic Flushing System

An automatic water distribution flushing system unit shall be placed at the end of all deadend lines in accordance with the standard details.

6. Water Services

- a. The minimum size water service line shall be 0.75 inches.
- b. The placement of services shall generally be at the lot line using bullhead services where possible.
- c. Services shall not be directly connected to water mains 16 inches in diameter or greater unless approved by the Public Works Director.
- d. Where water meter banks are installed, permanent metal tags with addresses shall be installed on the service line at the curb stop to link the service with the address. The meters shall be installed in a logical sequence.
- e. Water meters and boxes shall be located in accordance with the standard details.
- f. Plans shall contain the stationing of the water service connections.

7. Miscellaneous

- a. Water mains constructed within a subdivision shall be extended to the perimeter of the subdivision to allow for the future extension of the water system into adjacent properties.
- b. All water lines shall be Class 150, AWWA C900, DR18 or other material as approved by the Public Works Director.
- c. All ductile iron fitting shall meet NCTCOG *Standard Specifications for Public Works Construction* and shall be of domestic manufacture.
- d. When the water facilities fall under the jurisdiction of a provider other than the City, the facilities shall meet or exceed all requirements contained herein. A water analysis must be provided with the development of more than 4 residential lots with the zoning case or preliminary plat. The water analysis must be performed during a peak usage time between 5:00 and 7:00 p.m.

A copy of the plans shall be provided to the City for its records. Prior to construction, a letter must be provided to the City from the service provider stating that they have reviewed and accepted the plans for construction. The City reserves the right to verify water pressures and volumes upon installation. The owner shall bear any cost the City incurs for verification.

For subdivisions containing four (4) lots or fewer, a letter from the water service provider is required stating there are adequate facilities in the area to provide domestic service and fire protection. When the City has reason to believe that there may be water supply or pressure concerns, a water system analysis may be required.

C. Design Requirements – Sanitary Sewer

1. Pipe Sizing

- a. Sanitary sewer mains shall be adequately sized to serve the development and upstream drainage basin. Design must also be based on the current Water and Wastewater Master Plan. Sanitary sewer mains shall be extended through the development to serve abutting property as required. Sanitary sewer mains shall be a minimum of 8 inches in diameter.
- b. Sanitary sewer systems shall be designed based on an average flow of 100 gallons per person per day without separate provisions for infiltration. The population density shall be based on three persons per single family unit, but shall not be less than 9.5 persons per acre.

- c. For outfall and collector sewers, or when the drainage area is larger than 100 acres and the proposed land use (zoning) is unknown, Harmon's Formula shall be used to determine peak dry weather flow.

Harmon's Formula:

M = Ratio of design load to average load

$$M = 1 + \frac{14}{4 + \sqrt{P}}$$

P = Population in thousands, assuming a density of 14 people per acre

Sewer Line sizing procedure is as follows:

$$L = \text{Load / Person / Day} = 100 \text{ gal/person/day}$$

$$A = \text{Average load / person} = L/1440 = 0.694 \text{ gal/min/person}$$

T = Total average load of a given population

$$T = A \times \text{ultimate population within sewer basin}$$

$$D = \text{Design Load} = M \times T = \text{gal/min (gpm)}$$

In certain areas, the design load (D) may need to be increased by an infiltration factor to be provided by the City.

- d. In addition, infiltration shall be estimated at 100 gpd per acre of drainage basin and shall be added to the peak dry weather flow to determine the total peak flow. The peak flow shall be 75 percent of the pipe capacity. Capacities shall be calculated using a Manning's (n) equal to 0.013. The engineer may be required to submit design calculations to the DPW for review.
- e. Other methods may be used with DPW approval. Line sizing is subject to the final approval of the Public Works Director.
- f. A minimum velocity of 2 fps shall be maintained. Associated slopes are listed below:

<u>Diameter (inches)</u>	<u>Slope (ft/ft)</u> <u>n = 0.013</u>
8	0.0040
10	0.0028
12	0.0022
15	0.0015
18	0.0012
21	0.0010
24	0.0008
27	0.00067
30	0.00058
36	0.00046

2. Line Placement

If street improvements are proposed, the sanitary sewer line placement shall be coordinated with the street plans.

a. Vertical

- 1.) Sewer mains shall be installed on a uniform grade between manholes. Particular care shall be taken to avoid rapid grade changes or reduced velocities at the lower section of the sewer main.
- 2.) Sanitary sewer lines constructed along unimproved streets shall be a minimum of 8 feet below the level of the lowest part of the existing street or bar ditch to provide grade for future street improvements.
- 3.) Sanitary sewer mains and services shall be encased in Class 'A' concrete where:
 - the cover is 3 feet or less in paved areas, measured from the top of subgrade
 - the cover is 2 feet or less in parkways
 - the line has 2 feet or less of clearance beneath proposed storm drains or conduits.
- 4.) A profile drawing shall be provided for all sanitary sewer mains.
- 5.) Vertical curves in the sanitary sewer main will not be allowed.

b. Horizontal

- 1.) The minimum radius for PVC sewer pipe shall be determined using the following formula:

$$R = 300 \times D$$

R = minimum allowable radius of curvature

D = pipe diameter

R & D are in the same dimensional units

For pipe sizes greater than 12" only tangent sections will be permitted.

- 2.) Sanitary sewer lines shall be placed at the quarter-point of the street opposite the drainage pipe.
- 3.) When a sewer line falls between two lots, the sewer line shall be located entirely within one lot. Sewer mains adjacent to federal, state,

or county roads shall be constructed outside the right-of-way in a separate utility easement.

- 4.) The minimum horizontal separation between any sewer main and a storm drain facility shall be 2.5 feet or one-half the depth of the water line, whichever is greater.
- 5.) The minimum horizontal separation between any water main and a sanitary sewer facility shall be nine feet from the outside edge of pipe to outside edge of pipe.

3. Manholes and Cleanouts

- a. Manholes shall be required at a maximum spacing of 500 feet on public sewer lines. Manholes are required at direction, pipe size, and grade changes.
- b. A standard manhole is 60 inches in diameter for pipe sizes up to 24 inches. Manholes installed on pipe 24 inches or larger will require a 72" diameter manhole. Special circumstances such as acute angles, numerous connections or pipe diameters exceeding 36 inches may require modifications in size requirements which will be reflected in the design plans.
- c. Drop manholes shall only be used for depths greater than 12 feet or where the difference in the flowline is greater than 18 inches. Internal drops shall be used.
- d. A manhole shall be installed at the end of mains on cul-de-sacs. A maximum of three sanitary sewer services may be installed to the manhole at the end of a cul-de-sac.
- e. Sewer service connections shall discharge into the manhole at the top of the bench.
- f. Where manholes are located within the 100-year floodplain, watertight rings and lids shall be used. Vents shall be provided in accordance with TCEQ requirements.
- g. The top of manholes shall be set at 1 foot below the top of the subgrade when located in future pavement and raised to grade with the pavement construction or 6 inches above existing natural ground outside paved areas.
- h. When tying to existing manholes, the invert must be reworked.
- i. Cleanouts shall not be permitted unless the line will be extended with a future phase of the development.

4. Sanitary Sewer Services

- a. Generally, sanitary sewer services are a minimum of 4-inches in diameter and shall be installed below water services and shall be located 9 feet downstream of the center line of the lot. Exceptions will be considered on an individual basis. Services greater than 4 inches in diameter are required to connect to a manhole installed on the main.
- b. All services shall be a maximum of 10 feet deep unless otherwise approved by the DPW. If the existing or proposed sewer main is deeper than 15 feet, a parallel sewer shall be constructed that is less than 15 feet deep. When the sewer service is between 10 feet and 15 feet deep, the deep sewer service detail shall be used.
- c. Where lot grades are lower than the street, located in the floodplain, or a storm drain crosses the sanitary sewer main, the flow line elevation of the sewer service line at the property line shall be provided.
- d. The plans shall show the stationing of the sanitary sewer service connections.

5. Lift Stations and Separate Treatment Facilities

Lift stations or separate treatment facilities will not be permitted unless, in the opinion of the Public Works Director, there is no feasible alternative that can provide the necessary service to the proposed subdivision.

6. On-site Sewer Facilities

Sub-urban and rural subdivisions may be approved with alternative sewer facilities according to the following criteria:

- a. An on-site sewage facility may be installed to service an individual residence if:
 - 1.) the premise upon which the structure is located is more than 1000 feet from an approved sanitary sewer main.
 - 2.) the location of an alternative sewage facility is not within a designated floodplain.
 - 3.) The DPW agrees in writing that the topography of the site makes normal connection with the existing sanitary sewer main impractical or impossible.
 - 4.) The operation of an alternative sewage facility is feasible on the site and will meet the standards and requirements of the Texas Commission on Environmental Quality rules for on-site sewage facilities, except that the minimum size lot for which an alternative sewage facility can be installed is one acre.

- b. If an alternative sewage facility is approved for use, it shall be installed on a lot or building site that contains a minimum of one acre or be of such greater area as determined by the City. All alternative sewage facility system installation shall comply with Chapter 34 of the Burleson Code of Ordinances.
- c. Under normal circumstances, alternative sewage facilities will not be accepted as appropriate sewer facilities for the subdivision of land within the City.
- d. Within rural subdivisions, other alternative sewage facilities can be considered if satisfactory evidence is submitted certifying that the system meets all requirements of standards of the Texas Commission on Environmental Quality (except lot size), all applicable City ordinances, and the provisions of this manual.
- e. The following shall be provided prior to approval of any plat of the property:
 - 1.) Soil analysis, groundwater evaluation, surface drainage analysis, and separation requirements as required by the Texas Commission on Environmental Quality.
 - 2.) A statement from a licensed engineer or registered sanitarian that the site is suitable for on-site sanitary sewer systems.
- f. Easements for the future construction of sanitary sewer lines to serve the subdivision shall be provided on the plat or by separate instrument.
- g. Whenever the City sanitary sewer is extended to within 200 feet of any lot or tract within the City where an on-site sanitary sewer facility exists, the owner or occupant of each tract or lot shall abate the on-site sanitary sewer facility and shall construct a suitable water closet and connect with an approved sanitary sewer main within 30 days after written notice is provided from the City. In the event the property is required to tie onto a system not belonging to the City, and the system owner denies access to the system, the property owner is relieved of the obligation, until such time as access to the system is possible. Proof of denial of access to the sanitary system shall be through a sworn affidavit from the system owner.

7. Miscellaneous

- a. Sanitary sewer pipe shall be SDR-35 for depths less than 12 feet and SDR-26 for depths greater than 12 feet.
- b. At sanitary sewer junctions within a manhole, the crown of each pipe shall be matched. Where a larger upstream line connects to a smaller downstream line, the flow lines shall be matched.
- c. Aerial crossings of open drainage features shall incorporate the use of trusses, wide flange beams, or the strapping of the line to bridge structures

or culverts to minimize the number of piers within the open drainage feature. Spread footings shall not be used in pier design.

- d. Ductile iron pipe shall generally be used for aerial crossings, trench spans, fill areas, bored and grouted pavement crossings, or where cover is minimal.
- e. Sewer mains constructed within a subdivision shall be extended to the perimeter of the subdivision to allow for the future extension of the sewer system into adjacent properties.
- f. No connection shall be made to any sanitary sewer within the City that will permit the entrance of surface water or waste that has other than domestic characteristics without the authorization of the City Council.
- g. When the sanitary sewer facilities installed fall under the jurisdiction of a provider other than the City, the facilities shall meet or exceed all requirements contained herein. A copy of the plans shall be provided to the City for its records. Prior to construction, a letter must be provided to the City from the service provider stating that they have reviewed and accepted the plans for construction.
- h. All 12-inch and smaller sanitary sewer mains using poly-wrapped ductile iron pipe shall be Class 350 or greater. A greater pipe class may be required to accommodate trench conditions.

D. Utility Easements (Water & Sanitary Sewer)

Utility easements are required for all public water and sanitary sewer lines installed outside of the street right-of-way. Generally, utility easements shall be a minimum of 15 feet wide except when a utility easement is adjacent to another easement or right-of-way. In this case, 10 feet is allowed. When both water and sanitary sewer lines are located in the same easement or other facilities are within the easement, the minimum width shall be 20 feet. Where water or sanitary sewer lines are constructed deeper than 10 feet, the easement width shall be a minimum of 20 feet. For deep lines, the width of the easement shall encompass the trench width and side slopes which are based on one horizontal to one vertical for each side of the trench unless otherwise approved by the DPW.

When a utility easement falls between two lots, the easement shall be contained within one lot. Mains adjacent to federal, state, or county roads shall be constructed outside the right-of-way in a separate utility easement.

When utility easements are not dedicated by plat, the owner shall submit the ownership information, metes and bounds description, and the exhibit of the utility easement to the DPW. The description and easement shall be sealed, signed, and dated by a registered public land surveyor.

The filing process for separate easements can be found in Chapter 3 of this manual.

SECTION 4.5 STREETS

A. Master Thoroughfare Plan

Included in Appendix D is a map illustrating the Master Thoroughfare Plan (MTP). All developments shall comply with the MTP. Contact the DPW for the latest amendments to the MTP.

B. Street Lighting Standards

Streetlights shall be designed and installed in accordance with the following criteria:

1. All lights will be 100 watt HPS.
2. Lights will be placed at all street intersections except at major thoroughfares where median lighting is existing.
3. Lights will be spaced a maximum of 600 feet along local and collector streets. Lights will be spaced a maximum of 200 feet along arterial streets.
4. Lights will be placed no closer than 500 feet except for intersections, in cul de sacs, and where curves or grades require additional lighting.
5. All cul de sacs longer than 200 feet from centerline of street to center point of cul de sac shall have a light at the street intersection and at the end of the cul de sac.
6. All severe curves or areas with poor sight visibility shall be lighted.
7. Lights shall be placed so as to gain the maximum use of existing and proposed physical characteristics.
8. Electric service to the streetlight shall be underground.
9. Streetlights shall not be constructed in conflict with the sidewalk.
10. Decorative lights may be approved on a case by case basis.

C. Gated Entry

All gated entries must include turnaround facilities to accommodate a type "SU" vehicle and provide ingress for a fire truck. Placement of gate location and call box may vary based on trip generation for the development. All gated entries must be equipped with a Knox System Gate Access Key Switch.

Gated entries for apartment complexes must remain open during the hours of 7 to 9 a.m. and 4 to 6 p.m.

Any variation from the typical gated entries included in this section will require approval of the DPW. Refer to Appendix E for gated entry layout designs.

Public streets shall not be gated.

D. Intersection Geometric Design

Typical layouts of various street intersections are included in Appendix F.

E. Sight Distance Criteria

At controlled or uncontrolled intersections of any public street, the minimum intersection sight distance (visibility triangles) shall have the dimensions as illustrated in Figure 1 in Appendix G. Where a driveway intersects a public street, the minimum intersection sight distance shall have the dimensions as illustrated in Figure 2 in Appendix G. Additional sight distance may be required based on topography, roadway curvature, vegetation or other sight hindrance.

Deviations from the minimum intersection sight distance requirements may be allowed provided that the owner has demonstrated that the area proposed will provide adequate sight distance based on AASHTO standards. All deviations must be approved by the DPW.

The City may require a visibility study for street and driveway connections in curves.

F. Residential Driveway Design Criteria

1. Design Standards

The values in Table are standards to be used for the design and construction of driveways:

**TABLE 1
Driveway Design Criteria**

<u>Requirements</u>	<u>Street Class</u>	<u>Residential Driveway</u>
Driveway Throat Width ⁶	Local	10-28 feet
	Minor Collector	10-28 feet
	Major Collector	12-28 feet
	Arterial	12-28 feet
Driveway Curb Radius	Local	2.5-10 feet
	Minor Collector	2.5-10 feet
	Major Collector	10-20 feet
	Arterial	15-30 feet
Minimum Driveway Centerline Spacing	Local	15 feet
	Minor Collector	15 feet
	Major Collector ¹	100 feet
	Arterial ¹	100 feet
Driveway Angle		70-90 degrees
Minimum Distance ² from Driveway to Intersection	Local	30 feet
	Minor Collector	50 feet
	Major Collector	240 feet
	Arterial	250 feet
Max Approach Grade ³	Local/Minor Collector	+9%
	All Others	+6%
Min Approach Length ^{4,5}	Local/Minor Collector	6 feet
	All Others	9 feet

Notes:

- ¹ Head out egress shall be provided. Driveways for single-family infill lots that cannot meet this criteria will be approved on a case by case basis.
- ² Distance measured from the intersection of the extended right-of-way lines to the centerline of the driveway. In no case shall the driveway centerline be closer than 100 feet to the curb return departure of the major street facility.
- ³ The percent slope measured along the centerline of the driveway.
- ⁴ The minimum distance over which the maximum approach grade must be maintained.
- ⁵ The approach grade and length shall be altered to include a sidewalk section through the drive approach as applicable. See typical details for drive approaches.
- ⁶ The maximum driveway width may be increased to 32' if serving a three-car garage.

2. General Design Criteria

Driveway access to a residential lot from any major collector or arterial shall not be permitted unless that lot has no other public access or meets the requirements of the Subdivision Ordinance and this manual. The Public Works Director may require shared access easements.

A residential driveway shared by two or more properties shall have a minimum throat width of 12 feet. A joint-use private access easement shall be required. Shared residential driveways may be required for adjoining residential lots on major street facilities (arterials, minor collectors and collectors) to reduce the number of access points on those roadways.

To provide adequate vehicle storage and maneuvering area, a setback of 25 feet (minimum) shall be required between the street right-of-way and all garages or other structures served by the driveway. For side-yard driveways to local streets, a setback of 20 feet will be allowed. A maneuvering space of 24 feet (minimum) shall be required for all rear-entry garages that may extend into an adjacent access easement or alley.

A circular residential driveway may be allowed on any street type provided that the centerlines of the driveways are at least 50 feet apart and the other requirements in Table I are met. A circular residential driveway accessing two streets shall only be permitted for 31 feet wide residential streets.

If such a driveway is approved on a major street facility, an off-street maneuvering area shall be provided to ensure that vehicles will not back into the public street. Driveway access to a residential lot from a minor collector street may be denied if the lot has access to a local street or the proposed access would create a traffic flow or safety problem.

Driveway connections to rural road sections across bar ditches shall be installed in accordance with the City's standard detail. The culvert shall be sized by the owner's engineer. The minimum culvert size is 18" and shall be RCO. The maximum slope from the edge of driveway to the top of culvert pipe shall be 6:1 and the end of the pipe shall contain sloped end treatment. During the driveway installation, all ditch grading upstream and downstream of the proposed driveway culvert is the responsibility of the property owner.

3. Maintenance

Maintenance of the driveway approach shall be the responsibility of the owner.

G. Right-of-Way

Right-of-way shall be in accordance with the Master Thoroughfare Plan, the Subdivision and Development Ordinance and Zoning Ordinance.

H. Horizontal and Vertical Control

1. Horizontal Control

All plans submitted to the City shall be prepared using the NAD83 State Plane Grid Coordinate System. The City has established horizontal control monumentation that is tied to this coordinate system. Monumentation data is available in the map room or on the City's web page.

2. Vertical Control

Vertical control shall be tied to NGVD 29. The City has established vertical control throughout the City. This information is available in the map room or on the City's web page.

I. Street Design Requirements

1. Design Speed

All streets shall be designed and constructed to provide the following design speeds:

<u>Street Type</u>	<u>Design Speed</u>
Arterial	50 miles per hour
Major Collector	45 miles per hour
Minor Collector	35 miles per hour
Local Street	35 miles per hour

2. Minimum Radius

The required radius for curb returns at intersections shall be as follows:

Arterial/Arterial	80 feet*
Arterial/Major Collector (departure side)	80 feet*
Major Collector/Major Collector	30 feet
Arterial/All Others	35 feet
Major Collector/All Others	30 feet
Local Streets	20 feet
Alleys/All Others	30 feet

*The minimum allowable radius is 35 feet and 30 feet, respectively. See the Intersection Geometric Design in Appendix F.

The minimum radius for the back of curb on a cul-de-sac shall be 40 feet.

3. Vertical Alignment

- a. All streets shall be designed and constructed to a minimum grade of 0.5%; unless the required geotechnical report indicates the soil has a PI greater than or equal to 40, a minimum grade of 1% shall be required.

All streets shall have a maximum grade as follows:

<u>Street Type</u>	<u>Maximum Grade</u>
Arterial	6.0%
Major Collector	8.0%
Minor Collector	8.0%
Local	10.0%

- b. In order to maintain adequate sight distance, all streets shall be designed and constructed to comply with the following minimum vertical curve length for each algebraic percent difference in grade. Grade changes where the algebraic percent difference is less than one percent are not required to use vertical curves.

<u>Street Type</u>	<u>Crest Curves</u>	<u>Sag Curves</u>
Arterial	120	90
Major Collector	80	70
Minor Collector	50	50
Local	30	40

- c. The following maximum intersection grades involving arterial and major collector roadways shall be used at controlled intersections.

<u>Design Street Type</u>	<u>Intersecting With</u>	<u>Design Street Maximum Grade</u>	<u>Distance</u>
Arterial	Arterial	2%	300 feet
Arterial	Major Collector	3%	300 feet
Major Collector	Arterial	3%	200 feet
Major Collector	Major Collector	3%	200 feet
Minor Collector/Local	Arterial/ Collector	4%	150 feet

4. Horizontal Alignment

- a. The following minimum centerline radii shall be used in the design of all street construction:

<u>Type Street</u>	<u>Minimum Centerline Radius</u>
Arterial	1000 feet
Major Collector	800 feet
Minor Collector	500 feet
Local	As approved by the DPW
Cul-de-sacs and Loop Streets	50 feet radius to right-of-way line

- b. Reverse curves shall be separated by a tangent section in accordance with the following table:

<u>Type Street</u>	<u>Minimum Centerline Radius</u>
Arterial	200 feet
Major Collector	100 feet
Minor Collector	50 feet
Local	As approved by the DPW

- c. Major collector or arterial roadways intersecting other major collector/arterial roadways shall have the following minimum horizontal centerline approach tangent section length as measured from the nearest right-of-way line of the intersecting street, unless such requirement is waived by the DPW:

<u>Type Street</u>	<u>Intersecting With</u>	<u>Minimum Approach Tangent</u>
Arterial	Arterial	200 feet
Major Collector	Arterial	150 feet
Major Collector	Major Collector	100 feet

- d. More than two streets intersecting at a point shall be avoided. No street intersecting an arterial street should vary from a 90 degree angle of intersection by more than 5 degrees. Streets intersecting collector streets should not vary from a 90 degree angle of intersection by more than 10 degrees. All other street intersections should not vary from 90 degrees angle of intersection by more than 15 degrees.
- e. The curvilinear requirements described in Article 5 of the Subdivision and Development Ordinance must be accommodated.
- f. All streets should be designed to be in line with existing streets. When conditions require the centerlines to be offset, a minimum of 135 feet offset distance is required. Greater centerline offsets may be required when necessary for traffic safety.

5. Paving Requirements

Both public and private streets shall be designed in accordance with the requirements outlined below.

- a. Standard pavement widths and sections shall be constructed on prepared subgrade in accordance with the City of Burleson Standard Details and Specifications. Pavement widths shall be measured from back of curb except for local rural roadways where the width is measured from edge of pavement. The street classification shall be as shown in the Thoroughfare Plan Map. The widths and thicknesses shall be in accordance with the information provided on the typical section details and the following table.

Street Classification	Width	Thickness Concrete	Thickness HMA/C
Local Rural or Sub-urban (L2U)	30 feet ⁽¹⁾	6 inches	7 inches
Local (L2U)	31 feet	6 inches	7 inches
Minor Collector (C3U)	41 feet	6 inches	7 inches
Major Collector (C4U)	49 feet	7 inches	N/A
Minor Arterial (P5U)	68 feet	8 inches	N/A
Minor Arterial (P4D)	2 x 25 feet	8 inches	N/A
Principal Arterial (P6D)	2 x 37 feet	8 inches	N/A
Private Access Easement / Alley/Fire Lane	20 feet ⁽²⁾	6 inches	N/A

⁽¹⁾ A 12" wide x 18" deep reinforced concrete containment strip shall be constructed along both edges of the pavement.

⁽²⁾ The pavement width of a private access easement shall be increased to 24 feet when it functions as a required fire lane.

- b. All concrete shall be reinforced with #4 bars on 24-inch centers.
- c. All streets shall be constructed with a lime stabilized or cement stabilized subgrade. In order to determine the appropriate stabilization and application rate, the owner shall provide a geotechnical report prepared by an engineer. The application rate shall be specified in the plans. The minimum application rate shall be 30 lbs. per square yard at 8" depth.
- d. In small areas, such as the addition of median openings or auxiliary lanes to existing facilities, lime and cement stabilization can be difficult. In these areas 6-inch flexible base (TxDOT Type A, Grade 1) or 4-inch additional pavement thickness on compacted base may be used.
- e. Pavement widths may be modified for a Planned Development Community with the approval of the Public Works Director, the Director of Community and Economic Development, and the Fire Marshal.

- f. Where rural roadway sections are constructed, the maximum front slope is 6:1 and the maximum back slope is 3:1.

6. Median Openings

Requests for median openings for private or public developments shall be submitted to the DPW for approval. The following shall be submitted with the request:

- A drawing showing the location and distance to the next median opening. The drawing shall also include any driveways, public streets and property lines within 600 feet of the requested opening.
- A letter from property owners on both sides of the street within 600 feet stating their concurrence of the proposed location of the median opening.

Generally, median openings shall be spaced 600 feet apart (measured nose to nose) on principal arterials and 450 feet (600 feet from major intersections) on minor arterials. Median opening noses are typically 12-15 feet beyond the projection of the curb or driveway edge of the facility being served. Median openings may require the construction of left turn lanes. The typical storage length is 150 feet with 150 feet transition. The storage length may be altered based on projected traffic volumes.

If approved, all costs associated with the median opening shall be paid by the owner. The median opening shall be constructed or funds escrowed within 6 months of the date of approval, or the request shall be void.

a. Existing Improved Streets

The owner shall submit construction plans to the DPW for review. Upon acceptance of the plans, a Community Facilities Contract will be required for construction of the opening. All costs associated with the median opening shall be paid by the owner including construction and relocation of utilities and irrigation that may conflict with opening. If the remainder of the median is less than 8 feet wide it must be constructed in accordance with City standard median details. The request for a median opening shall be void if the median opening has not been constructed within 6 months of the date of approval.

b. Unimproved Streets - Construction Plans Available

Owner shall hire an engineer to modify the existing plans to include the median opening and prepare a construction cost estimate. The plans shall be in accordance with the standard details. The owner shall escrow the construction cost of the median opening with the City. The cost shall be escrowed within 6 months or the request shall be void.

c. Proposed Street – No Construction Plans Available

No median opening requests will be considered until an engineering services contract is initiated for the design of the street.

7. Deceleration Lanes

Deceleration lanes shall be constructed in accordance with requirements contained within the Traffic Study.

8. Screening of Double-Frontage Lots

Where residential development backs up to an arterial street, masonry screening shall be provided along the rear lot lines. Natural tree or other acceptable plant cover shall be provided in addition to the masonry screening wall.

9. Sidewalks, Walkways, and Access Ramps

Sidewalks and access ramps must be constructed in accordance with State and Federal regulations. The owner is responsible for submitting all pertinent information with regard to sidewalks and access ramps to the Texas Department of Licensing and Regulation (TDLR) prior to construction as required. The following describes general requirements for sidewalk and access ramp construction:

- a. Sidewalks shall be shown on the subdivision construction drawings. Generally, they shall be constructed by the homebuilder except where the sidewalks do not abut a residential lot or when the residential lot backs up to an existing street. In these cases, the sidewalks shall be constructed with the subdivision public paving improvements. The construction drawings shall clearly identify which sidewalks are to be constructed with the public paving improvements.
- b. Sidewalks shall be placed on both sides of the street within the right-of-way, shall be 4 feet wide and placed 1 foot off the right-of-way line. If necessary, sidewalks may be placed closer to the curb, but no closer than two feet except where site restrictions require the sidewalk to be placed closer to the curb. In these cases, the sidewalk shall be adjacent to the curb and shall be six feet in width. Sidewalks adjacent to the back of curb will generally not be allowed within residential areas due to common obstructions such as mailboxes, streetlights and fire hydrants.
- c. Sidewalks within a connectivity route must be 6' in width. The back edge of connectivity sidewalks must be located one foot behind the right-of-way line. A sidewalk easement must be dedicated behind the right-of-way line to contain the sidewalk.
- d. Sidewalks designated as park trails shall be a minimum of 8' in width.

- e. If obstructions are within the path of a proposed sidewalk, the sidewalk width and placement may be adjusted to allow the obstruction to remain. In these cases, a minimum sidewalk width of three feet shall be maintained. Obstructions in sidewalks will not be permitted.
- f. Access ramps shall be designed and constructed at all street intersections concurrent with the street construction. Mid-block ramps are required for local streets and at signalized locations.
- g. Sidewalks are not required for local rural standards.
- h. The developer may request in writing a determination by the Public Works Director that construction is either not feasible at the time of development for engineering reasons or inappropriate due to the nature of the construction project.

J. Private Facilities

Private street improvements shall be designed in accordance with City standards and shall meet the minimum construction standards for public streets. Inspections of private facilities shall be performed by the City at the owner's expense at the fee set by the City Council.

Prior to initial acceptance of private street improvements, an as-built letter or as-built plans sealed, signed, and dated by the design engineer shall be submitted certifying that the facilities were constructed in accordance with the accepted plans.

SECTION 4.6 DRAINAGE

When a development requires the construction of drainage facilities, the following drainage plan requirements shall be used.

A. Peak Runoff

The City may have flow rates available for watersheds with a drainage area greater than 1,000 acres. If so, these shall be used in the drainage calculations. Where no flow rates are available, unit hydrograph techniques shall be used.

The Rational Method ($Q=CIA$) shall be used for calculating peak runoff from watersheds of 200 acres or less.

1. Runoff Coefficients

Storm water runoff shall be based on a fully developed watershed. The most intense land use or zoning shall be used to determine the runoff coefficient for the fully developed watershed. The following table gives values for runoff coefficients that shall be used in the determination of storm water runoff.

RUNOFF COEFFICIENT "C"				
Zoning or Land Use	Hydrologic Soil Groups			
	A	B	C	D
Parks and Permanent Open Space	.35	.37	.39	.41
SFE Zoning	.43	.45	.47	.50
SF7, SF7D, SF10, and SF16 Zoning	.50	.52	.55	.58
2F Zoning	.60	.63	.66	.70
MH and MHP Zoning	.65	.68	.72	.76
MF and SFA Zoning	.65	.71	.87	.90
NS, GR, C, Zoning and Schools & Churches	.95	.96	.98	1.00
CC, OT, and I Zoning	1.00	1.00	1.00	1.00

SOIL GROUP CLASSIFICATION

- Group A Deep sand, aggregated silts
- Group B Sandy loam
- Group C Clay loam, shallow sandy loam
- Group D Heavy plastic clays

2. Intensity

TP-40 shall be used to determine the rainfall intensity. Refer to Appendix H.

3. Time of Concentration

The time of concentration shall be based on fully developed conditions for the upstream watershed. The total time of concentration shall include overland and channelized flow. The maximum length allowed for the overland portion of the calculation is 50 feet. The remainder of the watershed shall be considered channelized flow. Refer to Appendix I to determine the velocity, which is used to calculate the time of concentration. The minimum time of concentration shall be 10 minutes.

4. Storm Frequency

The following table shows the minimum design frequency to be used when designing drainage facilities:

<u>Type Of Facility</u>	<u>Minimum Design Frequency</u>
On-grade inlets	5 years
Low point inlets	100 years
Storm sewers upstream of low points	5 years
Storm sewers downstream of low points	100 years
Street right-of-way	100 years*
Channels and creeks	100 years
Creek culverts and bridges	100 years
Permanent bar ditch and associated culverts	5 years

*Depending on the amount of flow in the right-of-way, additional drainage infrastructure may be required to reduce the flow in order to protect the health, safety and welfare of the general public.

5. Drainage Areas

The drainage area shall be based on fully developed areas within and contributing to the development, shall follow natural drainage features, and shall not be diverted. Existing or anticipated features modified by the development shall be considered when outlining drainage areas. A drainage area map shall be prepared identifying the contributing drainage areas.

When sizing drainage systems, upstream detention shall not be considered.

B. Roughness Coefficients and Permissible Velocities

The following table provides roughness coefficients and permissible velocities:

Type of Section/Feature	Coefficient of Roughness "n"	Velocity, fps ¹
I. Natural Creeks		
A. Creek Section		
1. Some grass and weeds; little or no brush	0.045	3.0 to 8.0
2. Dense growth of grass or brush	0.055	3.0 to 8.0
3. Dense brush and trees	0.065	3.0 to 8.0
B. Floodplain/Overbank Areas		
1. Grass, Weeds, Some Brush and Trees	0.045	3.0 to 8.0
2. Dense Grass, Weeds or Brush	0.055	3.0 to 8.0
3. Dense Brush and Trees	0.080	3.0 to 8.0
II. Improved Open Channels		
A. Gabion Channels	0.035	3.0 to 10.0
B. Pre-Cast Concrete Block Channels	0.035	3.0 to 10.0
C. Natural Stone Channels	0.035	3.0 to 10.0
D. Grass Vegetated Channels	0.045	3.0 to 8.0
E. Concrete Channels	0.016	5.0 to 15.0
F. Rock Rip-Rap Channels	0.035	5.0 to 10.0
III. Streets		
A. Concrete	0.015	N/A
B. Asphalt	0.015	N/A
VI. Pipe		
A. Reinforced Concrete Pipe	0.013	3.0 to 15.0
B. Corrugated Metal Pipe	0.022	3.0 to 15.0
C. High Density Polyethylene Pipe	0.011	3.0 to 15.0

¹ Froude number should not be between 0.86 and 1.13.

C. Street Capacity Design

1. Streets with Curb and Gutter

Local and minor collector streets shall be designed to flow less than curb deep during a 5-year storm. For major collectors and arterials, one lane in each direction shall remain dry during the design storm. On all streets, the runoff from the 100-year storm shall be contained within the street right-of-way and shall not exceed 0.2 feet above the lowest top of curb.

2. Local Rural Streets

Local rural streets shall be constructed with bar ditches in lieu of curb and gutter. The 100-year storm shall be contained within the right-of-way and the flow shall not exceed the street crown elevation. Transitional materials may be required at driveway culverts to prevent erosion. Culverts under driveways shall be reinforced concrete pipe and a minimum of 18 inches and designed to carry the 5 year storm. The driveway or roadway shall also have an invert above the pipe for positive overflow. If a culvert is not feasible, the driveway shall be constructed with an invert.

D. Closed System Design

Closed systems shall be used when the flow can be carried in a 60-inch diameter pipe or smaller, unless otherwise approved by the Director. The closed system shall be connected to an existing system or extended until it reaches an open channel or natural creek.

1. Drainage Easements

A drainage easement shall be dedicated for all closed systems, unless the closed system is located on the most upstream lot. The minimum width of a drainage easement is 15 feet. When combined with other utilities, the minimum width is 20 feet. The easement may need to be larger to accommodate systems with pipe sizes larger than 60 inches or deep systems.

When a drainage easement falls between two lots the easement shall be contained within one lot.

2. Placement within Street.

Drainage pipe shall be placed at the quarter-point of the street opposite the sanitary sewer.

3. Hydraulic Grade Line (HGL)

The hydraulic grade line (HGL) for the design storm shall be shown on the plans and shall be below the bottom of the subgrade for systems under pavement. For systems outside of the pavement, the HGL shall be lower than all inlet throats and shall not exceed one pipe size above the top of pipe. The HGL shall start at the inside top of pipe or at the HGL of a connecting feature, whichever is higher.

4. Head Losses

The design techniques and methods used in the determination of all head losses shall be approved by the DPW. The City of Fort Worth's *Storm Water Management Design Manual* or TxDOT's *Hydraulic Design Manual* are acceptable guides for calculating head losses.

5. Entrance/Outfall Structures

Headwalls or sloped end treatments shall be constructed at the pipe ends of all storm sewer systems. Sloped end treatments are required along streets when the drainage feature is adjacent and parallel to traffic flow. The sloped end treatment shall be a 6H:1V end section. Storm sewer systems that outfall to a creek shall be extended to the flowline (toe of slope) of the creek. Gabion mattresses shall be installed at the outfall structure to lower velocities and prevent erosion.

6. Pipe

Underground systems shall be constructed, as a minimum, with Class III reinforced concrete pipe. The pipe size shall be a minimum of 18 inches. A higher class of pipe may be required when constructed shallow or deep. The City may allow plastic pipe for certain applications; however, plastic pipe is never allowed under street paving.

Minimum distance from top of curb to top of pipe is typically three feet.

All pipe bends and fittings shall be prefabricated. Collar connections shall be in accordance with the City standards. Pipes shall not be designed with vertical curves.

Radius pipe is allowed and shall be placed in accordance with the manufacturer's lay schedule.

Field connections may be allowed when the main pipe is twice the diameter of the lateral; however, field connections are not allowed when the lateral slope is greater than 10 percent.

7. Access Points

A manhole or inlet with a minimum 36-inch RCP lateral shall be constructed every 500 feet to provide access into the closed system.

8. Inlets

Curb inlets shall be a minimum of 10 feet in length. Recessed curb inlets are required on all concrete streets except local streets. Grate inlets are not allowed on public systems. Drop/Y inlets may be utilized in rear yards to intercept multiple lot to lot drainage or intercept offsite drainage.

E. Open System Design

A development that includes, or is adjacent to a creek, shall submit a hydraulic analysis (flood study) to determine easements and minimum finished floor (MFF) elevations, or to modify existing floodplain or floodway. The requirements for each flood study differ according to the existing creek designation (i.e., within a FEMA

designated floodplain) and whether improvements are proposed for the creek. This section will address the requirements for flood studies.

1. Unimproved Creeks (Natural)

If a developer chooses to leave the creek in its natural undisturbed state, a flood study shall be submitted to determine the easement limits and MFF elevations for the property. The requirements for this type of submittal are included in the Flood Study Matrix in this section.

A drainage easement shall be dedicated containing all land having an elevation below the water surface elevation for the 100-year storm event based on existing conditions or as shown on the FIRM.

Where natural creeks connect to improved systems, permanent transitional materials are required. Additionally, in areas along natural creeks where potential excessive erosion or head cutting may occur, grade control structures, drop structures, or other structures may be required to stabilize the creek. Stabilization materials shall be approved by the Director.

2. Improved Open Channels

If a developer chooses to improve or alter a natural creek, a flood study shall be submitted to the City for acceptance. The study shall define the easement limits and MFF elevations. If the creek is located in a FEMA designated floodplain (Zone A or AE), then the study will be sent to FEMA. Additional hydraulic analyses are required and shall be in accordance with the information outlined in the Flood Study Matrix in this section.

- An improved open channel shall have a concrete-lined bottom, but in no case shall the bottom be less than 8 feet in width. The concrete-lined bottom shall have 6-inch curbs on each side and shall have a bottom thickness of six inches. The concrete-lined bottom shall be at least 3000 psi concrete reinforced with #3 bars on 18" centers. Adequate weep holes shall be provided but in no case shall the weep holes be less than 2" in diameter on 25' spacing. Appropriate filter media shall be provided to protect the weep holes from clogging.
- When the velocity in a proposed earthen channel exceeds 8 feet per second, the City Engineer may require that the side slopes of the channel be lined with concrete, gabions, or another material that will eliminate the potential for erosion.
- In certain instances, a reinforced concrete access ramp may be required for access to improved channels from a public street. The ramp shall be a minimum of 12 feet wide with a maximum slope of 16 percent.
- Earthen channel side slopes shall be a minimum of 4 feet horizontal to 1 foot vertical.

A drainage easement shall be dedicated to include a channel designed to convey the runoff from the 100-year storm plus one foot of freeboard. The drainage easement shall also contain 12 feet on each side of the channel for access and maintenance. Additional easement may be needed at specific locations for access to the feature for maintenance.

Where improved open channels connect to a closed system, natural creeks, or a channel of a different material, a transitional area shall be designed to prevent erosion.

F. FEMA Designated Floodplain

In order to remove all or portions of property from the floodplain, or to improve a creek and construct a channel, a hydraulic analysis must be submitted to the City for acceptance and then to FEMA for approval. There are several types of map changes available through FEMA. The following lists the types of map changes available:

1. CLOMA – Conditional Letter of Map Amendment

A CLOMA is FEMA's concurrence that a proposed structure, upon construction, would be excluded from the Special Flood Hazard Area (SFHA) shown on the effective National Flood Insurance Program (NFIP) map. The letter becomes effective on the date sent. The letter does not revise an effective NFIP map; it indicates whether the project, if built as proposed, will be recognized by FEMA.

2. LOMA – Letter of Map Amendment

A LOMA is an official amendment, by letter, to an effective NFIP map. This is typically used to correct an error on the map and is based on current detailed topographic information. A LOMA establishes a property/structure's location in relation to the SFHA based on natural ground. The letter becomes effective on the date sent.

3. CLOMR-F – Conditional Letter of Map Revision Based on Fill

A CLOMR-F is FEMA's concurrence that a proposed structure/property involving the placement of fill outside of the floodway would exclude an area from the SFHA shown on the NFIP map. The letter becomes effective on the date sent. This letter does not revise an effective NFIP map, it indicates whether the project, if built as proposed, will be recognized by FEMA. The City will only allow a CLOMR-F for small (less than 2 acres), single lot developments where there are no anticipated water surface increases upstream or downstream from the lot.

4. LOMR-F – Letter of Map Revision Based on Fill

A LOMR-F is an official revision, by letter, to an effective NFIP map. A LOMR-F provides FEMA's determination concerning whether a structure or parcel has been elevated on fill above the Base Flood Elevation (BFE) and excluded from the SFHA. The letter becomes effective on the date sent. The City will only allow a LOMR-F for small (less than 2 acres), single lot developments where there are no anticipated water surface increases upstream or downstream from the lot.

5. CLOMR – Conditional Letter of Map Revision

A CLOMR is FEMA's concurrence that a proposed project will affect the hydrologic and/or hydraulic characteristics of a channel or creek and thus result in the modification of the existing regulatory floodway or effective base flood elevations (BFEs). The letter becomes effective on the date sent. This letter does not revise an effective NFIP map; it indicates whether the project, if built as proposed, will be recognized by FEMA.

6. LOMR – Letter of Map Revision

A LOMR is an official revision, by letter, to an effective NFIP map. A LOMR may change flood insurance risk zones, floodplain or floodway boundary delineations, and BFE.

G. Flood Study Submittal Requirements

1. Structures and Property

In order to remove structures or property from a FEMA designed floodplain, either a LOMA or LOMR-F must be submitted. The MT-1 form is used for CLOMA, LOMA, CLOMR-F, and LOMR-F. To remove an entire lot and structure from the SFHA, both the lowest point on the lot and the lowest floor of the structure must be higher than the 100-year flood elevation. The community must determine that the land and any existing or proposed structures to be removed from the SFHA are "reasonably safe from flooding." Follow the directions for the MT-1 form. The information shall be submitted to the City and upon acceptance will be forwarded to FEMA for approval.

2. Unimproved Creeks and Improved Open Channels

The following information shall be submitted for all flood studies.

- a. Letter/report from the Engineer that explains the purpose of the study, (i.e., to define easement limits, determine minimum finished floor elevations,

revise the floodplain/floodway, etc.), describes the project and details all information submitted.

- b. Hydrology
 - A current drainage area map
 - A proposed drainage area map, including all offsite area and adjacent subdivisions
 - All hydrology computations and the methods used
 - Channel cross sections showing property lines, easement lines, 100 year floodplain, and floodway.
 - Any other calculations – including verification that the downstream systems (bridges, pipes, bar ditches, etc.) are designed to handle the increased runoff.
- c. Hydraulics
 - A site map showing existing topography and cross section locations
 - A site map showing proposed contours and cross section locations
 - The required HEC runs (see the following sections for details)
 - Corresponding maps for each HEC run submitted.
- d. Submit the flood study in a bound notebook with all pertinent information included. In addition to the above information, an MT-2 form must be filled out and included in the report if the information will be submitted to FEMA.
- e. City Flood Study Review Fee in accordance with the City's Current Fee Schedule.
- f. FEMA Flood Study Fee (if applicable).

3. Flood Study Matrix

Various HEC runs are required to establish criteria set by the City and FEMA. The matrix below is an attempt to clarify which HEC runs are required for the type of creek and improvements proposed. The matrix is divided into creek type (i.e., whether the creek is proposed to remain in its natural (unimproved) condition or be an improved channel. For each type, the creek is further classified as mapped (FEMA designated Zones A and AE), or unmapped. For the specific type and classification of the creek, the following matrix indicates the HEC runs that are required with the Flood Study submittal. Additional HEC runs may be required depending on the analysis.

Flood Study Matrix							
		City		FEMA			
	FEMA Class	1	2	3	4	5	6
Unimproved Creeks	Mapped Zones A & AE	x	x				
	Unmapped	x	x				
Improved Open Channels	Mapped Zone A	x	x			x	x
	Mapped Zone AE	x	x	x	x	x	x
	Unmapped	x	x				
<u>HEC Runs</u> Type 1: 25-year fully developed conditions model Type 2: 100-year fully developed conditions model Type 3: Duplicate effective model Type 4: Corrected effective model Type 5: Existing or pre-project conditions model Type 6: Revised or post-project conditions model							

Unimproved Creeks (Natural)

The following HEC runs are required when a natural creek is mapped or unmapped. The information will not be submitted to FEMA.

- HEC analysis based on the 100-year storm event for a fully developed watershed. This information will be used to define the minimum finished floor (MFF) elevations and the easement limits.

Improved Open Channels (Earthen/Concrete)

The following HEC runs will be required when the development changes the FIRM maps or cross sections of the creek significantly. Some of the information will be submitted to FEMA (CLOMR/LOMR).

The following information is required by the City for all mapped or unmapped creeks. This information will not be submitted to FEMA.

- HEC analysis based on the 100-year storm event for a fully developed watershed. This information will be used to define the MFF elevations and the easement limits.

The following HEC models are required and will be sent to FEMA for review if the creek is within Zone A:

- HEC model based on existing or pre-project conditions – to reflect current conditions prior to the construction of the project using current cross

sections and flows from development within the drainage area since the date of effective model.

- HEC model based on revised or post-project conditions – based on current flows plus additional flow caused by the development.

The following additional HEC models are required and will be sent to FEMA for review if the creek is within Zone AE:

- Duplicate Effective Model – model used in the effective Flood Insurance Study (can be obtained from FEMA).
 - Corrected Effective Model - corrects any errors that occur in the duplicate effective model, adds cross sections, or incorporates more detailed topographic information.
4. It is the responsibility of the owner to obtain all required local, state and federal permits including, but not limited to, the Corps of Engineers Permit. The City may require documentation of coordination with any state or federal agency.

H. Drainage Easements

1. Unimproved Creeks

The minimum easement is the 100-year fully developed floodplain.

2. Improved Open Channels

The minimum easement is the width of the channel, which shall hold the runoff from the 100-year storm for fully developed conditions plus one foot of freeboard. An additional 12 feet shall be dedicated on either side of the channel for access and maintenance.

I. Bridges and culverts

All bridges and culverts shall be designed in accordance with the current edition of the *Hydraulic Design Manual* prepared by the Texas Department of Transportation. All culverts shall have headwalls and wingwalls upstream and downstream. All culverts shall pass the fully urbanized 100-year frequency storm runoff without allowing runoff to pass over the road. All bridges shall have channel bottom and sloped concrete lining. The low point on the bridge or culvert structure shall be at least two feet above the ultimate 100-year water surface elevation.

J. Storage (Detention/Retention)

Storm water storage may be designed and constructed with any development if located in an area where any of the following situations exist:

- The release rate of storm water runoff from the proposed development exceeds the capacity of the existing downstream drainage system.

- The development will create structural (building) flooding or significantly worsen known structural (building) flooding.

The storage and release rates shall be evaluated for the 5-year and 100-year storm events. The release velocities shall be designed to minimize erosion downstream of the facility. A minimum of one foot of freeboard shall be provided.

All above ground facilities that store more than a total depth of four feet shall be designed to meet all state and federal criteria for small dams.

Acceptable design methods include the Dallas and NCRS methods.

Detention/Retention facilities that serve more than one lot must be contained within a private drainage easement and a maintenance statement must be placed on the plat in accordance with the Subdivision and Development Ordinance. If the plat for the development has already been filed without the private drainage easement, the private drainage easement must be filed by separate instrument and a maintenance statement must be included with the dedication statement.

K. Positive Overflow

Positive overflow shall be evaluated for the entire development. Positive overflow means conveying the difference between the 100-year flow and the design frequency flow in a secondary drainage feature without flooding structures. The secondary drainage feature shall be a flume or other permanent facility authorized by the Public Works Director with a minimum width of four feet. A drainage easement shall be dedicated between lots at or near the low point in the street to allow for positive overflow systems. Flumes shall be constructed in accordance with the section below.

L. Flumes

Flumes constructed between lots or visible from a street shall be constructed with alternative materials or finishes in lieu of traditional reinforced concrete to soften the appearance. Examples of acceptable alternatives are colored concrete, exposed aggregate concrete or concrete pavers. Other alternatives may be submitted with the construction plans and will be evaluated for acceptance.

Flumes are not allowed in lieu of an underground drainage system without approval of the DPW.

M. Concentrated Runoff from Development

In areas where concentrated runoff leaves the development, the following information shall be provided:

- The 5-year and 100-year design discharges.
- The depth of inundation of these discharges.
- The impacts on existing and proposed facilities for the 100-year discharge.

Upon analysis of the information submitted, the owner may be required to provide facilities to address negative impacts from the 100-year discharge.

Where drainage features such as storm sewer systems, ditches, channels, and natural creeks are available to receive concentrated runoff, the design storm shall be collected on-site and connected to the feature.

When offsite grading is required or the development discharges concentrated flow on an adjacent property, a Notarized Letter of Permission from the affected property owner(s) shall be required. The letter shall state that the permission binds all future owners of the property and shall be a covenant running with the land. It shall also reference the subdivision plans. The letter shall be filed with the county by the City. A letter of permission template may be found in Appendix O.

N. Site Grading

An engineered overall site grading plan shall be submitted with the subdivision's paving and drainage plans. The plan shall be consistent with the drainage area map. The plan shall include flow arrows, spot elevations and/or proposed contours. Type 1 or 2 block grading as shown in the HUD (FHA) Data Sheet 72 (Appendix J) is preferred. Type 3 and 4 block grading is allowed only if:

- a flume, channel or underground drainage system is constructed at the rear of the lot to intercept runoff; or
- runoff from no more than 3 lots is accumulated prior to constructing an underground drainage system, flume or channel to intercept the runoff.

The engineer may utilize berms and swales to redirect flows. Grass swales shall have a minimum of 1 percent slope. Retaining walls may be used to direct flow. All retaining walls shall be permitted through the Building Inspections Division.

If the site is complex and an overall site grading plan cannot be developed in accordance with the HUD standards, an individual grading plan for each lot shall be submitted by an engineer prior to issuing the building permit. The individual grading plans shall be coordinated with surrounding lots and the drainage area map for the subdivision. For these complex plans, an "as-built" letter shall be submitted by an engineer prior to final inspection.

O. Minimum Finished Floor Elevation

The City reserves the right to require minimum finished floor elevations on any lot. Minimum finished floor elevations are required for all lots located in the floodplain or near open drainage features and shall be set one foot above the 100-year fully developed water surface elevation. MFF elevations may also be required at T-intersections, low points, or as required by the subdivision design. These elevations are typically set 1 foot above the top of curb. Elevation certificates will be required for lots impacted by the floodplain. Refer to the FEMA website for the most current version.

When minimum finished floors are required, a letter from a Registered Public Land Surveyor shall be provided to the City stating the floor elevation. This letter shall be provided prior to placement of the concrete slab.

P. Miscellaneous

1. Valley Gutters

Transverse valley gutters are not allowed in lieu of an underground drainage system without approval from the DPW. Where approved, the valley gutter shall be a minimum of 8 feet in width for the full width of the street and constructed of reinforced concrete. The street crown transition shall be a minimum of 25 feet in both directions.

2. Temporary Tie-ins to County-type Roadways

Tie-ins to existing county-type roadways planned for future improvements are considered temporary. Culverts under driveways and roadways shall be a reinforced concrete pipe and a minimum of 18 inches and designed to carry the 5-year storm. The driveway or roadway shall also have an invert above the pipe for positive overflow and safety end treatments. If the driveway or roadway is located in an area of shallow bar ditches and a culvert is not feasible, the driveway or roadway shall be constructed with an invert.

3. Private Drainage Improvements

Private drainage improvements shall be designed in accordance with City standards and shall meet the minimum construction standards for public drainage facilities. Inspections of private facilities shall be performed by the City at the owner's expense at the rate set by the City Council.

SECTION 4.7 FIRE ACCESS REQUIREMENTS

A. Construction Requirements

To provide adequate emergency vehicle access, all required fire lanes and public streets shall be installed and accepted before any construction occurs above the slab.

B. Hose Lay Distance

All buildings or structures shall be constructed such that all ground level, exterior sides of the building are within 150 feet of a dedicated street or fire lane. The 150 feet is measured by an approved route around the exterior of the building or facility. If the 150 feet cannot be reached from a public street, a fire lane will be required on site. This distance may be extended to 200 feet for single-family dwellings with approval of the Fire Marshal. Except for single or two-family residences, the path of measurement shall be along a minimum of a ten (10) feet wide unobstructed pathway around the exterior walls of the structure.

C. Unusual Conditions

When fire lanes cannot be installed due to topography, waterways, non-negotiable grades or other similar conditions, the Fire Marshal may require additional fire protection systems.

D. Surface

Fire lanes shall be constructed of a 6" reinforced concrete to provide all-weather driving capabilities, meeting the requirements of the standards contained within this manual and the adopted Fire Code.

E. Vertical Clearance

All fire lanes shall have a minimum vertical clearance of 14 feet to allow a fire truck to pass under.

F. Width

The minimum unobstructed width of a fire lane shall be 24 feet to allow two fire trucks to pass in case of an emergency. For one single-family dwelling, this width may be reduced with approval of the Fire Marshal.

G. Turning Radius

All fire lanes shall have a minimum inside turning radius of 30 feet and an outside turning radius of 54 feet.

H. Grade

The maximum grade for a fire lane or street when serving a building not protected throughout by an automatic sprinkler system is 10 percent.

I. Bridges

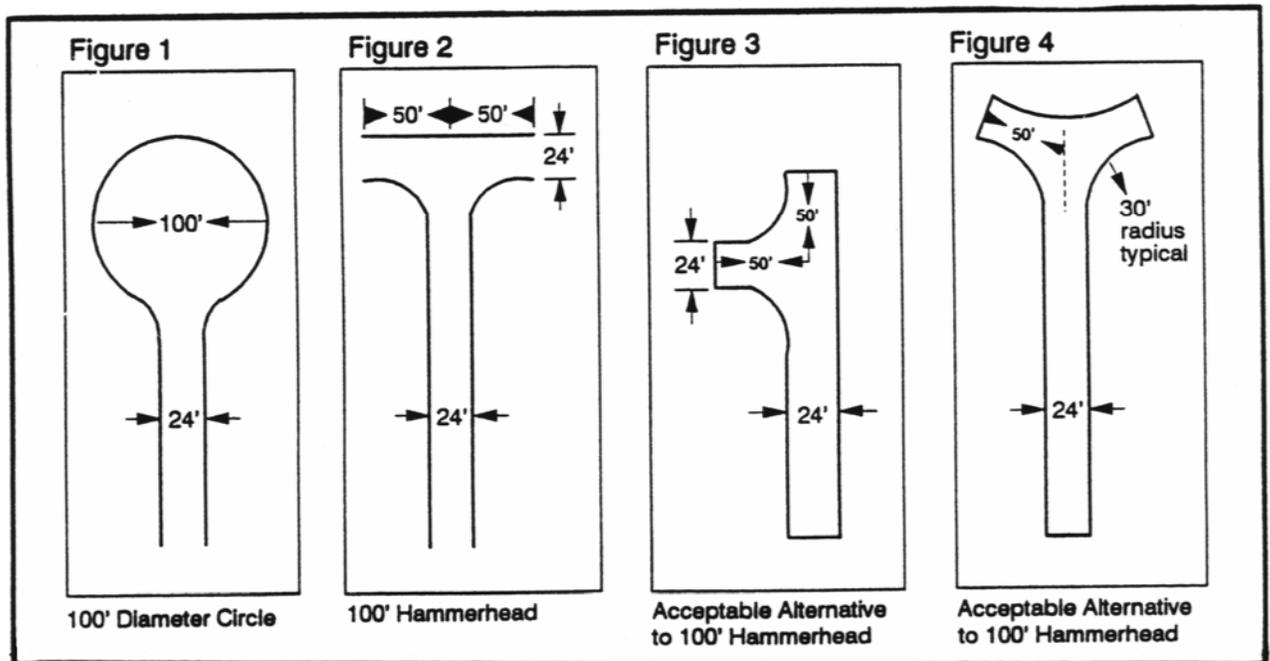
When a bridge is required to be used as access, it shall be constructed and maintained to carry a load of 75,000 pounds.

J. Gates

All gates across streets or fire lanes must be approved by the Fire Marshal and DPW. Plans shall be submitted to the Fire Marshal and DPW and approved prior to a permit being issued. All gates across fire lanes shall be equipped with a Knox entry system. A call box shall be required for all gates.

K. Turn-Around Areas

Dead-end fire lanes shall not exceed 150 feet in length without an approved turn around. Illustrations of approved turn-around arrangements are as follows:



L. Obstruction

The required fire lane width shall not be obstructed by parked vehicles or other obstructions. Speed bumps or similar obstacles that have the effect of slowing or impeding the response of fire apparatus shall be approved by the Fire Marshal prior to installation.

M. Striping

In general, residential streets constructed to the standards contained herein are not required to be striped as fire lanes. However, there may be certain instances where narrow roads are constructed or there is a concern with excessive parking on the street, where the Fire Marshal may require fire lane striping. If fire lane striping is required, the fire lane shall be marked by painted lines of red traffic paint six inches (6") in width to show the boundaries of the lane. The words "NO PARKING FIRE LANE – Tow Away Zone" or "FIRE LANE NP PARKING – Tow Away Zone" shall appear in (4") white letters at 25 feet intervals on the red border markings along both sides of the fire lanes. Where a curb is available, the striping shall be on the vertical face of the curb.

N. Signs

Signs may be substituted for fire lane striping in residential areas with approval of the Fire Marshal. If signs are required, they shall read "NO PARKING FIRE LANE" or "FIRE LANE NO PARKING" and shall be twelve (12) inches wide and eighteen (18) high. Signs shall be painted on a white background with letters and borders in red, using not less than two (2) inch lettering. Signs shall be permanently affixed to a stationary post and the bottom of the sign shall be six (6) feet, six (6) inches above finished grade. A companion "Tow-Away Zone" sign shall be placed directly under this sign. The sign shall read "Tow-Away Zone" and shall be twelve (12) inches wide and six (6) inches high. Signs shall be painted on a white background with letters and borders in red, using not less than two (2) inch lettering. Signs shall be spaced not more than fifty (50) feet apart. Signs may be installed on permanent buildings or walls as approved by the Fire Marshal.

O. Maintenance

All designated fire lanes shall be maintained by the owner or the homeowners association at all times.

SECTION 4.8 CONSTRUCTION REQUIREMENTS

A. Fill

Grading prior to the issuance of a CFC and fill placed within the right-of-way shall follow the requirements in 3.9.B of the Design Standards Manual.

B. Construction Responsibility

The owner shall be responsible for all improvements required for the development of the subdivision, including any necessary offsite facilities and construction staking. If construction is not feasible at the time of site development, the owner may request to escrow the costs with the City. The escrow amount shall be equivalent to the owner's share of the construction cost plus actual engineering cost, plus any cost for right-of-way or easements, plus the cost for utility relocation. The City shall determine whether escrow will be accepted in lieu of construction. The escrow shall not be subject to refund.

C. As-built Plans

Once the subdivision is initially accepted, the owner's engineer shall furnish the City with one mylar set and two paper sets of as-built drawings and electronic files of the plans. The as-built drawings shall be clearly marked as such.

The owner's engineer shall furnish the City an electronic file of the construction drawings in AutoCAD R14 or higher in .DXF or .DWG format. The information shall be provided to the City on CD-ROM. The following layer names shall be used:

DATA	LAYER NAME
Water Lines	C-WTR-WL
Water Line Text	C-STR-WL-TXT
Water Line Valves	C-WTR-GV
Water Line Valve Text	C-WTR-GV-TXT
Water Line Fire Hydrants	C-WTR-FH
Water Line Fire Hydrant Text	C-STR-FH-TXT
Sewer Lines	C-SWR-SL
Sewer Line Text	C-SWR-SL-TX
Sewer Lines Cleanouts	C-SWR-CO
Sewer Lines Cleanout Text	C-SWR-CO-TXT
Sewer Lines Manholes	C-SWR-MH
Sewer Lines Manhole Text	C-SWR-MH-TXT
Closed storm sewer system	STORM
Back of curb	CURB
Right-of-way	ROW
Edge of sidewalk	SIDEWALK
Open storm sewer systems	CHANNEL

All files shall be in the same directory, including all construction documents with their dependencies (XREFS), plot files, and any support files needed. The electronic files shall use only standard AutoCAD fonts with "ROMANS" as the main font.

D. Private Facilities

Prior to acceptance of private improvements, an as-built letter sealed, signed, and dated by the design engineer shall be submitted certifying that the facilities were constructed in accordance with the accepted plans.

THIS PAGE INTENTIONALLY LEFT BLANK.

CHAPTER 5

COMMERCIAL SITES

SECTION 5.1 INTRODUCTION

The purpose of these guidelines is to provide information required to prepare construction plans for commercial, apartment and industrial developments.

SECTION 5.2 PLAN SUBMITTAL

There are four different plan submittals that may be required depending on the nature of the project. The following plan submittal information is general in nature and the City reserves the right to require additional plans as needed for the development.

A. Development Assistance Committee (DAC) Submittal

Requirements for the DAC site plan submittal are provided with the site plan application. The DAC is coordinated by the Department of Community and Economic Development. The DAC usually meets twice per month. Submittal deadlines may be obtained from the Department of Community and Economic Development or from the City's website. Site plans submitted for DAC review must be prepared by a licensed design professional in accordance with state law.

B. Private Improvement Plan Submittal

For larger sites, it may be necessary to provide a supplemental private improvements package to provide additional detail about private improvements associated with the project. For smaller sites, the information may be incorporated into the DAC submittal. Private improvement plans must be prepared by a licensed civil engineer. The following are typical items that must be included with the private improvements submittal:

- Storm Water Management Site Plan (scale no smaller than 1" = 100')
- Storm Water Pollution Prevention Plan (scale no smaller than 1" = 100')
- Drainage Area Map (scale no smaller than 1" = 100')
- Grading Plan
- Detention Pond Design
- Private Drainage Improvement Plans
- Applicable Details

Preliminary submittals shall include three sets of full size plans (22" x 34") for distribution within the City. The engineer shall submit one full size and four half size sets of the plans released for construction.

C. Public Improvement Plan Requirements

These are the plans that will be associated with the Community Facilities Contract. These plans must be prepared by a licensed civil engineer. The following items must be included with the public improvements plans:

- Public Street Construction Plans and Profiles (horizontal scale 1" = 20' or 1" = 40', vertical scale 1" = 4')
- Drainage Area Map (scale no smaller than 1" = 100')
- Public Storm Drain Plan and Profile (horizontal scale 1" = 20' or 1" = 40', vertical scale 1" = 4')
- Water and Sewer Plan
- Water and Sewer Profiles as required by this manual (horizontal scale 1" = 20' or 1" = 40', vertical scale 1" = 4')
- Median Opening/Deceleration Lane Plan
- Applicable Details
- Plat

Preliminary submittals shall include three sets of full size plans (22" x 34") for distribution within the City. Once the plans have been reviewed and accepted by the City, the engineer shall submit two full size and four half size sets of the plans released for construction.

D. Building Permit Plan Requirements

Building plans must be submitted for permit. Building plans may be reviewed concurrently with the above plans. No permit will be issued until the above plans have been reviewed and accepted. Building plan requirements shall be coordinated with the Building Official.

SECTION 5.3 ENVIRONMENTAL MANAGEMENT

A. Storm Water Management Site Plan – Permanent Controls

1. General Requirements

A Storm Water Management Site Plan (SWMSP) shall be prepared for developments that meet the following conditions:

- disturb a surface area of 12,000 SF or more, and

- create or add 5,000 SF or more of impervious surfaces

The SWMSP shall identify permanent site features and controls that will be included in the design and constructed with the project to minimize and mitigate the project’s long-term effects on storm water quality and quantity. A preliminary SWMSP shall be submitted with the plat in accordance with Section 6.2 of the Subdivision and Development Ordinance. The SWMSP shall be submitted with the public infrastructure plans and the site plan.

The SWMSP shall be developed and coordinated with the site drainage plan and may be shown on the same sheet. It shall also be coordinated with the landscaping plan to prevent conflicts and assure compatible land use. The SWMSP shall be sealed by a licensed engineer.

2. Permanent Best Management Practices (BMPs)

BMPs and design criteria to be used for the site shall be accepted by the City before the final plat is approved as required in the Subdivision and Development Ordinance. It is the responsibility of the engineer to design BMPs that address site-specific conditions using appropriate design criteria for the North Central Texas region. The NCTCOG Best Management Practices shall be referenced in the SWMSP, unless another source of design criteria has been specifically approved by the Public Works Director.

The following minimum number of BMPs shall be provided:

BMP Requirements	
<u>Area Disturbed</u>	<u>No. of BMPs (minimum)</u>
12,000 SF ≤ Disturbed Area < 5 acres	1
5 acres ≤ Disturbed Area < 10 acres	2
10 acres ≤ Disturbed Area < 20 acres	3
≥ 20 acres	4

The following items are acceptable permanent BMPs for commercial sites:

- a. Preservation of natural creeks – Refer to the Subdivision and Development Ordinance for requirements when preserving natural creeks.
- b. Site layout – Site layouts should be designed to require the least modification to existing topography and drainage. Factors to be considered are buildings and parking areas oriented to minimize the amount of pavement, drainage systems designed to minimize the change in time of concentration, and improvements designed to avoid existing trees and to minimize change in existing site grades.

- c. Vegetated swales – Vegetated swales may be used if drainage design criteria are met. Vegetated swales shall be designed with a trapezoidal cross section and a gentle slope that yields a maximum velocity of 2 fps for the 2-year storm event. The engineer shall evaluate flow depths to verify no upstream flooding is caused by the vegetated swale during larger events.
- d. Vegetated strips – Vegetated strips may be used to separate impervious areas. Each strip shall be a minimum of 20 feet wide and flow spreaders or other measures must be provided to ensure sheet flow across the strip. Vegetation for the strip shall be included in the site's landscaping plan.
- e. Floatables exclusion systems – Inlet inserts, trash racks on culverts, grates on curb inlets, and similar means of excluding trash are acceptable floatables exclusion systems when installed on private inlets and maintained by the property owner. BMP credit will not be given for grated surface inlets in parking lots.
- f. Permeable and semi-pervious pavement – Permeable and semi-pervious pavement may be used for spillover and excess parking areas. Permeable and semi-pervious pavement may also be used where pavement will only be subjected to foot traffic. The pavement design shall address life expectancy of the proposed material, load-bearing capacity, soil condition, and drainage to assure no standing water.
- g. 100-year drainage easement – Dedication of the unaltered, 100-year, fully-developed flood plain as a drainage easement with the creek left in its natural condition will receive two BMP credits. This BMP is only available when no credit is being given for preservation of natural creeks.
- h. Discharge of roof drains to pervious surface - Roof drains shall discharge to vegetated areas, infiltration trenches, or holding tanks for irrigation use to minimize the increase in runoff from the development.
- i. Retention ponds – Retention ponds may be used if the engineer can show that daily flows, ground water seeps, or other water sources are available to maintain a permanent pool with a healthy aquatic community. A water balance shall be submitted with the plan. Retention ponds shall be a minimum of 4 feet deep, have a 10H:1V slope for areas that are 1 foot deep or less, and be designed to prevent short-circuiting. Fountains, cascades, or other means of aeration shall be provided to prevent the pond from becoming stagnant. The pond shall be evaluated for its effect on the 5- and 100-year storm events to verify that the pond will not induce flooding.
- j. Grease traps – Apartment complexes and similar multi-family residential facilities may receive BMP credit for installing a grease trap that meets all the requirements of the City Code. Credit will not be given if a grease trap is required by the City Code.
- k. Parking lot drainage – Parking lots may be designed to drain to vegetated areas or infiltration trenches instead of directly into storm drains or a paved

channel. The design shall ensure that standing water does not occur. Sheet flow or the use of flow spreaders to disperse flow from a parking lot is preferred when draining to an adjacent vegetated area. Parking lots may also drain to sunken medians when implemented with appropriate landscaping.

- i. Subsurface treatment devices – Oil/water separators, centrifugal treatment devices, and other commercially available devices may be installed as part of the private drainage system. The devices shall be able to treat or pass the 100-year storm event without causing structure flooding.
- m. Rainwater harvesting – Runoff from roofs and other impervious areas that is collected for landscape watering or other uses shall be stored in tanks or covered containers that are not accessible to mosquitoes.
- n. Other BMPs – Other BMPs and innovative designs will be considered when submitted to the DPW with supporting calculations and references.

3. Construction and Maintenance

The owner shall construct all permanent BMPs and is permanently responsible for maintenance of the BMPs. When the BMP falls within a drainage easement, the plat or separate instrument dedicating the easement shall include a statement of the owner's responsibility for maintenance. The statement shall be identical to the one in Article 6, Drainage and Environmental Standards, Section 6.6.E, of the Subdivision and Development Ordinance with the words "storm water treatment facility" substituted for "storm water storage facility."

B. Storm Water Permit Required for Industrial Operations

The SWMSP shall identify if the planned facility operations, after completion of construction, will be classified by a Standard Industrial Classification (SIC) code that requires an industrial storm water permit. If the operations will require a permit, the drainage design shall provide for point discharges from the property and access to the discharge points for required storm water sampling. Storm water controls shall be included for outside storage areas.

C. Storm Water Pollution Prevention Plan (SWPPP) – Temporary Controls During Construction

1. Applicable Regulations and Ordinances

Construction activities shall comply with the SWPPP requirements in Ordinance B-652, Storm Water Pollution Control Ordinance, and the appropriate Environmental Protection Agency (EPA) and Texas Commission on Environmental Quality (TCEQ) regulations. When the ordinance and applicable regulations are in conflict, the most stringent requirements shall apply.

2. General Requirements

Projects that disturb less than 1 acre shall have a SWPPP that complies with the requirements in the Checklist for Small Sites. Projects that disturb 1 acre or more shall comply with the requirements in the Checklist for Large Sites. These checklists are in Appendices B and C, respectively.

The SWPPP shall be sealed by an engineer and submitted to the DPW with the paving and drainage plans for review and acceptance.

3. Best Management Practices (BMPs) During Construction

Structural BMPs shall comply with details and specifications in the latest edition of the NCTCOG BMP Manual titled "*Storm Water Quality Best Management Practices for Construction Activities*" and this manual. When the NCTCOG Manual and this manual are in conflict, this manual shall govern.

The SWPPP shall provide a series of changing BMPs that are appropriate for each phase of construction. The SWPPP shall also identify which owner/operator is responsible for installing, inspecting and maintaining each BMP during the different phases of construction. All temporary BMPs must be removed after final stabilization is achieved.

The following items are acceptable temporary BMPs for use during construction:

- a. Preservation of existing vegetation - This is a preferred BMP. When areas of existing vegetation are to be preserved, the areas shall be delineated on the plans, and the plans shall include notes stating that temporary chain-link fencing shall be installed to protect the vegetation.
- b. Vegetated buffer strips – Buffer strips may consist of preserved or planted vegetation. The strip shall be at least 10 feet wide, identified on the SWPPP, and flagged or otherwise designated in the field to prevent disturbance. Wider strips shall be specified when the slope is steeper than 10H:1V. If existing vegetation is used, it may be removed at the end of the project for establishment of permanent landscaping. The following design criteria shall be met when using vegetated buffer strips:
 - 1.) The drainage area shall not exceed 0.25 acres per 100 feet length of vegetation.
 - 2.) The distance of flow to the vegetated buffer shall be 100 feet or less.
 - 3.) The up-slope grade perpendicular to the vegetated buffer shall not exceed 5H:1V.
- c. Staked hay bales - This BMP is only acceptable as a perimeter control for sheet flow on the down-slope side of the construction site. The ends of the line of bales shall be turned up-slope, perpendicular to the contours, to form a sediment trap. Bales shall not be placed across swales or other areas of concentrated flow or be placed in front of curb inlets. The following design criteria shall be met when using staked hay bales:

- 1.) The drainage area shall not exceed 0.25 acres per 100 feet of bale length.
 - 2.) For slopes of 3H:1V and flatter, the maximum distance of flow to the staked hay bales shall be 100 feet or less.
 - 3.) For slopes of 3H:1V and steeper, the maximum distance of flow to the staked hay bales shall be 20 feet.
 - 4.) The up-slope grade perpendicular to the line of bales shall not exceed 1H:1V.
- d. Silt fence - Silt fences shall have wire mesh backing and be supported by metal posts. When used as a perimeter control, they shall only be placed down-slope from the construction activity, with the ends turned up-slope, perpendicular to the contours, to form a sediment trap. Silt fences may be used for concentrated flows up to a maximum design flow rate of 0.5 cfs. The following design criteria shall be met when using silt fence:
- 1.) The drainage area shall not exceed 0.25 acres per 100 feet of fence length.
 - 2.) For slopes between 50H:1V and 3H:1V, the maximum distance of flow to the silt fence shall be 100 feet.
 - 3.) For slopes of 3H:1V and steeper, the maximum distance of flow to the silt fence shall be 20 feet.
 - 4.) The up-slope grade perpendicular to the fence line shall not exceed 1H:1V.
- e. Curb inlet protection - Inlet protection is the least desirable BMP. It will only be permitted with specific approval for use on private streets and on public streets when no other BMP is viable. Temporary inlet inserts shall be used unless a written request to use other measures is submitted to and approved by the Director. If other measures of protecting the inlet are requested, the engineer shall evaluate them for possible flooding in low areas and flow diversion on steep slopes.
- f. Temporary inlet inserts - Commercially available or fabricated inserts may be used when inlet protection is the only viable BMP. Inlet inserts must be configured to pass the inlet's design flow without causing flooding and are only permitted with specific approval.
- g. Temporary detention structure - If 10 acres or more drain to a common drainage point, the SWPPP shall require the low area to be excavated as a temporary detention structure while the drainage facilities are being constructed. This practice is advisable on smaller drainage areas where practicable.
- h. Rock check dams - Rock check dams are appropriate for areas of concentrated flow such as swales, ditches, and outfalls. Rock shall be contained within a wire mesh. Check dams shall be placed at a spacing that sets the top elevation of a dam at the toe elevation of the next upstream dam, with the top of the furthest upstream dam set at the invert of the last

stabilized portion of the swale or ditch. When check dams are used as an outfall control, the first check dam shall be at least 10 feet from the outfall, but no further than 50 feet from the outfall.

- i. Earthen berms - Earthen berms may be used as a perimeter control to retain runoff within the development. Earthen berms shall be stabilized within 14 days of their construction. The engineer shall analyze the impact of these berms on adjacent sites.
- j. Soil retention blankets – Soil retention blankets shall be anchored per the manufacturer’s recommendations. On lots with slopes of 3H:1V or flatter, the blanketed area shall be at least 8 feet wide. Greater widths and additional BMPs shall be specified on steeper slopes. Soil retention blankets used in channels shall meet TxDOT requirements for Type E-H blankets, as appropriate.
- k. Fibrous mulch - Fibrous mulch may be used as an erosion control to limit the runoff from disturbed areas within the development. Mulch shall be at least 3 inches thick and cover all disturbed areas. When used on steep slopes of 3H:1V or steeper and in critical areas such as waterways, mulch matting must be anchored with netting to hold it in place.
- l. Hydromulch - Hydromulch stabilization may be used as an alternative to seeding for erosion control when all disturbed area is covered by the hydromulch. A strip of hydromulch is not acceptable unless additional structural controls are provided.
- m. Stabilized construction entrance - All construction entrances shall be stabilized with rock or other non-erodible material. If rock is used, the minimum effective diameter shall be 3 inches. Entrances shall be placed at high points or other areas where runoff from the construction site will not be directed to the entrance. The construction entrance shall not extend into the street or block flow in the gutter.
- n. Other BMPs - It is the responsibility of the engineer to design appropriate BMPs for each site. If the most appropriate BMP is not in the NCTCOG BMP Manual, the engineer shall submit calculations and references for design of the BMP to the Public Works Department.

4. Waste and Hazardous Material Controls

Covered containers shall be provided for waste construction materials and daily trash. Hazardous materials shall be stored in a manner that prevents contact with rainfall and runoff. On-site fuel tanks and other containers of motor vehicle fluids shall be placed in a bermed area with a liquid-tight liner or be provided with secondary containment and spill prevention controls.

The SWPPP shall require federal, state and local reporting of any spills and releases of hazardous materials greater than the regulated Reportable Quantity

(RQ) and reporting to the Environmental Management Division of all spills and releases to the storm drainage system.

5. Temporary Stabilization

Portions of a site that have been disturbed but where no work will occur for more than 21 days shall be temporarily stabilized as soon as possible, and no later than 14 days after work temporarily ceases.

Temporary stabilization shall consist of providing a protective cover, without large bare areas, that is designed to reduce erosion on disturbed areas. Temporary stabilization may be achieved using the following BMPs: temporary seeding, soil retention blankets, fibrous mulches, hydro-mulches and other techniques that cover 100 percent of the disturbed areas until either final stabilization can be achieved or until further construction activities take place.

Perimeter BMPs such as silt fence, vegetated buffer strips or other similar perimeter controls are intended to act as controls when stabilization has not occurred. Perimeter BMPs may remain in place during temporary stabilization, however, they are not acceptable as temporary stabilization.

6. Final Stabilization

Final stabilization consists of soil cover such as vegetation, geotextiles, mulch, rock, chemical modification of the soil, or placement of pavement. For vegetative stabilization, perennial vegetation must cover all disturbed areas without large bare areas and with a density of 70 percent of the native background vegetative cover. Vegetated buffer strips are not allowed unless designed and credited as a permanent BMP. All other forms of stabilization must cover 100 percent of the disturbed area.

For stabilizing vegetated drainage ways, sod or seeded soil retention blankets shall be used. Hydromulch will not be allowed in vegetated swales, channels or other drainage ways. BMPs may remain in place during stabilization, however, BMPs shall be removed after stabilization is achieved.

The plan for final stabilization shall be coordinated with the permanent BMPs in the SWMSP and with the landscaping plan, if applicable.

7. Notice of Intent (NOI)

On projects 5 acres in size or larger, the owner and each contractor shall submit a copy of the NOI to the DPW at least 2 days prior to construction. When a contractor is acting as the owner's agent and has the ability to direct changes to the plans and specifications, only the contractor needs to submit a copy of the NOI.

8. TCEQ Construction Site Notice

On projects that are 1 acre and larger but smaller than 5 acres, the owner and each contractor shall complete the Construction Site Notice provided in the TCEQ's New General Permit for Construction and submit a copy of it to the DPW at least two days prior to commencement of construction activities. A signed copy of each Construction Site Notice must be posted at the construction site in a location where it is readily viewed by the general public during all construction activity. When a contractor is acting as the owner's agent and has the ability to direct changes to the plans and specifications, only the contractor must submit and post the Construction Site Notice.

9. Notice of Termination (NOT)

All parties that submitted a NOI shall submit a NOT within 30 days after final stabilization is established.

10. Inspection and Maintenance during Construction

The owner shall construct all BMPs and other controls required by the SWPPP. The owner shall have qualified personnel inspect the BMPs at least every two weeks during construction and within 24 hours after a storm event of 0.5 inches or greater. Alternately, inspections may be performed every 7 days with no additional inspections after rain events. Certified inspection reports shall be retained as part of the SWPPP. Within 7 days of the inspection, BMPs identified as damaged or deteriorated shall be repaired or replaced, as appropriate. BMPs shall also be cleaned to maintain adequate capacity.

If a discharge of soil or other pollutant occurs, the BMPs shall be evaluated. Changes or additions shall be made to the BMPs within seven days to prevent future discharges. In addition, the owner shall implement procedures to remove discharged soil from all portions of the Municipal Separate Storm Sewer System (MS4) that received the discharge, including streets, gutters, inlets, storm drains, channels, creeks, and ponds.

Notes requiring the inspection and maintenance shall be placed on SWPPP drawings. The SWPPP shall identify the responsible party for inspecting and maintaining each BMP. If no party is identified, each owner and operator that submitted a NOI for the site shall be fully responsible for implementing all requirements of the SWPPP.

Inspectors for the City will not allow construction of public improvements to start, nor will they grant final acceptance of public improvements, until the SWPPP is implemented and maintained.

SECTION 5.4 WATER AND SANITARY SEWER

A. Horizontal and Vertical Control

1. Horizontal Control

All plans submitted to the City shall be prepared using the NAD83 State Plane Grid Coordinate System. The City has established horizontal control monumentation that is tied to this coordinate system. Monumentation data is available in the map room or on the City's web page.

2. Vertical Control

Vertical control shall be tied to NAVD88. The City has established vertical control throughout the City. This information is available in the map room or on the City's web page.

B. Design Plan Information

In addition to this design manual, the following resources for water and sanitary sewer requirements are:

- The Water Chapter and the Subdivision and Development Chapter of the City Code
- North Central Texas Council of Governments' *Public Works Construction Standards*.
- The Texas Commission on Environmental Quality (TCEQ)
- The National Sanitation Foundation (NSF)
- The Texas Department of Insurance
- The Insurance Services Office
- City of Burleson Standard Details

C. Design Requirements – Water

1. Pipe Sizing

- a. Water mains shall be sized for fully developed conditions based on the current Water and Wastewater Master Plan. In addition, 12-inch water mains shall be installed on a ½ mile grid pattern and 8-inch water mains shall be installed on a ¼ mile grid pattern. Water lines shall be a minimum of 8 inches throughout the distribution system.
- b. Water lines shall be designed based on the flow and pressure requirements of the adopted fire code.
- c. Water lines serving commercial and multi-family developments shall be looped.

2. Line Placement

If street improvements are proposed, the water line placement shall be coordinated with the street plans.

a. Vertical

- 1.) The following note shall appear on the water layout plan sheets:
"There shall be a minimum cover of 42 inches over the water pipe as measured from the top of the pipe to the existing ground. Existing ground may be the flow line of the bar ditch, natural ground on the low side of a county-type road, or the proposed finished grade, whichever is lowest."
- 2.) Water lines along unimproved streets shall have a minimum depth of 5 feet from the lowest ditch elevation to the top of pipe to provide grade for future street improvements.
- 3.) A profile drawing shall also be provided for all water mains 12 inches and larger.

b. Horizontal

- 1.) Water lines shall be located 4.5 feet behind the proposed curb. Lines shall be located to clear the back of curb inlets by at least 2 feet by deflecting the pipe or using offset bends.
- 2.) The minimum radius to be used for PVC water pipe is as follows:

<u>Pipe Size (Inches)</u>	<u>Minimum Allowable Radius (Feet)</u>
8	200
10	250
12	300

For pipe sizes larger than 12 inches, the minimum radius shall be: $300 \times D$ (where D = pipe diameter in feet), unless the pipe manufacturer recommends a greater radius.

3. Gate Valves

Gate valves shall be installed at pipe intersections to allow for the isolation of lines for repairs. Valves shall also be placed such that no more than 35 lots will be out of service when a line is out of service. When installed at street intersections, main line valves shall be installed 4.5 feet behind the back of the curb at the point of tangency for the curb return. Valves installed between intersections shall align with common lot lines.

4. Fire Hydrants

- a. Fire hydrants shall be spaced to have an effective radius of 300 feet or a fire hose lay distance no greater than 300 feet to the front entrance of the building, whichever results in the closer fire hydrant spacing, or as required in the current Fire Code.
- b. When the street is designated on the Thoroughfare Plan Map as an arterial or larger, fire hydrants shall be required on the same side of the street that the building is to be constructed. All streets with medians shall have a fire hydrant on the same side of the street that the building is to be constructed.
- c. The minimum fire flow and flow duration for buildings other than one-and two-family dwelling shall be as specified in Table B105.1 from the *2003 International Fire Code*.
- d. All fire hydrants must provide a minimum of 35 psi static pressure and a 20 psi residual pressure.
- e. Fire hydrants shall be located in accessible protected areas. They shall be located a minimum of 3 feet and no more than 8 feet behind the back of curb. They shall not be located in the sidewalk.
- f. Fire hydrants shall be located outside curb returns and at least 4 feet from a driveway.
- g. A clear space of three feet shall be maintained around all fire hydrants.
- h. Fire hydrant mains shall be placed between 4 feet and 6 feet in depth. Offsets or bends shall be used to bring the fire hydrant up to allowable depths.
- i. Private fire protection systems shall be approved by the Fire Marshal prior to construction. A fire hydrant shall be installed no more than 150 feet from the fire department connection for an automatic sprinkler system.
- j. Fire hydrants within commercial sites shall be placed on a looped line. If line will be looped with future phases of the development, the City will evaluate the need for the loop on a case by case basis.
- k. A fire hydrant and the fire department connection, when required, shall not be located on the same dead end line. When the fire department connection is required, either the fire department connection or the fire hydrant shall be located on a looped water line.
- l. Fire hydrants and water lines associated with fire hydrants shall be located in a public utility easement or water line easement.

5. Water Services

- a. The minimum size water service shall be 3/4 inch.
- b. Where water meter banks are installed, permanent metal tags with addresses shall be installed on the service line at the curb stop to link the service with the address. The meters shall be installed in a logical sequence.
- c. Water meters shall be located in accordance with the standard details.

6. Miscellaneous

- a. Water mains constructed within a development shall be extended to the perimeter of the development to allow for the future extension of the water system into adjacent properties.
- b. All water lines shall be Class 150, AWWA C900, DR18 or other material as approved by the Public Works Director.
- c. All ductile iron fitting shall meet NCTCOG *Standard Specifications for Public Works Construction* and shall be of domestic manufacture.
- d. When the water facilities fall under the jurisdiction of a provider other than the City, the facilities shall meet or exceed all requirements contained herein. A water analysis must be provided with the zoning case or plat. The water analysis must be performed during a peak usage time between 5:00 and 7:00 p.m.

A copy of the plans shall be provided to the City for its records. Prior to construction, a letter must be provided to the City from the service provider stating that they have reviewed and accepted the plans for construction. The City reserves the right to verify water pressures and volumes upon installation. The owner shall bear any cost the City incurs for verification.

D. Design Requirements – Sanitary Sewer

1. Pipe Sizing

- a. Sanitary sewer mains shall be adequately sized to serve the development and upstream drainage basin. Sanitary sewer mains shall be extended through the development to serve abutting property as required. Sanitary sewer mains shall be a minimum of 8 inches in diameter.
- b. Sanitary sewer systems shall be designed based on 1 gpm of flow for up to 100 units or residences and 0.60 gpm for each unit or residence over 100. When the drainage area is larger than 100 acres and the proposed land use (zoning) is unknown, Harmon's Formula shall be used to determine peak dry weather flow.

Harmon's Formula:

M = Ratio of design load to average load

$$M = 1 + \frac{14}{4 + \sqrt{P}}$$

P = Population in thousands, assuming a density of 14 people per acre

Sewer Line sizing procedure is as follows:

$$L = \text{Load / Person / Day} = 100 \text{ gal/person/day}$$

$$A = \text{Average load / person} = L/1440 = 0.694 \text{ gal/min/person}$$

T = Total average load of a given population

$$T = A \times \text{ultimate population within sewer basin}$$

$$D = \text{Design Load} = M \times T = \text{gal/min (gpm)}$$

- c. In addition, infiltration shall be estimated at 100 gpd per acre of drainage basin and shall be added to the peak dry weather flow to determine the total peak flow. The peak flow shall be 75 percent of the pipe capacity. Capacities shall be calculated using a Manning's (n) equal to 0.013. The Engineer may be required to submit design calculations to the DPW for review.
- d. Other methods may be used with DPW approval. Line sizing is subject to the final approval of the DPW.
- e. A minimum velocity of 2 fps shall be maintained. Associated slopes are listed below:

<u>Diameter (inches)</u>	<u>Slope (ft/ft)</u> <u>n = 0.013</u>
8	0.0040
10	0.0028
12	0.0022
15	0.0015
18	0.0012
21	0.0010
24	0.0008
27	0.00067
30	0.00058
36	0.00046

2. Line Placement

If street improvements are proposed, the sanitary sewer line placement shall be coordinated with the street plans.

a. Vertical

- 1.) Sewer mains shall be installed on a uniform grade between manholes. Particular care shall be taken to avoid rapid grade changes or reduced velocities at the lower section of the sewer main.
- 2.) Sanitary sewer lines constructed along unimproved streets shall be a minimum of 8 feet below the level of the lowest part of the existing street or bar ditch to provide grade for future street improvements.
- 3.) Sanitary sewer mains and services shall be encased in Class 'A' concrete where:
 - the cover is 3 feet or less in paved areas, measured from the top of subgrade
 - the cover is 2 feet or less in parkways
 - the line has 2 feet or less of clearance beneath proposed storm drains or conduits.
- 4.) A profile drawing shall be provided for all sanitary sewer mains.
- 5.) Vertical curves in the sanitary sewer main will not be allowed.

b. Horizontal

- 1.) For pipe sizes up to and including 12 inches, the minimum radius for PVC sewer pipe shall be determined using the following formula:

$$R = 300 \times D$$

R = minimum allowable radius of curvature

D = pipe diameter

R & D are in the same dimensional units

For pipe sizes greater than 12 inches, only tangent sections will be permitted.

- 2.) Sanitary sewer lines shall be placed at the quarter-point of the street opposite the drainage pipe.

3. Manholes and Cleanouts

- a. Manholes shall be required at a maximum spacing of 500 feet on public sewer lines. Manholes are required at direction, pipe size, and grade changes.
- b. A standard manhole is 60 inches in diameter for pipe sizes up to 24 inches. Manholes installed on pipe 24 inches or larger will require a 72" diameter manhole. Special circumstances such as acute angles, numerous

connections or pipe diameters exceeding 36 inches may require modifications in size requirements which will be reflected in the design plans.

- c. Drop manholes shall only be used for depths greater than 12 feet, or where the difference in flowline is greater than 18 inches.
- d. A manhole shall be installed at the end of mains. Cleanouts shall not be permitted, except where the main will be extended as a result of a future development.
- e. Where manholes are located within the 100-year floodplain, watertight rings shall be used. Vents shall be provided in accordance with TCEQ requirements.
- f. The top of manholes shall be set at 1 foot below the top of the subgrade when located in future pavement and raised to grade with the pavement construction, or 6 inches above existing natural ground outside paved areas.
- g. When tying to existing manholes, the invert must be reworked.
- h. Manholes shall be installed as sampling ports on all automotive repair, food handling facilities or any industry deemed to discharge "abnormal sewage". The manhole must be located between the public sewer main and the grease trap.

4. Sanitary Sewer Services

- a. Generally, sanitary sewer services are a minimum of 4-inches in diameter and shall be installed below water services. Exceptions will be considered on an individual basis. Services greater than 4 inches in diameter are required to connect to a manhole installed on the main.
- b. All services shall be a maximum of 10 feet deep unless otherwise approved by the DPW. If the existing or proposed sewer main is deeper than 15 feet, a parallel sewer shall be constructed that is less than 15 feet deep. When the sewer service is between 10 feet and 15 feet deep, the deep sewer service detail shall be used.
- c. For sites where food service is proposed a standard 4' diameter manhole shall be installed on the service line between the grease trap and the connection to the public sewer system. The manhole shall serve as a sampling port for the property and will be a private facility.
- d. Where lot grades are lower than the street, located in the floodplain, or a storm drain crosses the sanitary sewer main, the flow line elevation of the sewer service line at the property line shall be provided.
- e. The plans shall show the stationing of the sanitary sewer service connection.

5. Miscellaneous

- a. Sanitary sewer pipe shall be SDR-35 for depths less than 12 feet and SDR-26 for depths greater than 12 feet.
- b. At sanitary sewer junctions within a manhole, the crown of each pipe shall be matched. Where a larger upstream line connects to a smaller downstream line, the flow lines shall be matched.
- c. Aerial crossings of open drainage features shall incorporate the use of trusses, wide flange beams, or the strapping of the line to bridge structures or culverts to minimize the number of piers within the open drainage feature. Spread footings shall not be used in pier design.
- d. Ductile iron pipe shall generally be used for aerial crossings, trench spans, fill areas, bored and grouted pavement crossings, or where cover is minimal.
- e. Sewer mains constructed within a subdivision shall be extended to the perimeter of the subdivision to allow for the future extension of the water system into adjacent properties.
- f. No connection shall be made to any sanitary sewer within the City that will permit the entrance of surface water or waste that has other than domestic characteristics without the authorization of the City Council.
- g. When the sanitary sewer facilities installed fall under the jurisdiction of a provider other than the City, the facilities shall meet or exceed all requirements contained herein. A copy of the plans shall be provided to the City for its records. Prior to construction, a letter must be provided to the City from the service provider stating that they have reviewed and accepted the plans for construction.
- h. All 12-inch and smaller sanitary sewer mains using poly-wrapped ductile iron pipe shall be Class 350 or greater. A greater pipe class may be required to accommodate trench conditions.

6. On-site sanitary sewer systems

Non-residential subdivisions may be approved with alternative sewer facilities according to the following criteria:

- a. An on-site sewage facility may be installed to service a commercial structure if:
 - 1.) the premise upon which the structure is located is more than 1000 feet from an approved sanitary sewer main.
 - 2.) the location of a septic tank is not within a designated floodplain.

- 3.) The DPW agrees in writing that the topography of the site makes normal connection with the existing sanitary sewer main impractical or impossible.
 - 4.) The operation of an on-site sewage facility is feasible on the site and will meet the standards and requirements of the Texas Commission on Environmental Quality (TCEQ) rules for on-site sewage facilities.
- b. If a septic tank is approved for use, it shall be installed on a lot or building site that contains a minimum of one acre or be of such greater area as determined by the City. All septic system installation shall comply with Chapter 7, Article IV, Section 7-60 et seq., "Private Sewage Facilities" in the Burleson Code of Ordinances.
 - c. Under normal circumstances, on-site sanitary sewage facilities will not be accepted as appropriate sewer facilities for the subdivision of land within the City.
 - d. The following shall be provided prior to approval of any plat of the property:
 - 1.) Soil analysis, groundwater evaluation, surface drainage analysis, and separation requirements as required by the TCEQ.
 - 2.) A statement from a licensed engineer or registered sanitarian that the site is suitable for on-site sanitary sewer systems.
 - e. Easements for the future construction of sanitary sewer lines to serve the subdivision shall be provided on the plat or by separate instrument.

E. Utility Easements (Water & Sanitary Sewer)

Utility easements are required for all public water and sanitary sewer lines installed outside of the street right-of-way. Generally, utility easements shall be a minimum of 15 feet wide except when a utility easement is adjacent to another easement or right-of-way where 10 feet is allowed. When both water and sanitary sewer lines are located in the same easement or other facilities are within the easement, the minimum width shall be 20 feet. Where water or sanitary sewer lines are constructed deeper than 10 feet, the easement width shall be a minimum of 20 feet. For deep lines, the width of the easement shall encompass the trench width and side slopes that are based on one horizontal to one vertical for each side of the trench unless otherwise approved by the DPW.

When utility easements are not dedicated by plat, the owner shall submit the ownership information, metes and bounds description, and the exhibit of the utility easement to the DPW. The description and easement shall be sealed, signed, and dated by a surveyor.

The filing process for separate easements can be found in Chapter 3 of this manual.

F. Certificates of Occupancy

No certificates of occupancy shall be issued until all water and sanitary sewer infrastructure is initially accepted.

SECTION 5.5 STREETS AND SITE STANDARDS

A. Master Thoroughfare Plan (MTP)

Included in Appendix D is a map illustrating the Master Thoroughfare Plan (MTP). All developments shall comply with the MTP. Contact the DPW for the latest amendments to the MTP.

B. Street Lighting Standards

Streetlights placed on public streets shall be designed by the developer and installed by the appropriate electric company in accordance with the following criteria:

1. All lights will be 100 watt HPS.
2. Lights will be placed at all street intersections except at major thoroughfares where median lighting is existing.
3. Lights will be spaced a maximum of 600 feet along local and collector streets. Lights will be spaced a maximum of 200 feet along arterial streets.
4. Lights will be placed no closer than 500 feet except for intersections, in cul de sacs, and where curves or grades require additional lighting.
5. All cul de sacs longer than 200 feet from centerline of street to center point of cul de sac shall have a light at the street intersection and at the end of the cul de sac.
6. All severe curves or areas with poor sight visibility shall be lighted.
7. Lights shall be placed so as to gain the maximum use of existing and proposed physical characteristics.
8. Electric service to the streetlight shall be underground.
9. Streetlights shall not be constructed in conflict with the sidewalk.
10. Decorative lights may be approved on a case by case basis.

C. Intersection Geometric Design

Typical layouts of various street intersections are included in Appendix F.

D. Sight Distance Criteria

At controlled or uncontrolled intersections of any public street, the minimum intersection sight distance (visibility triangles) shall have the dimensions as illustrated

in Figure 1 in Appendix G. Where a driveway intersects a public street, the minimum intersection sight distance shall have the dimensions as illustrated in Figure 2 in Appendix G. Additional sight distance may be required based on topography, roadway curvature, vegetation or other sight hindrance. Sight visibility easements must be dedicated on the plat.

Deviations from the minimum intersection sight distance requirements may be allowed provided that the owner has demonstrated that the area proposed will provide adequate sight distance as required based on AASHTO standards. All deviations from the above requirements must be approved by the DPW.

The City may require the submittal of a visibility study for street or driveway connections located in curves.

E. Parking Lot/Site Layout Design Criteria

Parking lots shall be designed in accordance with the standards as shown in Appendix K. The site shall be designed such that all vehicle maneuvers are accomplished on site.

F. Commercial Driveway Design Criteria

A site plan showing the following shall be submitted for review:

- All existing and future right-of-way and easements
- Curbs, storm drain, inlets and flumes
- Utilities
- Trees
- Sidewalks
- Driveway grade profile (15 feet beyond right-of-way)
- Existing driveways on both sides of the street and median openings (within 150 feet)

1. Design Standards

The values in Table 1 are standards for the design and construction of driveways. For each driveway, the DPW may require a specific combination of dimensions within these ranges based on the anticipated traffic flow and safety characteristics of the driveway and public street.

**TABLE I
Driveway Design Criteria**

<u>Requirements</u>	<u>Street Class</u>	<u>Apartment- Commercial Driveway</u>	<u>Industrial Driveway</u>
Driveway Throat Width	Local	24-36 feet	24-45 feet
	Minor Collector	24-36 feet	30-45 feet
	Major Collector	24-36 feet	30-45 feet
	Arterial	30-36 feet	30-45 feet
Driveway Curb Radius	Local	10-20 feet	15-30 feet
	Minor Collector	15-20 feet	15-30 feet
	Major Collector	15-30 feet	20-30 feet
	Arterial	20-30 feet	20-30 feet
Minimum Driveway Centerline Spacing	Local	100 feet	100 feet
	Minor Collector	150 feet	200 feet
	Major Collector	200 feet	305 feet
	Arterial	250 feet ¹	305 feet ¹
Driveway Angle		90 degrees	90 degrees
Minimum Distance ² from Driveway to Intersection	Local	75 feet	75 feet
	Minor Collector	100 feet	100 feet
	Major Collector	150 feet	150 feet
	Arterial	180 feet	180 feet
Max Approach Grade ^{3,5}	Local/Minor Col.	+6%	+6%
	All Others	+3%	+3%
Min Approach Length ^{4,5}	Local/Minor Col.	9 feet	9 feet
	All Others	20 feet	20 feet

Notes:

¹ Driveways on arterials served by deceleration lanes may be spaced at 200 feet intervals.

² Distance measured from the intersection of the extended right-of-way lines to the centerline of the driveway. In no case shall the driveway centerline be closer than 100 feet to the curb return departure of the major street facility.

³ The percent slope measured along the centerline of the driveway.

⁴ The minimum distance over which the maximum approach grade must be maintained.

⁵ The approach grade and length shall be altered to include a sidewalk section through the drive approach as applicable. See typical details for drive approaches.

For driveways located on TxDOT facilities, refer to the TxDOT Access Management Manual.

2. General Design Criteria

The driveway for any apartment, commercial or industrial property that connects to a major collector or arterial shall extend onto private property a minimum distance of 20 feet before intersecting any internal driveway.

Driveways having a projected design volume of 5,000 or more vehicles per day shall have a minimum of 100 feet continuous approach length without adjacent parking or vehicular cross flow.

All vehicle maneuvering on apartment, commercial and industrial properties into a parking space, up to a loading dock, or into any other area shall be accomplished by off-street maneuvering areas and internal driveways. No back-in or back-out vehicle maneuvering from a driveway shall be allowed to occur on any public street or right-of-way.

Shared access easements may be required by the Public Works Director for commercial properties abutting arterials or collector roadways in order to minimize the number of driveway connections.

Shared driveways shall require the dedication of a private access easement on each affected property and execution of a private maintenance agreement. If the dedication is not shown on the final plat, it shall be filed by separate instrument. The combined size of the access easement must be a minimum of 24 feet wide and 48 feet deep. The easement width shall encompass the entire width of the driveway and shall extend at least one foot onto each property.

The curb return shall not extend beyond the property line, except as provided in shared driveway agreements, or as approved by DPW.

Driveways shall not be located within 4 feet of a fire hydrant, utility pole or other above ground utility and within 6 feet up or downstream of an inlet. The owner may have the above ground utility moved at the owner's expense if the utility company agrees.

Driveway connections to rural road sections across bar ditches shall be installed in accordance with the City's standard detail. The culvert shall be sized by the owner's engineer. The minimum culvert size is 18" and shall be RCP. The maximum slope from the edge of the driveway to the top of the culvert pipe shall be 6:1 and the ends of the pipe shall contain sloped end treatments.

3. Maintenance

Maintenance of the driveway approach shall be the responsibility of the owner.

4. Auxiliary Lanes

As a condition of a driveway permit, the Director may require the applicant to provide a deceleration lane for any driveway located on a major collector or

arterial street facility or interstate frontage road where the right-turn ingress volume exceeds 40 right turns in the design hour of the street or if the use of driveway is determined to cause excessive delay on the roadway (i.e., heavy truck traffic). Such calculation shall be made by the DPW unless a traffic study is provided by the applicant. The deceleration lane shall have 100 feet of storage and 100 feet of transition, at a minimum, unless otherwise authorized by the Director.

When a driveway is approved within a right-turn lane or deceleration lane, the lane shall be extended a minimum of 50 feet in advance of the driveway. No driveway shall be permitted within the transition area of a right-turn or deceleration lane. If the owner is allowed to locate a driveway requiring a deceleration lane within 180 feet of an intersection, the deceleration lane shall be extended to the intersection.

A continuous deceleration lane may be required as a condition of a driveway permit when two or more deceleration lanes are planned, and their proximity necessitates that they be combined for proper traffic flow and safety. The transition taper for a continuous deceleration lane shall not extend into or beyond a public street intersection.

A left-turn lane may be required as a condition of a driveway permit when the projected product of the left-turn ingress volume (50 minimum) and the opposing volume per lane exceeds 420 trips in any design hour. In such cases, the Director will analyze the present and future traffic volumes to verify that the left-turn lane is necessary to maintain minimum levels of traffic flow and safety.

A left turn lane shall be constructed to serve the driveway if it aligns with an existing median opening. An existing left turn lane may require lengthening to provide adequate storage.

Auxiliary lanes may be required on existing county-type roadways if capacity issues exist.

The owner shall be responsible for the design, right-of-way acquisition, adjustment of utilities and construction costs of any auxiliary lane required.

5. Median Openings

Requests for median openings shall be submitted to the DPW for approval. The following shall be submitted with the request:

- A drawing showing the location and distance to the next median opening. The drawing shall also include any driveways, public streets, and property lines within 600 feet of the requested opening.
- A letter from property owners on both sides of the street within 600 feet stating their concurrence of the proposed location of the median opening.

Generally, median openings shall be spaced 600 feet apart (measured nose to nose) on major arterials and 450 feet (600 feet from major intersections) on

minor arterials. Median opening noses are typically 12-15 feet beyond the projection of the curb or driveway edge of the facility being served. Median openings may require the construction of left turn lanes. The typical storage length is 150 feet with 150 feet transition. The storage length may be altered based on projected traffic volumes.

If approved, all costs associated with the median opening shall be paid by the owner. The median opening shall be constructed or funds escrowed within 6 months of the date of approval, or the request shall be void.

a. Existing Improved Streets

The owner shall submit construction plans to the DPW for review. The plans shall be in accordance with the standard details. Upon acceptance of the plans, Community Facilities Contracts will be required for construction of the opening. All costs associated with the median opening shall be paid by the owner including construction and relocation of utilities and irrigation that may conflict with the opening. If the remainder of the median is less than 8 feet wide it must be constructed in accordance with City standard median details. The request for a median opening shall be void if the median opening has not been constructed within 6 months of the date of approval.

b. Unimproved Streets with Construction Drawings Available

Owner shall hire an engineer to modify the existing plans to include the median opening and prepare a construction cost estimate. The plans shall be in accordance with the standard details. The owner shall escrow the construction cost of the median opening with the City. The funds shall be escrowed within 6 months or the request shall be void.

c. Proposed Street – No Construction Plans Available

No median opening requests will be considered until an engineering services contract is initiated for the design of the street.

6. Signalized Driveways

On major collectors or arterials, if a traffic study indicates traffic signal warrants are met to require a signal at a driveway, the owner shall pay for the traffic signal installation costs. The owner may also be required to construct onsite and offsite improvements necessary to provide proper alignment, adequate signal capacity, smooth traffic flow and safety for the public street/driveway intersection.

A traffic signal access easement (minimum 20 feet wide by 60 feet deep) must be provided along the driveway to allow the City to install and/or maintain the signal detectors placed in the driveway.

If a driveway is permitted and installed at an existing signalized intersection, the applicant shall pay any costs and dedicate easements necessary to modify the existing signal and intersection to accommodate the new driveway.

7. Special Driveway Designs

The DPW may require internal driveway improvements, turning movement prohibitions, auxiliary lanes and traffic control devices to address safety or capacity problems within the property that will have a detrimental effect on the adjacent public street system.

All driveways on undivided arterial roadways having a projected exiting left-turn volume that will operate at a level of service "D" or worse may be required to be constructed with a left-turn egress control median. In addition, any driveway having a projected ingress left-turn volume that will have a level of service "D" or worse may be required to have a left-turn ingress control median. If both conditions exist, a right-in/right-out driveway design may be required.

Driveways may be prohibited where adequate sight distance is not available for the established speed limit or the design speed of a future street improvement. Sight distances shall be calculated in accordance with the latest edition of the AASHTO Handbook. If an inspection indicates that driveway sight distance may be insufficient, the applicant will be required to submit vertical and horizontal information to the City that verifies adequate sight distance is available for the proposed driveway location. The Director may deny access or a specific driveway location to any abutting public street if said access cannot be provided in a reasonable and safe manner.

G. Right-of-Way

Right-of-way shall be required in accordance with the Master Thoroughfare Plan (MTP), Subdivision and Development Ordinance and Zoning Ordinance.

H. Horizontal and Vertical Control

1. Horizontal Control

All plans submitted to the City shall be prepared using the NAD83 State Plane Grid Coordinate System. The City has established horizontal control monumentation that is tied to this coordinate system. Monumentation data is available in the map room or on the City's web page.

2. Vertical Control

Vertical control shall be tied to NGVD29. The City has established vertical control throughout the City. This information is available in the map room or on the City's web page.

I. Paving Plan Design Requirements

When the development of a commercial site requires construction of a public street, the following paving plan design requirements shall be used.

1. Design Speed

All streets shall be designed and constructed to provide the following design speeds:

<u>Street Type</u>	<u>Design Speed</u>
Arterial	50 miles per hour
Major Collector	45 miles per hour
Minor Collector	35 miles per hour
Local Street	35 miles per hour

2. Minimum Radius

The required radius for curb returns at intersections shall be as follows:

Arterial/Arterial	80 feet*
Arterial/Collector (departure side)	80 feet*
Collector/Collector	30 feet
Arterial/All Others	30 feet
Collector/All Others	30 feet
Local Streets	20 feet
Alleys/All Others	30 feet

*The minimum allowable radii are 35 feet and 30 feet, respectively. See Intersection Geometric Standards in Appendix F.

The minimum radius for the back of curb on a cul-de-sac shall be 40 feet.

3. Vertical Alignment

- a. All streets shall be designed and constructed to a minimum grade of 0.5 unless the required geotechnical report indicates the soil has a PI greater than or equal to 40, a minimum grade of 1% shall be required.

All streets shall have a maximum grade as follows:

<u>Street Type</u>	<u>Maximum Grade</u>
Arterial	6.0%
Major Collector	8.0%
Minor Collector	8.0%
Local	10.0%

- b. In order to maintain adequate sight distance, all streets shall be designed and constructed to comply with the following minimum vertical curve length for each algebraic percent difference in grade. Grade changes where the algebraic percent difference is less than one percent are not required to use vertical curves.

<u>Street Type</u>	<u>Crest Curves</u>	<u>Sag Curves</u>
Arterial	120	90
Major Collector	80	70
Minor Collector	50	50
Local	30	40

- c. The following maximum intersection grades involving arterial and major collector roadways shall be used at controlled intersections.

<u>Design Street Type</u>	<u>Intersecting With</u>	<u>Design Street Maximum Grade</u>	<u>Distance</u>
Arterial	Arterial	2%	300 feet
Arterial	Major Collector	3%	300 feet
Major Collector	Arterial	3%	200 feet
Major Collector	Major Collector	3%	200 feet
Minor Collector/Local	Arterial/Major Collector	4%	150 feet

4. Horizontal Alignment

- a. The following minimum centerline radii shall be used in the design of all street construction:

<u>Type Street</u>	<u>Minimum Centerline Radius</u>
Arterial	1000 feet
Major Collector	800 feet
Minor Collector	500 feet
Local	As approved by the DPW
Cul-de-sacs and Loop Streets	50 feet radius to right-of-way line

- b. Reverse curves shall be separated by a tangent section in accordance with the following table:

<u>Type Street</u>	<u>Minimum Centerline Radius</u>
Arterial	200 feet
Major Collector	100 feet
Minor Collector	50 feet
Local	As approved by the DPW

- c. Collector or arterial roadways intersecting other collector/arterial roadways shall have the following minimum horizontal centerline approach tangent section length as measured from the nearest right-of-way line of the intersecting street, unless such requirement is waived by the DPW:

<u>Type Street</u>	<u>Intersecting With</u>	<u>Minimum Approach Tangent</u>
Arterial	Arterial	200 feet
Collector	Arterial	150 feet
Collector	Collector	100 feet

- d. More than two street intersecting at a point shall be avoided. No street intersecting an arterial street should vary from a 90 degree angle of intersection by more than 5 degrees. Streets intersecting collector streets should not vary from a 90 degree angle of intersection by more than 10 degrees. All other street intersections should not vary from 90 degrees angle of intersection by more than 15 degrees.
- e. All streets should be designed to be in line with existing streets. When conditions require the centerlines to be offset, a minimum of 135 feet offset distance is required. Greater centerline offsets may be required when necessary for traffic safety.

5. Paving Requirements

Both public and private streets shall be designed in accordance with the requirements outlined below:

- a. Standard pavement widths and sections shall be constructed on prepared subgrade in accordance with the City of Burleson Standard Details and Specifications. Pavement widths shall be measured from back of curb except for local rural roadways where the width is measured from edge of pavement. The street classification shall be as shown in the Thoroughfare Development Plan. The widths and thicknesses shall be in accordance with the information provided on the typical section details and the following table:

Street Type	Width	Thickness Concrete	Thickness HMAc
Local ⁽¹⁾	31 feet or less	6 inches	7 inches
Minor Collector	41 feet	7 inches	8 inches
Major Collector	49 feet	7 inches	N/A
Minor or Major Arterial	As indicated in Thoroughfare Plan	8 inches	N/A
Local Rural	30 feet	6 inches	7 inches
Private Access Easement	20 feet ⁽¹⁾	6 inches	N/A

⁽¹⁾ The pavement width of a private access easement shall be increased to 24 feet when it functions as a required fire lane. The width may be reduced if used for a one way alley-way.

- b. All concrete shall have #4 bars on 24-inch centers.
- c. All streets shall be constructed with a lime stabilized or cement stabilized subgrade. In order to determine the appropriate stabilization and application rate, the owner shall provide a geotechnical report prepared by an engineer. The application rate shall be specified in the plans.
- d. In small areas, such as the addition of median openings or auxiliary lanes to existing facilities, lime and cement stabilization can be difficult. In these areas 6-inch flexible base (TxDOT Type A, Grade 1) or 4-inch additional pavement thickness on compacted base may be utilized.

6. Sidewalks and Access Ramps

Sidewalks and access ramps must be constructed in accordance with State and Federal regulations. The owner is responsible for submitting all pertinent information with regard to sidewalks and access ramps to the Texas Department of Licensing and Regulation (TDLR) prior to construction as required. The following describes general requirements for sidewalk and access ramp construction:

- a. Sidewalks shall be shown on the site construction drawings and shall be constructed by the owner.
- b. Sidewalks shall be placed within the right-of-way, shall be 4 feet wide and placed 1 foot off the right-of-way line. If necessary, sidewalks may be placed closer to the curb, but no closer than two feet except where site restrictions require the sidewalk to be placed closer to the curb. In these cases, the sidewalk shall be adjacent to the curb and shall be six feet in width.
- c. Obstructions shall not be permitted in the sidewalk.

- d. Access ramps shall be designed and constructed at all street intersections. Mid-block ramps are required for local street “T” intersections and signalized intersections.
- e. When required, sidewalks along TxDOT facilities shall be 5 feet wide and located 4 feet off the right-of-way line.

7. Masonry Screening Wall

Where commercial, industrial and apartment development backs up to an arterial street, masonry screening walls shall be provided along the rear lot lines. Natural tree or other acceptable plant cover shall be used in addition to the screening wall.

J. Private Facilities

Private street improvements shall be designed in accordance with City standards and shall meet the minimum construction standards for public streets. Inspections of private facilities shall be performed by the City at the owner’s expense at the fee set by the City Council.

Prior to initial acceptance of private street improvements, an as-built letter sealed, signed, and dated by the design engineer shall be submitted certifying that the facilities were constructed in accordance with the accepted plans.

SECTION 5.6 DRAINAGE

When the development of a commercial site requires the construction of drainage facilities, the following drainage plan design requirements shall be used.

A. Peak Runoff

The City may have flow rates available for watersheds with a drainage area greater than 1,000 acres. If so, these shall be used in the drainage calculations. Where no flow rates are available, unit hydrograph techniques shall be used.

The Rational Method ($Q=CIA$) shall be used for calculating peak runoff from watersheds of 200 acres or less.

1. Runoff Coefficients

Storm water runoff shall be based on a fully developed watershed. The most intense land use zoning shall be used to determine the runoff coefficient for the fully developed watershed. The following table gives values for runoff coefficients that shall be used in the determination of storm water runoff.

RUNOFF COEFFICIENT "C"				
Zoning or Land Use	Hydrologic Soil Groups			
	A	B	C	D
Parks and Permanent Open Space	.35	.37	.39	.41
SFE Zoning	.43	.45	.47	.50
SF7, SF7D, SF10, and SF16 Zoning	.50	.52	.55	.58
2F Zoning	.60	.63	.66	.70
MH and MHP Zoning	.65	.68	.72	.76
MF and SFA Zoning	.65	.71	.87	.90
NS, GR, C, Zoning and Schools & Churches	.95	.96	.98	1.00
CC, OT, and I Zoning	1.00	1.00	1.00	1.00

SOIL GROUP CLASSIFICATION

- Group A Deep sand, aggregated silts
- Group B Sandy loam
- Group C Clay loam, shallow sandy loam
- Group D Heavy plastic clays

2. Intensity

TP-40 shall be used to determine the rainfall intensity. Refer to Appendix H.

3. Time of Concentration

The time of concentration shall be based on fully developed conditions for the upstream watershed. The total time of concentration shall include overland and channelized flow. The maximum length allowed for the overland portion of the calculation is 50 feet. The remainder of the watershed shall be considered channelized flow. Refer to Appendix I to determine the velocity, which is used to calculate the time of concentration. The minimum time of concentration shall be 5 minutes.

4. Storm Frequency

The following table shows the minimum design frequency to be used when designing drainage facilities:

<u>Type of Facility</u>	<u>Minimum Design Frequency</u>
On-grade inlets	5 years
Low point inlets	100 years
Storm sewers upstream of low points	5 years
Storm sewers downstream of low points	100 years
Street right-of-way	100 years
Channels and creeks	100 years
Creek culverts and bridges	100 years
Permanent bar ditch and associated culverts	5 years

Depending on the amount of flow in the right-of-way, additional drainage infrastructure may be required to reduce the flow in order to protect the health, safety and welfare of the general public.

5. Drainage Areas

The drainage area shall be based on fully developed areas within and contributing to the development and shall follow natural drainage features and shall not be diverted. Existing or anticipated features modified by the development shall be considered when outlining drainage areas. However, upstream detention shall not be considered.

B. Roughness Coefficients and Permissible Velocities

The following table provides roughness coefficients and permissible velocities:

Type of Section/Feature	Coefficient of Roughness "n"	Velocity fps ¹
I. Natural Creeks		
A. Creek Section		
1. Some grass and weeds; little or no brush	0.045	3.0 to 8.0
2. Dense growth of grass or brush	0.055	3.0 to 8.0
3. Dense brush and trees	0.065	3.0 to 8.0
B. Floodplain/Overbank Areas		
1. Grass, Weeds, Some Brush and Trees	0.045	3.0 to 8.0
2. Dense Grass, Weeds or Brush	0.055	3.0 to 8.0
3. Dense Brush and Trees	0.080	3.0 to 8.0
II. Improved Open Channels		
A. Gabion Channels	0.035	3.0 to 10.0
B. Pre-Cast Concrete Block Channels	0.035	3.0 to 10.0
C. Natural Stone Channels	0.035	3.0 to 10.0
D. Grass Vegetated Channels	0.045	3.0 to 8.0
E. Concrete Channels	0.016	5.0 to 15.0
F. Rock Rip-Rap Channels	0.035	5.0 to 10.0
III. Streets		
A. Concrete	0.015	N/A
B. Asphalt	0.015	N/A
VI. Pipe		
A. Reinforced Concrete Pipe	0.013	3.0 to 15.0
B. Corrugated Metal Pipe	0.022	3.0 to 15.0
C. High Density Polyethylene Pipe	0.011	3.0 to 15.0

¹ Froude number should not be between 0.86 and 1.13.

C. Street Capacity Design

1. Streets with Curb and Gutter

Local and minor collector streets shall be designed to flow less than curb deep during a 5-year storm. For collectors and arterials, one lane in each direction shall remain dry during the design storm. On all streets, the runoff from the 100-year storm shall be contained within the street right-of-way and shall not exceed 0.2 feet above the lowest top of curb.

2. Local Rural Streets

Local rural streets shall be constructed with bar ditches in lieu of curb and gutter. The 100-year storm shall be contained within the right-of-way and the flow shall not exceed the street crown elevation. Transitional materials may be required at driveway culverts to prevent erosion. Culverts under driveways shall be reinforced concrete pipe and a minimum of 18 inches and designed to carry the 5 year storm. The driveway or roadway shall also have an invert above the pipe for positive overflow. If a culvert is not feasible, the driveway shall be constructed with an invert.

D. Closed System Design

Closed systems shall be used when the flow can be carried in a 60-inch diameter pipe or smaller, unless otherwise approved by the Director. The closed system shall be connected to an existing system or extended until it reaches an open channel or natural creek.

1. Drainage Easements

A drainage easement shall be dedicated for all closed public systems. The minimum width of a drainage easement is 15 feet. When combined with other utilities, the minimum width is 20 feet. The easement may need to be larger to accommodate systems with pipe sizes larger than 60 inches or deep systems.

A private drainage easement shall be dedicated for ponds in which runoff for more than one lot contribute to the pond. The City will not maintain the pond.

2. Hydraulic Grade Line (HGL)

The hydraulic grade line (HGL) for the design storm shall be shown on the plans and shall be below the bottom of the subgrade for systems under pavement. For systems outside of the pavement, the HGL shall be lower than all inlet throats and shall not exceed one pipe size above the top of pipe. The HGL shall start at the inside top of pipe or at the HGL of a connecting feature, whichever is higher.

3. Head Losses

The design techniques and methods used in the determination of all head losses shall be approved by the DPW. The City of Fort Worth's Storm Water Management Design manual or TxDOT's Hydraulic Design Manual are acceptable guides for calculating head losses.

4. Entrance/Outfall Structures

Headwalls or sloped end treatments shall be constructed at the pipe ends of all storm sewer systems. Sloped end treatments are required along streets when the drainage feature is adjacent and parallel to traffic flow. The sloped end treatment shall be a 6H:1V end section. Storm sewer systems that outfall to a creek shall be extended to the centerline of the creek. Gabion mattresses shall be installed at the outfall structure to lower velocities and prevent erosion.

5. Pipe

Underground systems shall be constructed, as a minimum, with Class III reinforced concrete pipe. The pipe size shall be a minimum of 18 inches. A higher class of pipe may be required when constructed shallow or deep. The City may allow plastic pipe for certain applications; however, plastic pipe is never allowed under public street paving.

All pipe bends and fittings shall be prefabricated. Collar connections shall be in accordance with the City standards.

Radius pipe is allowed and shall be placed in accordance with the manufacturer's lay schedule. Pipes shall not be designed with vertical curves.

Field connections may be allowed when the main pipe is twice the diameter of the lateral; however, field connections are not allowed when the lateral slope is greater than 10 percent.

6. Access Points

A manhole or inlet with minimum 36-inch RCP lateral shall be constructed every 500 feet to provide access into the closed system.

7. Inlets

Curb inlets shall be a minimum of 10 feet in length. Recessed curb inlets are required on all concrete streets except local streets. Grate inlets are not allowed on public systems. Drop/Y inlets may be utilized to intercept offsite drainage.

E. Open System Design

A development that includes, or is adjacent to a creek, shall submit a hydraulic analysis (flood study) to determine easements and minimum finished floor (MFF)

elevations, or to modify existing floodplain or floodway. The requirements for each flood study differ according to the existing creek designation (i.e., within a FEMA designated floodplain) and whether improvements are proposed for the creek. This section will address the requirements for flood studies.

1. Unimproved Creeks (Natural)

If a developer chooses to leave the creek in its natural undisturbed state, a flood study shall be submitted to determine the easement limits and MFF elevations for the property. The requirements for this type of submittal are included in the Flood Study Matrix in this section.

A drainage easement shall be dedicated containing all land having an elevation below the water surface elevation for the 100-year storm event based on existing conditions or as shown on the FIRM.

Where natural creeks connect to improved systems, permanent transitional materials are required. Additionally, in areas along natural creeks where potential excessive erosion or head cutting may occur, grade control structures, drop structures, or other structures may be required to stabilize the creek. Stabilization materials shall be approved by the Director of the DPW.

2. Improved Open Channels

If a developer chooses to improve or alter a natural creek, a flood study shall be submitted to the City for acceptance. The study shall define the easement limits and MFF elevations. If the creek is located in a FEMA designated floodplain (Zone A or AE), then the study will be sent to FEMA. Additional hydraulic analyses are required and shall be in accordance with the information outlined in the Flood Study Matrix in this section.

- An improved open channel shall have a concrete-lined bottom, but in no case shall the bottom be less than 8 feet in width. The concrete-lined bottom shall have 6-inch curbs on each side and shall have a bottom thickness of six inches. The concrete-lined bottom shall be at least 3000 psi concrete reinforced with #3 bars on 18" centers. Adequate weep holes shall be provided but in no case shall the weep holes be less than 2" in diameter on 25' spacing. Appropriate filter media shall be provided to protect the weep holes from clogging.
- When the velocity in a proposed earthen channel exceeds 8 feet per second, the City Engineer may require that the side slopes of the channel be lined with concrete, gabions, or another material that will eliminate the potential for erosion.
- In certain instances, a reinforced concrete access ramp may be required for access to improved channels from a public street. The ramp shall be a minimum of 12 feet wide with a maximum slope of 16 percent.

- Earthen channel side slopes shall be a minimum of 4 feet horizontal to 1 foot vertical.

A drainage easement shall be dedicated to include a channel designed to convey the runoff from the 100-year storm plus one foot of freeboard. The drainage easement shall also contain 12 feet on each side of the channel for access and maintenance. Additional easement may be needed at specific locations for access to the feature for maintenance.

Where improved open channels connect to a closed system, natural creeks, or a channel of a different material, a transitional area shall be designed to prevent erosion.

F. FEMA Designated Floodplain

In order to remove all or portions of property from the floodplain, or to improve a creek and construct a channel (concrete, earthen or other approved material), the hydraulic analyses must be submitted to the City for acceptance and then to FEMA for approval. There are several types of map changes available through FEMA. The following lists the types of map changes available:

1. CLOMA – Conditional Letter of Map Amendment

A CLOMA is FEMA's concurrence that a proposed structure, upon construction, would be excluded from the Special Flood Hazard Area (SFHA) shown on the effective National Flood Insurance Program (NFIP) map. The letter becomes effective on the date sent. The letter does not revise an effective NFIP map; it indicates whether the project, if built as proposed, will be recognized by FEMA.

2. LOMA – Letter of Map Amendment

A LOMA is an official amendment, by letter, to an effective NFIP map. This is typically used to correct an error on the map and is based on current detailed topographic information. A LOMA establishes a property/structure's location in relation to the SFHA based on natural ground. The letter becomes effective on the date sent.

3. CLOMR-F – Conditional Letter of Map Revision Based on Fill

A CLOMR-F is FEMA's concurrence that a proposed structure/property involving the placement of fill outside of the floodway would exclude an area from the SFHA shown on the NFIP map. The letter becomes effective on the date sent. This letter does not revise an effective NFIP map, it indicates whether the project, if built as proposed, will be recognized by FEMA. The City will only allow a CLOMR-F for small (less than 2 acres) single lot developments where there are no anticipated water surface increases upstream or downstream from the lot.

4. LOMR-F – Letter of Map Revision Based on Fill

A LOMR-F is an official revision, by letter, to an effective NFIP map. A LOMR-F provides FEMA's determination concerning whether a structure or parcel has been elevated on fill above the Base Flood Elevation (BFE) and excluded from the SFHA. The letter becomes effective on the date sent. The City will only allow a LOMR-F for small (less than 2 acres) single lot developments where there are no anticipated water surface increases upstream or downstream from the lot.

5. CLOMR – Conditional Letter of Map Revision

A CLOMR is FEMA's concurrence that a proposed project will affect the hydrologic and/or hydraulic characteristics of a channel/creek and thus result in the modification of the existing regulatory floodway or effective base flood elevations (BFEs). The letter becomes effective on the date sent. This letter does not revise an effective NFIP map; it indicates whether the project, if built as proposed, will be recognized by FEMA.

6. LOMR – Letter of Map Revision

A LOMR is an official revision, by letter, to an effective NFIP map. A LOMR may change flood insurance risk zones, floodplain and/or floodway boundary delineations, and BFE.

G. Flood Study Submittal Requirements

1. Structures and Property

In order to remove structures or property from a FEMA designed floodplain, either a LOMA or LOMR-F must be submitted. The MT-1 form is used for CLOMA, LOMA, CLOMR-F, and LOMR-F. To remove an entire lot and structure from the SFHA, both the lowest point on the lot and the lowest floor of the structure must be higher than the 100-year flood elevation. The community must determine that the land and any existing or proposed structures to be removed from the SFHA are "reasonably safe from flooding." Follow the directions for the MT-1 for submittal. The information shall be submitted to the City and upon acceptance will be forwarded to FEMA for approval.

2. Unimproved Creeks and Improved Open Channels

The following information shall be submitted for all flood studies.

- a. Letter/report from the Engineer that explains the purpose of the study, (i.e., to define easement limits, determine minimum finished floor elevations, revise

the floodplain/floodway, etc.), describes the project and details all information submitted.

b. Hydrology

- A current drainage area map
- A proposed drainage area map, including all offsite area and adjacent subdivisions
- All hydrology computations and describe the methods used
- Channel cross sections showing the property lines, easement lines, 100 year floodplain, and floodway.
- Any other calculations – including verification that the downstream systems (bridges, pipes, bar ditches, etc.) are designed to handle the increased runoff.

c. Hydraulics

- A site map showing existing topography and cross section locations
- A site map showing proposed contours and cross section locations
- The required HEC runs (see the following sections for details)
- Corresponding maps for each HEC run submitted.

d. Submit the flood study in a bound notebook with all pertinent information included. In addition to the above information, an MT-2 form must be completed and included in the report if the information will be submitted to FEMA.

e. City Flood Study Review Fee in accordance with the City's Current Fee Schedule.

d. FEMA Flood Study Fee (if applicable).

3. Flood Study Matrix

Various HEC runs are required to establish criteria set by the City and FEMA. The matrix below is an attempt to clarify which HEC runs are required for the type of creek and improvements proposed. The matrix is divided into creek type (i.e., whether the creek is proposed to remain in its natural (unimproved) condition or be improved as an earthen or concrete channel. For each type, the creek is further classified as mapped (FEMA designated Zones A and AE), or unmapped. For the specific type and classification of the creek, the following matrix indicates the HEC runs that are required with the Flood Study submittal. Additional HEC runs may be required depending on the analysis.

Flood Study Matrix							
		City		FEMA			
	FEMA Class	1	2	3	4	5	6
Unimproved Creeks	Mapped Zones A & AE	x	x				
	Unmapped	x	x				
Improved Open Channels	Mapped Zone A	x	x			x	x
	Mapped Zone AE	x	x	x	x	x	x
	Unmapped	x	x				
<u>HEC Runs</u> Type 1: 25-year fully developed conditions model Type 2: 100-year fully developed conditions model Type 3: Duplicate effective model Type 4: Corrected effective model Type 5: Existing or pre-project conditions model Type 6: Revised or post-project conditions model							

a. Unimproved Creeks (Natural)

The following HEC runs are required when a natural creek is mapped or unmapped. The information will not be submitted to FEMA.

- HEC analysis based on the 100-year storm event for a fully developed watershed. This information shall be used to define the minimum finished floor (MFF) elevations and the easement.

b. Improved Open Channels (Earthen/Concrete)

The following HEC runs will be required when the development changes the FIRM maps or cross sections of the creek significantly. Some of the information will be submitted to FEMA (CLOMR/LOMR).

The following information is required by the City for all mapped or unmapped creeks. This information will not be submitted to FEMA.

- HEC analysis based on the 100-year storm event for a fully developed watershed. This information shall be used to define the MFF elevations and the easement.

The following HEC models are required and will be sent to FEMA for review if the creek is within Zone A:

- HEC model based on existing or pre-project conditions – to reflect current conditions prior to the construction of the project using current

cross sections and flows from development within the drainage area since the date of effective model.

- HEC model based on revised or post-project conditions – based on current flows plus additional flow caused by the development.

The following additional HEC models are required and will be sent to FEMA for review if the creek is within Zone AE:

- Duplicate Effective Model – model used in the effective Flood Insurance Study (can be obtained from FEMA).
- Corrected Effective Model - corrects any errors that occur in the duplicate effective model, adds cross sections, or incorporates more detailed topographic information.

It is the responsibility of the owner to obtain all required local, state and federal permits including, but not limited to, the Corps of Engineers. The City may require documentation of coordination with any state or federal agency.

H. Drainage Easements

1. Unimproved Creeks

The minimum easement is the 100-year fully developed floodplain.

2. Improved Open Channels

The minimum easement is the width of the channel, which shall hold the runoff from the 100-year storm for fully developed conditions plus one foot of freeboard. An additional 12 feet shall be dedicated on either side of the channel for access and maintenance.

I. Storage (Detention/Retention)

Storm water storage shall be designed and constructed with any non-residential development, including apartments, equal to or greater than one acre in size. The size of the development shall be based upon the total acreage included in the preliminary plat.

The storage and release rates shall be evaluated for the 5-year and 100-year storm events. The release velocities shall be designed to minimize erosion downstream of the facility. A minimum of one foot of freeboard shall be provided.

All above ground facilities that store more than a total depth of 4 feet shall be designed to meet all state and federal criteria for small dams.

Acceptable design methods include the Dallas and NCRS methods.

J. Positive Overflow

Positive overflow shall be evaluated for the entire development. Positive overflow means conveying the difference between the 100-year flow and the design frequency flow in a secondary drainage feature without flooding structures.

K. Flumes

Flumes visible from a street shall be constructed with alternative materials or finishes in lieu of traditional reinforced concrete to soften the appearance. Examples of acceptable alternatives are colored, stamped concrete, exposed aggregate concrete or concrete pavers. Other alternatives may be submitted with the construction plans and will be evaluated for acceptance.

Flumes are not allowed in lieu of an underground drainage system without approval of the DPW.

L. Concentrated Runoff from Development

In areas where concentrated runoff leaves the development, the following information shall be provided:

- The 5-year and 100-year design discharges.
- The depth of inundation of these discharges.
- The impacts on existing and proposed facilities for the 100-year discharge.

Upon analysis of the information submitted, the owner may be required to provide facilities to address negative impacts from the 100-year discharge.

Where drainage features such as storm sewer systems, ditches, channels, and natural creeks are available to receive concentrated runoff, the design storm shall be collected on-site and connected to the feature.

When offsite grading is required or the development discharges concentrated flow on an adjacent property, a Notarized Letter of Permission from the affected property owner(s) shall be required. The letter shall state that the permission binds all future owners of the property and shall be a covenant running with the land. It shall also reference the subdivision plans. The letter shall be filed with the County by the City. An letter of permission template may be found in Appendix O.

M. Site Grading

The construction drawings shall include a site-grading plan designed in accordance with the drainage area map. The site-grading plan shall show existing and proposed contours and any additional information to clearly show how the site will be graded.

N. Minimum Finished Floor Elevation

The City reserves the right to require minimum finished floor elevations on any lot. Minimum finished floor elevations are required for all lots located in the floodplain or near open drainage features and shall be set one foot above the 100-year fully developed water surface elevation, as determined by a flood study. Elevation certificates will be required for lots located in the floodplain. Refer to the FEMA website for the most current version.

O. Temporary Tie-ins to County-type Roads

Tie-ins to existing county-type roadways planned for future improvements are considered temporary. Culverts under driveways and roadways shall be a minimum of 18 inches and designed to carry the 5-year storm. The driveway or roadway shall also have an invert above the pipe for positive overflow and safety end treatments. If the driveway or roadway is located in an area of shallow bar ditches and a culvert is not feasible, the driveway or roadway shall be constructed with an invert. Other requirements are noted on the typical detail.

SECTION 5.7 FIRE SAFETY

A. Fire Protection

1. Water Lines

- a. An approved water supply capable of supplying required fire flow for fire protection shall be provided to all premises upon which buildings or portions of buildings are constructed, in accordance with the Fire Code. Total fire flow requirements depend upon the type of construction and number of square feet.
- b. In all cases, it is the responsibility of the owner to provide adequate water line piping capacity in order to provide the minimum water flow.

2. Hydrants

- a. An additional fire hydrant shall be required for every 2,000 gallons per minute (gpm) or portion of fire flow required. (Example: Fire flow of 3,100 gpm. is required. Two fire hydrants shall be required to supply this amount).
- b. Fire hydrants are required within 300 feet of all exterior portions of the building. The distance shall be equal to the laying distance for fire apparatus hose lines along public street and fire lanes from the nearest water supply.
- c. A fire hydrant is required within 150 feet of lay distance from the fire department connection for a standpipe or fire sprinkler system.
- d. When the street is designated on the Master Thoroughfare Plan as a minor arterial or larger, fire hydrants shall be required on the same side of the street that the building is to be constructed. All streets with medians, regardless of size, shall have fire hydrants on the same side as the construction.
- e. All required fire hydrants shall be in place and accepted before any construction above the slab commences.
- f. A clear space of 3 feet shall be maintained around all fire hydrants.
- g. The Fire Department requires looped water systems for fire hydrant supply lines.
- i. Wall hydrants are to be used only where fire lane access is not possible or where otherwise required by the policy for fire lanes. Wall hydrants are not allowed as an alternative to fire hydrants.

3. Fire Sprinkler Systems

All underground piping, beginning at the point where water is used exclusively for sprinklers, shall be installed by a State certified fire sprinkler firm.

- a. Pipe depth shall be 42 inches minimum and 60 inches maximum to top of pipe.
- b. In all cases, clean sand backfill shall be provided a minimum of 6 inches around pipe. In rock, tamped backfill shall be used six inches under and around the pipe and at least two feet above the pipe, per NFPA.
- c. Standard thrust blocks shall be provided at each change in direction and at all tees, hydrants, plugs, caps, and bends.
- d. All underground mains shall have a clearance of 2 feet to any other utility or obstruction.
- e. All plans shall have the registration number of a State certified firm and RME number with original signature.
- f. A fire hydrant shall be installed no more than 150 feet from the Fire Department connection for a standpipe or automatic sprinkler system. The Fire Department Connection shall be within 50 feet of a fire lane or street.

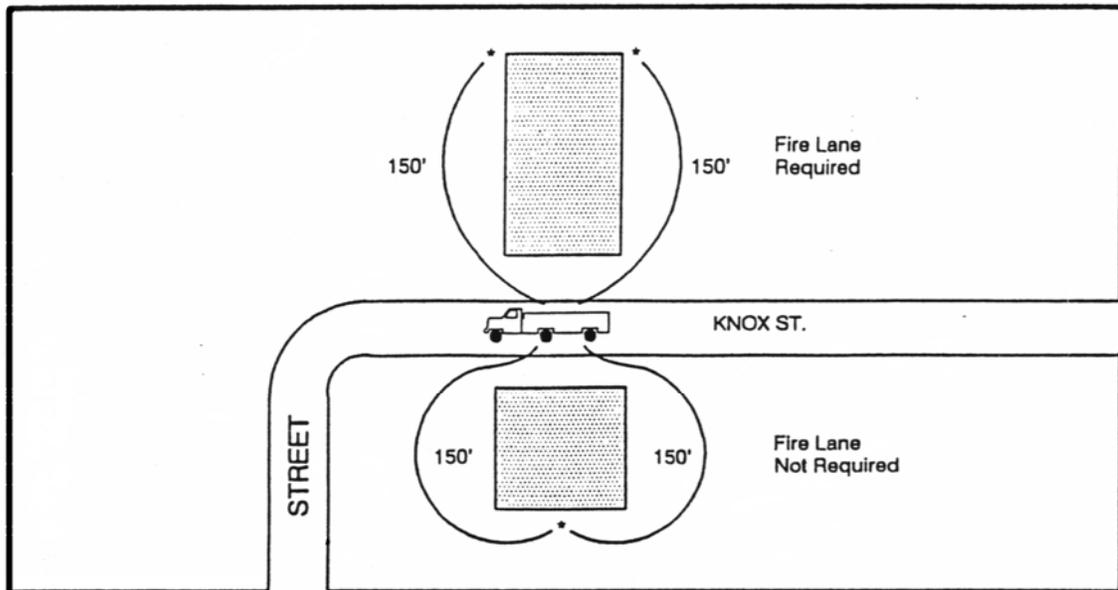
B. Fire Lane Requirements

1. Construction Requirements

To provide adequate emergency vehicle access all required streets or fire lanes be shall installed and accepted before any construction goes above the slab.

2. Hose Lay Distance

All buildings or structures shall be constructed in such a way that all ground level, exterior sides of the building are within 150 feet of the dedicated street or fire lane. The 150 feet is measured along the route necessary to extend fire hose lines around the building. If the 150 feet cannot be reached from a public street, a fire lane will be required on site.



3. Unusual Conditions

When fire lanes cannot be installed due to topography, waterways, non-negotiable grades or other similar conditions, the Fire Department may require an additional fire protection system or systems.

4. Surface

Fire lanes shall be constructed with a concrete surface to provide all-weather driving capabilities and shall support a 60,000 pound vehicle. The minimum pavement thickness is 6" concrete on 6" stabilized subgrade.

5. Vertical Clearance

All fire lanes shall have a minimum vertical clearance of 14 feet to allow a fire truck to pass under.

6. Width

The minimum unobstructed width of a fire lane shall be 24 feet to allow two fire trucks to pass in case of an emergency.

7. Turning Radius

All fire lanes shall have at least a 20 foot inside turning radius and a 44 foot outside turning radius.

8. Grade

The maximum grade for a fire lane is 10 percent when serving a building not protected throughout by an automatic sprinkler system.

9. Bridges

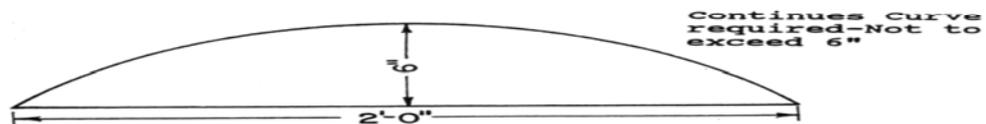
When a bridge is required to be used as access, it shall be constructed and maintained to carry a load of 75,000 pounds.

10. Gates

All gates across private access easements or fire lanes must be approved by the Fire Marshal and DPW. Plans shall be submitted to both departments and approved prior to a permit being issued. Opticom receivers are required for all electric gates across fire lanes. A manual means of opening the gate shall also be provided. A call box shall be required for all gates. Refer to Appendix E of this manual for Gated Entry guidelines.

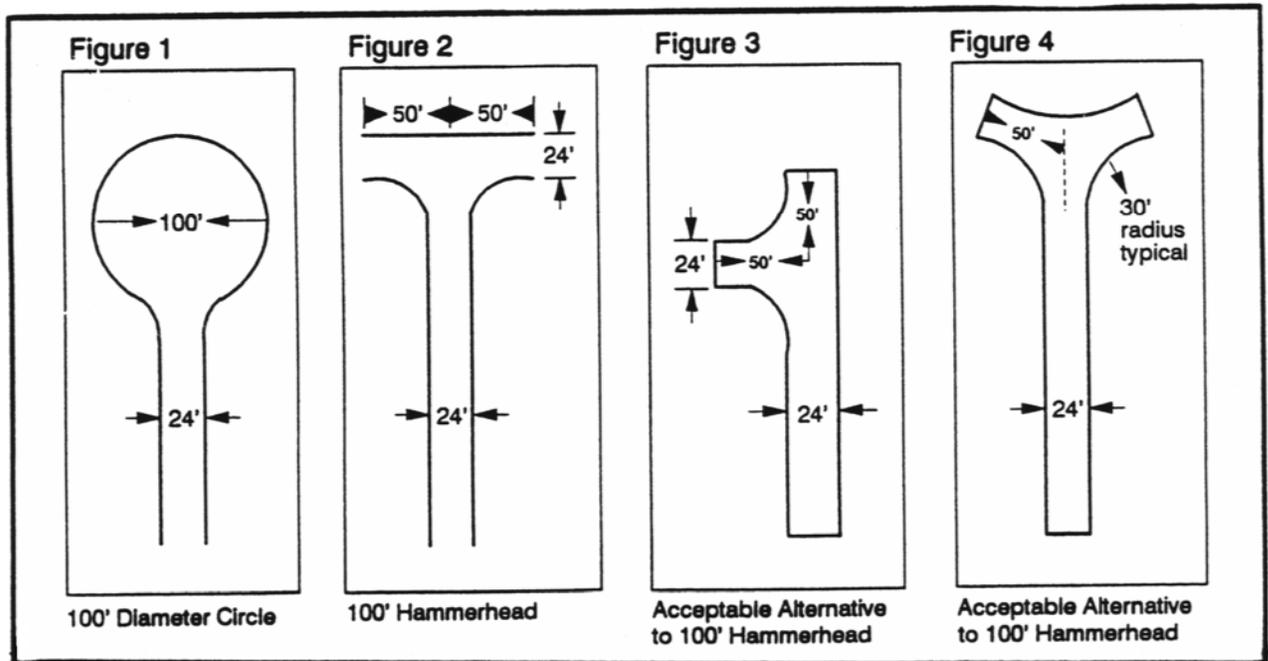
11. Obstruction

The required fire lane width shall not be obstructed by parked vehicles or other obstructions. Speed bumps or similar obstacles that have the effect of slowing or impeding the response of fire apparatus shall be approved by the Fire Marshal prior to installation.



12. Turn-Around Areas

When it is not possible to connect a fire lane at both ends to a dedicated street, an approved turn-around shall be provided. Dead-end fire lanes shall not exceed 150 feet in length. Illustrations of approved turn-around arrangements are as follows:



13. Marking

Approved striping or, when allowed by the Fire Marshal, signs or both, shall be provided for fire apparatus access roads to identify such roads or prohibit the obstruction thereof. Signs and striping shall be maintained in a clean and legible condition at all times and be replaced or repaired when necessary to provide adequate visibility.

- a. Striping. Fire apparatus access roads (fire lanes) shall be marked by a painted lines of red traffic paint six inches (6") in width to show the boundaries of the lane. The words "NO PARKING FIRE LANE – Tow Away Zone" or "FIRE LANE NO PARKING – Tow Away Zone" shall appear in four inch (4") white letters at 25 feet intervals on the red border markings along both sides of the fire lanes. Where a curb is available, the striping shall be on the vertical face of the curb.
- b. Signs. Signs shall read "NO PARKING FIRE LANE" or "FIRE LANE NO PARKING" and shall be twelve inches (12") wide and eighteen inches (18") high. Signs shall be painted on a white background with letters and borders in red, using not less than two inch (2") lettering. Signs shall be permanently affixed to a stationary post and the bottom of the sign shall be six feet, six inches (6' 6") above finished grade. A companion "Tow-Away Zone" sign shall be placed directly under this sign. The sign shall read "Tow-Away Zone" and shall be twelve inches (12") wide and borders in red, using not less than two inch (2") lettering. Signs shall be spaced not more than fifty feet (50')

apart. Signs may be installed on permanent buildings or walls or as approved by the Fire Marshal.

Fire lanes shall be maintained with fire lane striping that consists of a 6 inch wide red background stripe with 4 inch high white letters stating "No Parking, Fire Lane" painted on the red stripe every 15 feet. Where a curb defines the fire lane, the markings shall be painted on the vertical surface of the curb. When repainting, additions to the existing fire lanes are not allowed without prior approval of the Fire Department. Only designated fire lanes shall be marked

14. Maintenance

All designated fire lanes shall be maintained by the property owner.

15. Special Hazards

Fire lanes for high-pile combustible storage have special requirements in accordance with the Fire Code

SECTION 5.8 CONSTRUCTION REQUIREMENTS

A. Construction Responsibility

The owner shall be responsible for all improvements required for the development, including any necessary offsite facilities and construction staking. If construction is not feasible at the time of site development, the owner may request to escrow the funds with the City. The escrow amount shall be equivalent to the owner's share of the construction cost plus actual engineering cost. The City shall determine whether escrow will be accepted in lieu of construction. The escrow shall not be subject to refund.

B. As-built Letter/Plans

1. Private Site Improvements

Prior to Certificate of Occupancy being issued, an as-built letter prepared by the engineer or architect shall be submitted for the private site improvements. The letter shall state the site grading and drainage improvements are constructed in accordance with the plans. The following information may be requested with the as-built letter:

Paving

Survey data/cross sections
Subgrade densities and thickness
Lime application rate
Steel size and placement
Concrete thickness and strength

Drainage

- Survey data/cross sections
- Pipe embedment
- Pipe placement
- Pipe connections
- Pipe sizes
- Ditch backfill and densities
- Steel size and placement for structures
- Concrete thickness and strength for structures

If the improvements were not constructed in accordance with the plans, appropriate documentation shall be provided to substantiate any changes. The owner's engineer or architect shall provide one set of paper and one set of mylar as-built plans. The as-built plans shall be clearly marked as such.

2. Public Improvements

Once the public improvements are initially accepted, the owner's engineer shall furnish the City with one mylar set and two paper sets of as-built drawings and electronic files of the plans. The as-built drawings shall be clearly marked as such.

The owner's engineer shall furnish the City an electronic file of the water and sewer construction drawings in AutoCAD R14 or higher in .DXF or .DWG format. The information shall be provided to the City on CD-ROM. The following layer names shall be used:

DATA	LAYER NAME
Water Lines	C-WTR-WL
Water Line Text	C-STR-WL-TXT
Water Line Valves	C-WTR-GV
Water Line Valve Text	C-WTR-GV-TXT
Water Line Fire Hydrants	C-WTR-FH
Water Line Fire Hydrant Text	C-STR-FH-TXT
Sewer Lines	C-SWR-SL
Sewer Line Text	C-SWR-SL-TX
Sewer Lines Cleanouts	C-SWR-CO
Sewer Lines Cleanout Text	C-SWR-CO-TXT
Sewer Lines Manholes	C-SWR-MH
Sewer Lines Manhole Text	C-SWR-MH-TXT
Closed Storm Sewer System	STORM
Back of Curb	CURB
Right-of-way	ROW
Edge of Sidewalk	SIDEWALK
Open Storm Sewer Systems	CHANNEL

All files shall be in the same directory, including all construction documents with their dependencies (XREFS), plot files, and any support files needed. The electronic files shall use only standard AutoCAD fonts with "ROMANS" as the main font.

THIS PAGE INTENTIONALLY LEFT BLANK.

APPENDICES

A	SWMSP Checklist
B	SWPPP Checklist (small sites)
C	SWPPP Checklist (large sites)
D	Master Thoroughfare Plan Map
E	Gated Entry Layouts
F	Intersection Geometric Layouts
G	Sight Distance Criteria
H	TP-40
I	Flow Velocity
J	HUD Figures
K	Parking Lot/Site Layout Design Criteria
L	Easement/Right-of-Way Use Agreement
M	Easement/Right-of-Way Abandonment Application
N	Standard Construction Notes
O	Letter of Permission
P	TXDOT Utility Permit Questionnaire
Q	Floodplain Development Permit
R	Standard Details

APPENDIX A

STORM WATER MANAGEMENT SITE PLAN (SWMSP)
CHECKLIST

STORM WATER MANAGEMENT SITE PLAN (SWMSP) CHECKLIST

A SWMSP is required for all development that disturbs a surface area of 12,000 square feet and creates or adds 5,000 square feet or more of impervious surface. Refer to Sections 4.3.A and 5.3.A of the Design Standards Manual for specific requirements.

Project name: _____

Project address: _____

Acreage to be disturbed: _____

Acreage or square-footage of proposed impervious surface: _____

Paved private access easement: Yes No

If yes, then one additional BMP above the minimum will be required.

Total Number of BMPs required: 1 2 3 4

Are the following existing site features shown?

Existing two foot contours	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Existing drainage patterns and features	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Existing "C" value (runoff coefficient)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
"Q" for 2-year, 15-minute duration, storm event before development	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Approximate limit of tree canopy	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Tree survey, if commercial site	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Approximate limit of wetlands	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Soil type and classification	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
100-year floodplain	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA

Are the following permanent, post-development features shown?

Proposed two foot contours	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Drainage system layout	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Post-development "C" value (runoff coefficient)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
"Q" for 2-year, 15 minute duration, storm event	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Site layout	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Areas to be protected from disturbance	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Trees to be saved	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
100-year floodplain	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Drainage easements	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
List of potential pollutants	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
BMP # 1 (describe) _____ _____	
• Design criteria provided	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
• Appropriate application	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
• Shown as public or private	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
• Coordinated with drainage plan	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
• Coordinated with landscaping plan	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
• Other comments	_____ _____

APPENDIX B

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)
CHECKLIST
SMALL SITES

SWPPP CHECKLIST FOR SMALL PROJECTS

RESIDENTIAL: 12,000 SF TO 1 ACRE DISTURBED

NON-RESIDENTIAL: 0 SF TO 1 ACRE DISTURBED

See Sections 4.3.B and 5.3.C of the Design Standards Manual for specific requirements.

Project Description: Are the following provided?

Construction plans or identifying notice containing the following:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Contact person, company name, address and phone number of each contractor or other person controlling the daily construction activity at the site.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Company name, contact, address and phone number of the site owner/developer.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Location of the site by street address and legal description.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Description of the construction activity.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
SWPPP and plans signed and sealed by a professional engineer licensed in Texas.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA

Site Map: Does the site map include the following?

Limits of soil disturbance to avoid disturbing vegetation in areas outside the minimum needed for construction.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Location of the construction entrance, designed to limit tracking.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Location of structural storm water and sediment controls.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA

Best Management Practices: Are the following practices present?

Sediment barriers along the down-slope perimeter of disturbed areas and stockpiles where there is a potential for sediment discharge to adjacent property, streets and drainage facilities. Turn ends of sediment barriers up-slope to form sediment traps.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Permanently stabilize exposed soil, within and adjacent to the site, that is disturbed by vehicles, grading and other construction activities.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Prevention of the discharge of building materials, lime, cement, concrete, asphalt, and mortar to the MS4 or to the waters of the United States.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Liquid tight bermed area (liner required) or other spill protection measure per the Fire Code for any temporary fuel tanks placed on site during construction.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A pit for temporary on-site disposal of concrete waste from mixing drums and chutes.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Note to contain all runoff from materials used in the subgrade stabilization process.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Covered trash receptacle for on site litter and construction debris provided.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Notes requiring inspections by the permittee(s) once every 2 weeks and within 24 hours after a storm event of 0.5 inches or more.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA

APPENDIX C

STORM WATER POLLUTION PREVENTION PLAN
(SWPPP) CHECKLIST
LARGE SITES

SWPPP CHECKLIST FOR LARGE PROJECTS

ALL PROJECTS: 1 ACRE OR MORE DISTURBED

See Sections 4.3.B and 5.3.C of the Design Standards Manual for specific requirements.

Site/Project Description: Are the following provided?

Nature of construction activity.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Potential pollutants and sources.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Sequence of major soil disturbing events.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Total number of acres of the entire property.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Total number of acres where construction activities will occur, including off-site material storage, overburden and stockpiles of dirt and borrow areas.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A map showing the general location of the site.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Which permittee is responsible for each event.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Listing of controls associated with each event.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Existing data describing the soil and quality of any discharge from the site.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A copy of the signed Notice of Intent for owner if site is larger than 5 acres.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A copy of the signed Notice of intent for the contractor if the site is larger than 5 acres.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A copy of the TCEQ site notice.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Signature of the owner and operator.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A copy of the TPDES General Permit.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Signature and seal of a professional engineer licensed in Texas.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Comments:	

Site Map: Have plans been provided that include the following?

Topographic map of the site.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Existing drainage patterns.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Proposed drainage patterns and approximate slopes after grading activities.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Locations where stabilization practices are expected to be used.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Location of major storm water controls.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Limits of soil disturbance.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Location of off-site borrow materials.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Location of off-site equipment storage areas.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Location of on-site or near site wetland or surface waters.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Location of storm water discharges to on-site or near-site wetland or surface waters.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Location of on-site and off-site support activities (asphalt/concrete plant).	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Location of industrial discharges to on-site or near-site wetland or surface waters.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Name of receiving water (s) (location or direction).	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Comments:	

Best Management Practices: Are the following practices present?

Velocity dissipation devices at discharge locations and along the length or any outfall channel to provide a non-erosive flow velocity from the structure to the watercourse (i.e., no significant changes in the hydrological regime of the receiving water).	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Measures to minimize off-site vehicle tracking.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Measures to minimize the generation of dust.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Fencing to protect any vegetation to be preserved.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Updateable list of materials to be stored on-sits.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Covered trash receptacle for on-site litter and construction debris.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A temporary detention structure if 10 or more acres drain to a common point or a discussion of why it is not feasible.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A pit for temporary on-site disposal of concrete waste from mixing drums and chutes.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A liquid tight bermed area (liner required) or other spill protection measure per the Fire Code for any temporary fuel tanks placed on site during construction.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A list of allowable non-storm water discharges and indicate appropriate control measures for non-storm water components of the discharge.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A note that ensures and demonstrates compliance with applicable federal, state and/or local waste disposal, sanitary sewer or septic system regulations.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A list of measures to be installed during construction that will remain after construction and be used to control pollutants in the storm water.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Are the measures provided adequate and in compliance with the Design Standards Manual?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Comments:	

Site Maintenance: Are the following activities included?

The maintenance of all erosion and sediment control measures and other protective measures to ensure effective operating conditions.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
The inspection of adjacent areas daily, and the pick up of construction waste materials, debris, and fugitive sediment that have blown or wasted off-site.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Updates of the plan that may be necessary to protect surface water resources when the permittee is notified of such changes.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Sediment removal from controls (to include silt fences, ponds, etc.) when design capacity is reduced by 50%	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA

Site Inspection:

Does the SWPPP provide for inspections by the permittee(s) once every 2 weeks and within 24 hours after a storm event of 0.5 inches or more? Alternatively, inspections may be performed once every 7 days without additional inspections after rain events.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Is an example inspection checklist provided?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Do the inspections include:	
A place for the inspector's name and qualifications?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A place for the date(s) of inspections(s) to be recorded?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Disturbed areas of the construction site that have not been stabilized?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Areas used for storage of materials that are exposed to precipitation?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Structural control measures?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Locations where vehicles enter or exit the site?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Identification of measures that need to be maintained, modified, or added to correct problems (and specify update of plan within 7 calendar days)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
A place to be signed in accordance with 30 TAC § 305.128?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Is the checklist provided adequate?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Comments:	

Site Stabilization:

Does the SWPPP include a description of interim and permanent stabilization practices for the site, including a schedule of when the practices will be implemented? (Examples include temporary/permanent seeding, mulching, geotextiles, sod, etc.)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Does the SWPPP address initiation of stabilization measures by the 14 th day where construction activity temporarily or permanently ceases and will not resume on that portion of the site within 21 days?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Does the SWPPP include a note requiring the removal of all temporary controls and filing of a Notice of Termination when final stabilization is achieved?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Are stabilization specifications adequate and in compliance with the Design Standards Manual?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Does the SWPPP include a requirement to maintain records that include dates of major grading activities, dates when construction stops temporarily or permanently, and the date when stabilization is initiated.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Comments:	

APPENDIX D

MASTER THOROUGHFARE PLAN MAP

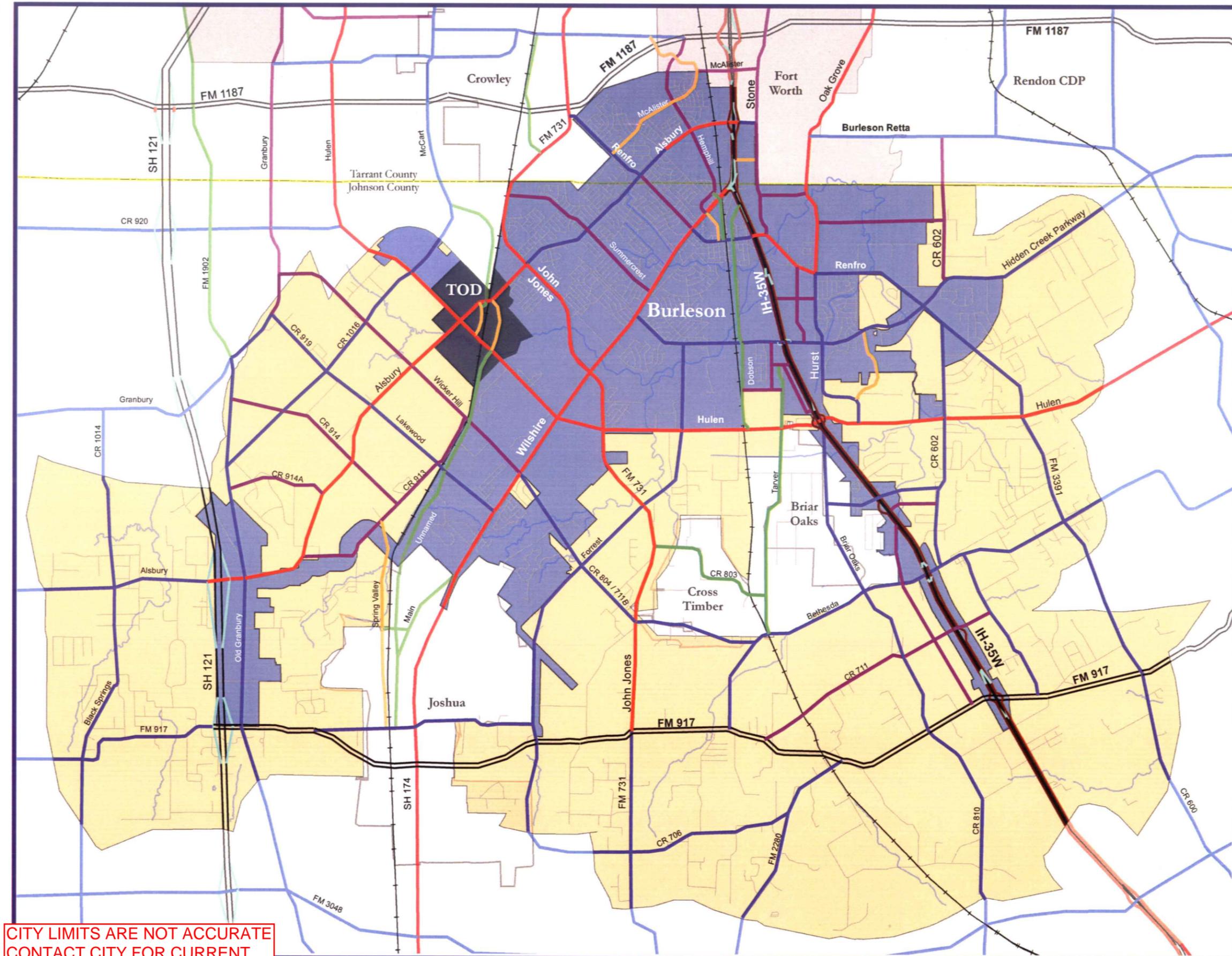
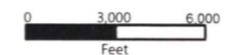
FIGURE 3.9
ROADWAY CLASSIFICATIONS



Kimley-Horn
and Associates, Inc.

LEGEND

- Freeway
- Frontage Road
- Ramp
- Principal Arterial (P7U/P6D)
- Minor Arterial (P5U/P4D)
- Major Collector (C4U)
- Minor Collector (C3U)
- Local (L2U)
- Existing Rail
- Existing Streets
- City Limits
- Transit Oriented Development
- ETJ
- Streams
- Existing Grade Separation
- Proposed Grade Separation



CITY LIMITS ARE NOT ACCURATE
CONTACT CITY FOR CURRENT
CITY LIMITS

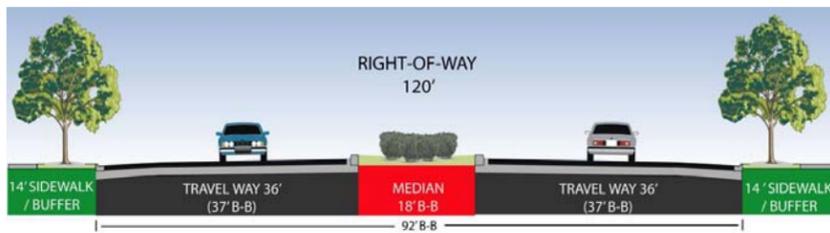
BURLESON
MASTER
THOROUGHFARE
PLAN

MASTER THOROUGHFARE PLAN SUMMARY

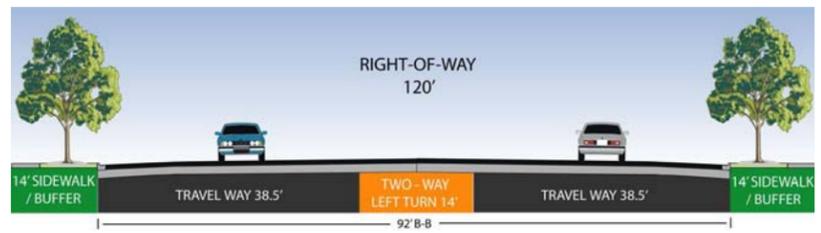
This is a summary of the design data for streets contained within the Master Thoroughfare Plan. For a complete copy of the City of Burleson Master Thoroughfare Plan, contact the Department of Planning and Engineering Services or Visit the City's website, www.burlesontx.com. For traffic study requirements, construction requirements and design requirements, see Section 5 of the Subdivision and Development Ordinance and Sections 3.7, 4.5 and 5.5 of the Design Standards Manual.

Street Type	Classification Code	Lane Configuration	Right-of-Way Width	Design Speed
Principal Arterial	P7U/P6D	7-Lane Undivided 6-Lane Divided	120'	50 mph
Minor Arterial	P5U/P4D	5-Lane Undivided 4-Lane Divided	90'	50 mph
Major Collector	C4U	4-Lane Undivided	70'	45 mph
Minor Collector	C3U	3-Lane Undivided	60'	35 mph
Local	L2U	2-Lane Undivided	50' (Conventional) 80' (Rural)	35 mph

PRINCIPAL ARTERIAL

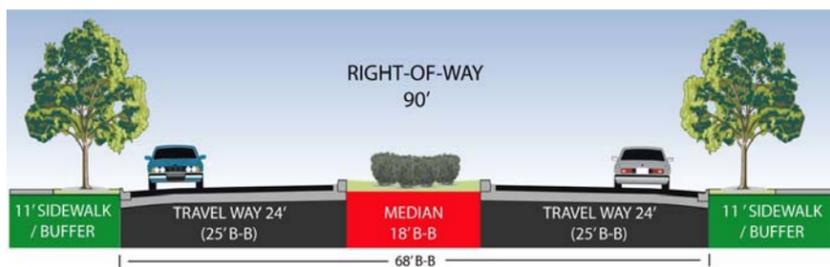


PRINCIPAL ARTERIAL (CONVENTIONAL)



PRINCIPAL ARTERIAL (TWLTL) – For state highways only.

MINOR ARTERIAL

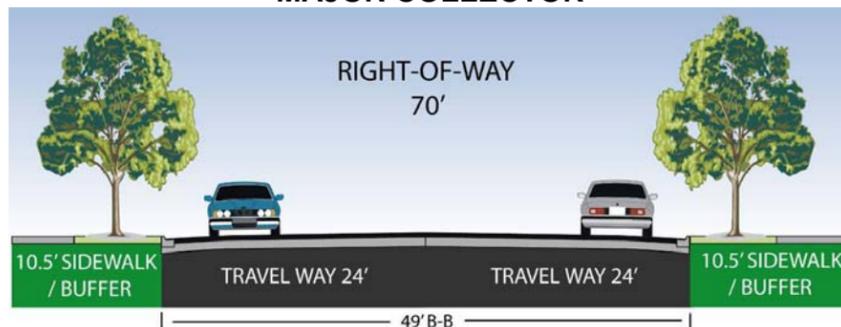


MINOR ARTERIAL (CONVENTIONAL)

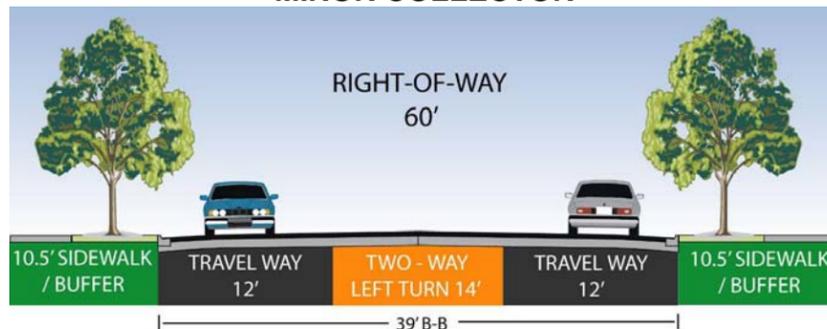


MINOR ARTERIAL (TWLTL)

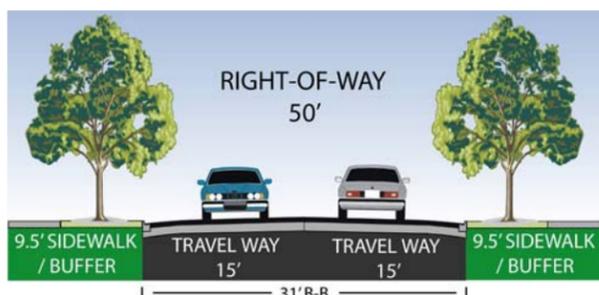
MAJOR COLLECTOR



MINOR COLLECTOR



LOCAL STREET



LOCAL STREET (CONVENTIONAL)

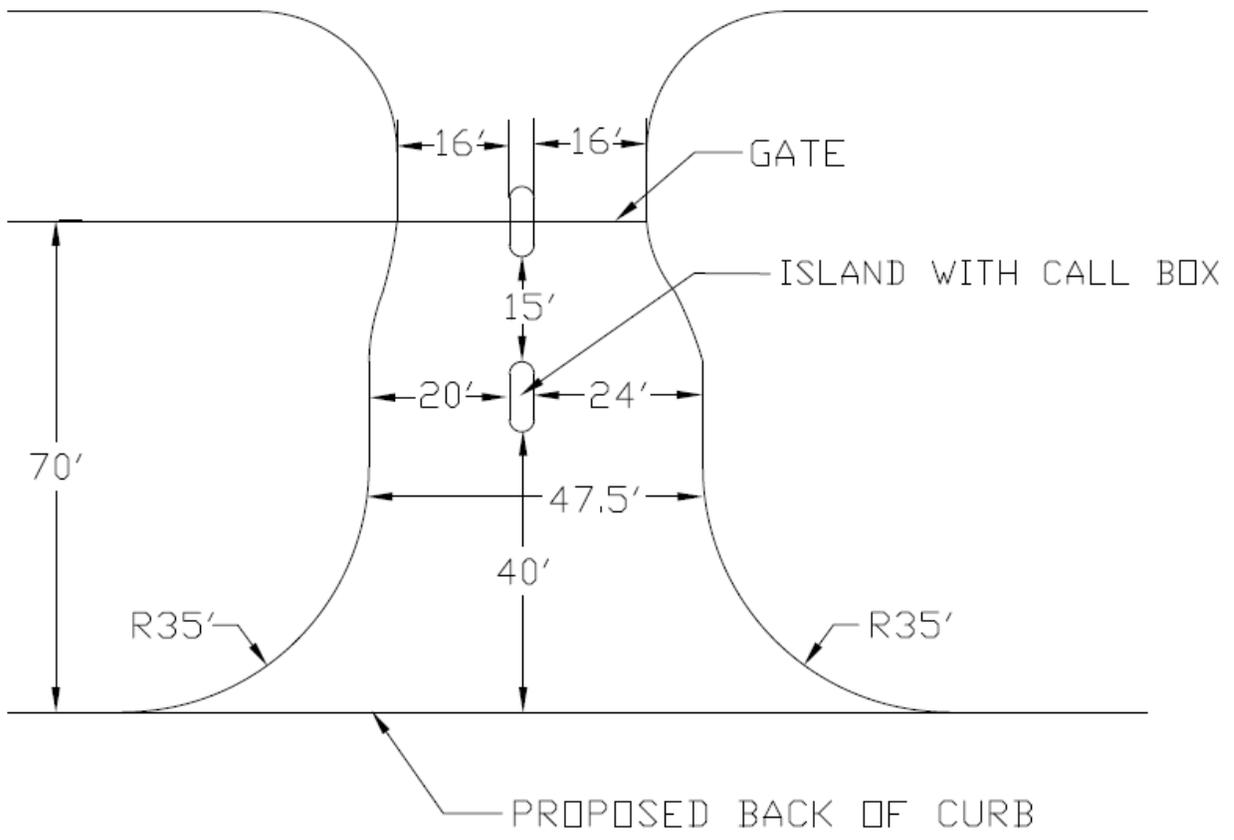


LOCAL STREET (RURAL)

APPENDIX E

GATED ENTRY LAYOUTS

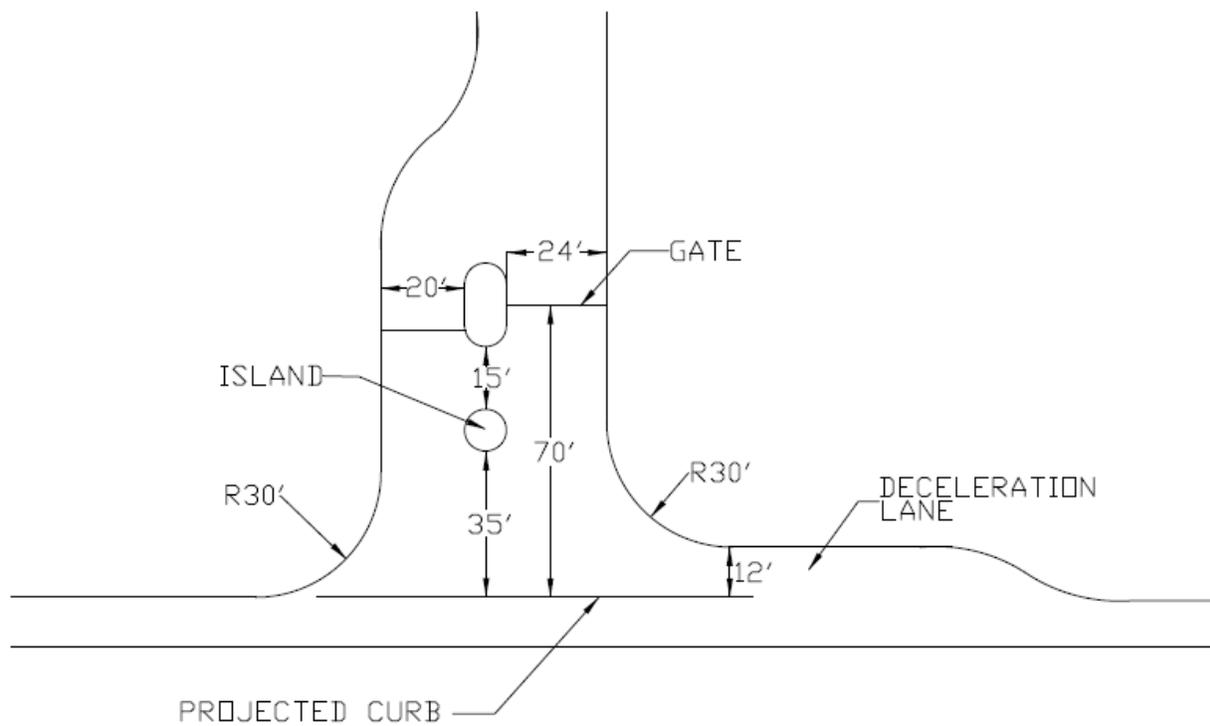
- E-1 Typical Residential Gated Entry Design
- E-2 Gated Entry for High Volume/High Speed Entry Way
- E-3 Circular Gated Entry
- E-4 Typical Multi-family Gated Entry Design



NOTES:

- All dimensions are minimums.
- Distance between back of curb and gate may vary depending on traffic generated by the site.
- All dimensions are back of curb.

E-1	TYPICAL RESIDENTIAL GATED ENTRY DESIGN	
CITY OF BURLESON		
ORIGINAL	2/8/08	SWC
REVISION		
REVISION		
REVISION		



NOTES:

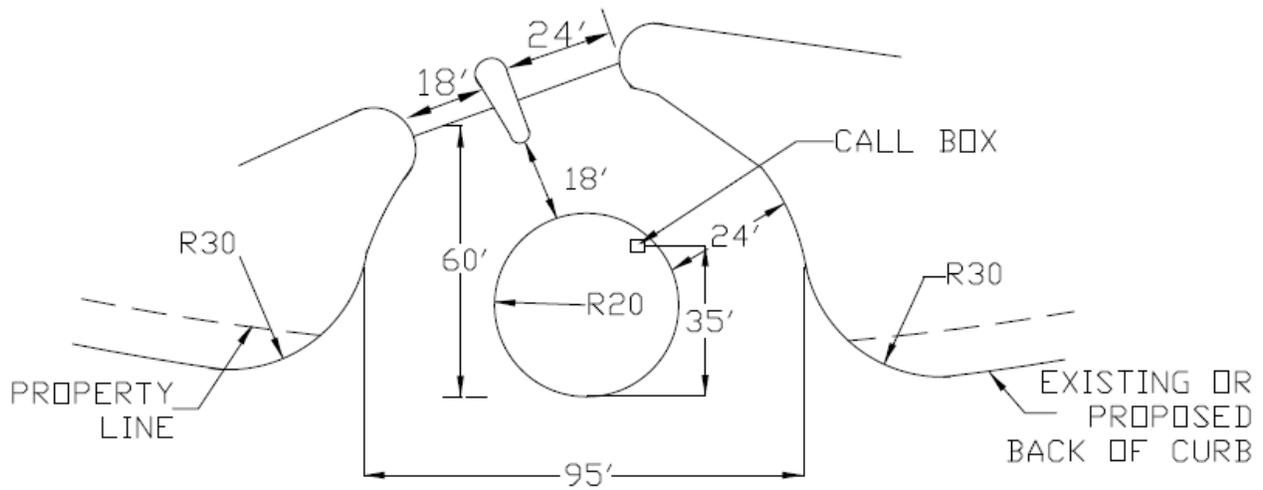
All dimensions are minimums.

Distance between back of curb and gate may vary depending on traffic generated by the site.

All dimensions are back of curb.

Deceleration Lane length varies based on traffic generation (Minimum storage length = 75 feet).

E-2	HIGH VOLUME/HIGH SPEED GATED ENTRY DESIGN	
CITY OF BURLESON		
ORIGINAL	3/24/08	SWC
REVISION		
REVISION		
REVISION		



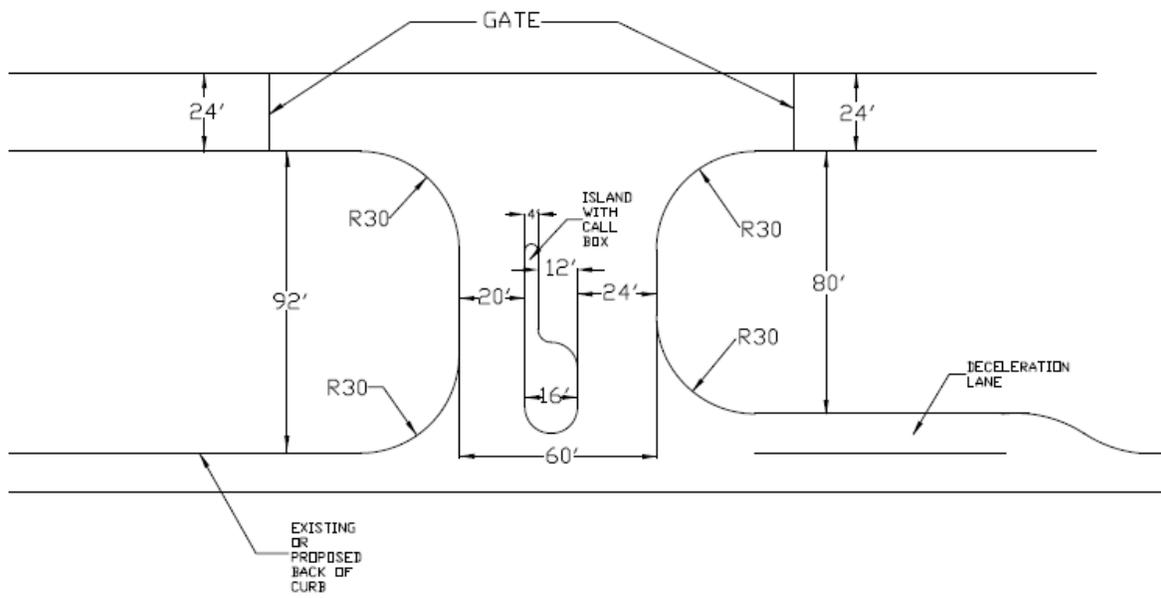
NOTES:

All dimensions are minimums.

Distance between back of curb and gate may vary depending on traffic generated by the site.

All dimensions are back of curb.

E-3	CIRCULAR GATED ENTRY DESIGN	
CITY OF BURLESON		
ORIGINAL	3/25/08	SWC
REVISION		
REVISION		
REVISION		



NOTES:

All dimensions are minimums.

Distance between back of curb and gate may vary depending on traffic generated by the site.

All dimensions are back of curb.

Deceleration lane length may vary depending on traffic generated by site.

E-4	MULTI-FAMILY GATED ENTRY DESIGN	
CITY OF BURLESON		
ORIGINAL	3/27/08	SWC
REVISION		
REVISION		
REVISION		

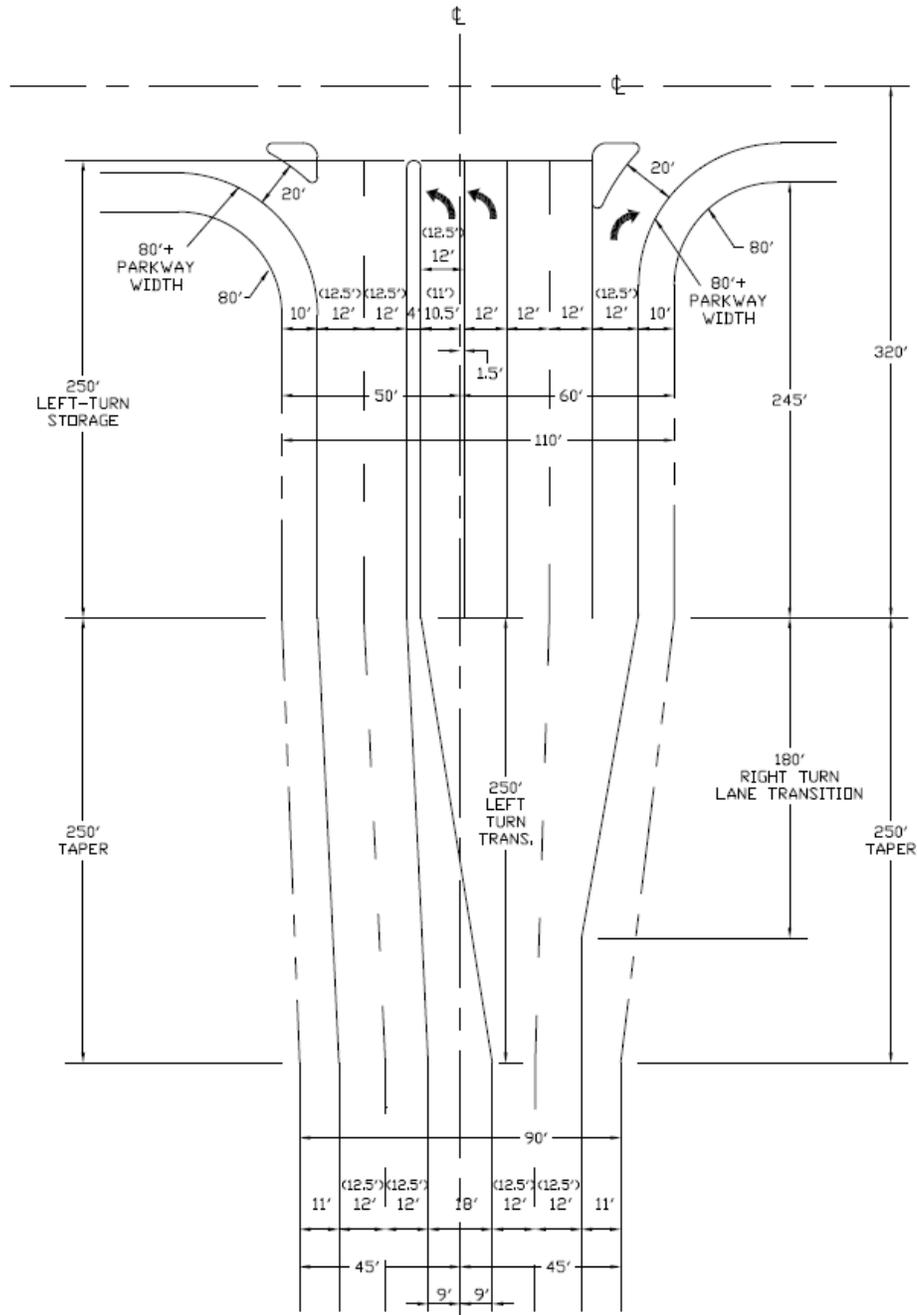
APPENDIX F

INTERSECTION GEOMETRIC LAYOUTS

- F-1 4D Intersecting with 6D or 7U
- F-2 4D Intersecting with 5U, 4D, or 4U
- F-3 6D Intersecting with 7U, 6D, or 4D
- F-4 6D Intersecting with 4U
- F-5 7U Intersecting with 4U
- F-6 Typical Island Detail

4 LANE DIVIDED APPROACH

INTERSECTING WITH 6D, 7U

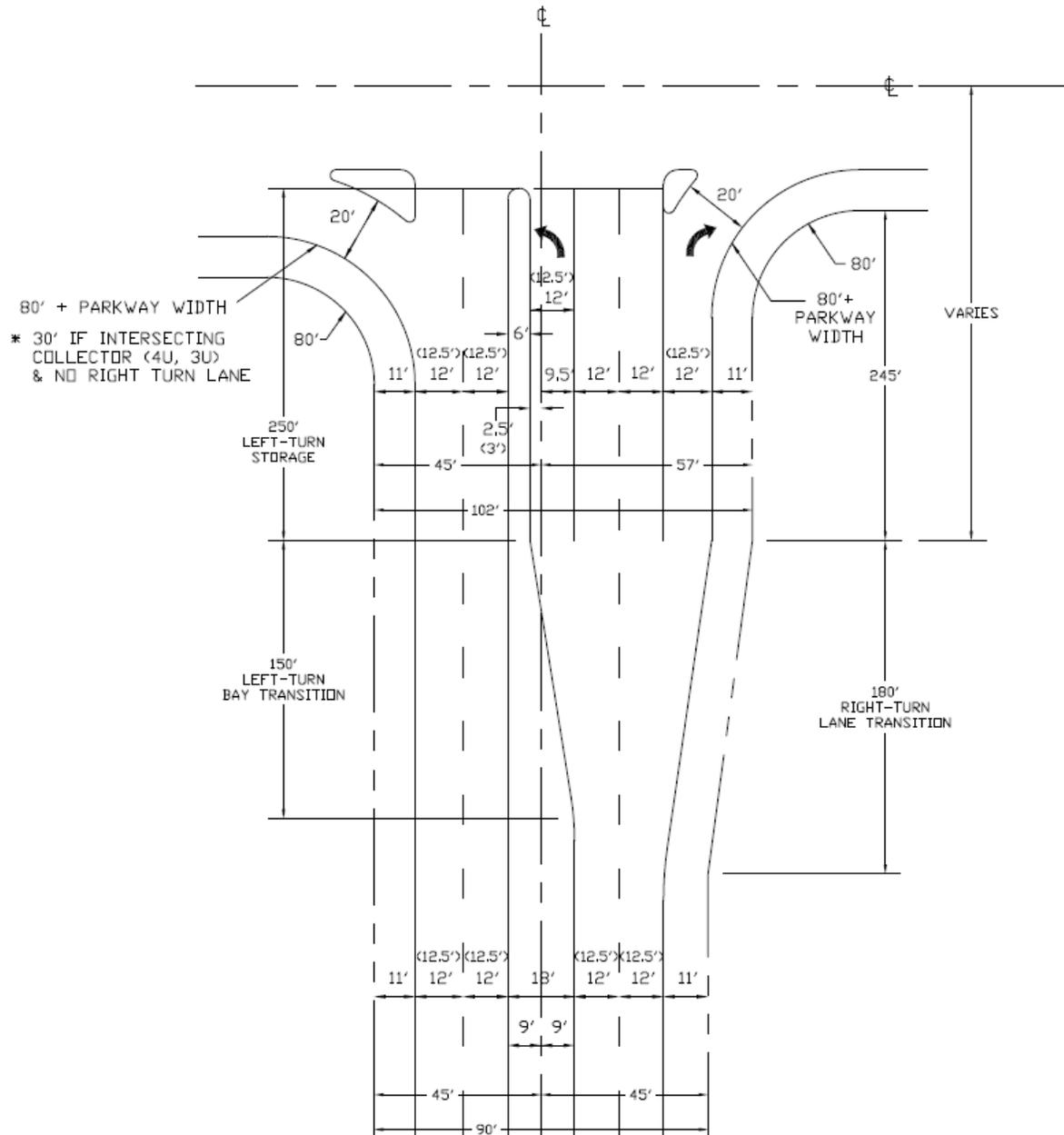


- * Lane widths in parentheses () are back of curb dimensions
- * All transitions shall be designed using reverse curves
- * Parkway dimension may vary at intersection flare
- * Islands should be placed 2'-3' from outside edge of through lane traffic

N.T.S.

4 LANE DIVIDED APPROACH

INTERSECTING WITH 5U, 4D, 4U



80' + PARKWAY WIDTH
 * 30' IF INTERSECTING COLLECTOR (4U, 3U) & NO RIGHT TURN LANE

VARIES

250' LEFT-TURN STORAGE

150' LEFT-TURN BAY TRANSITION

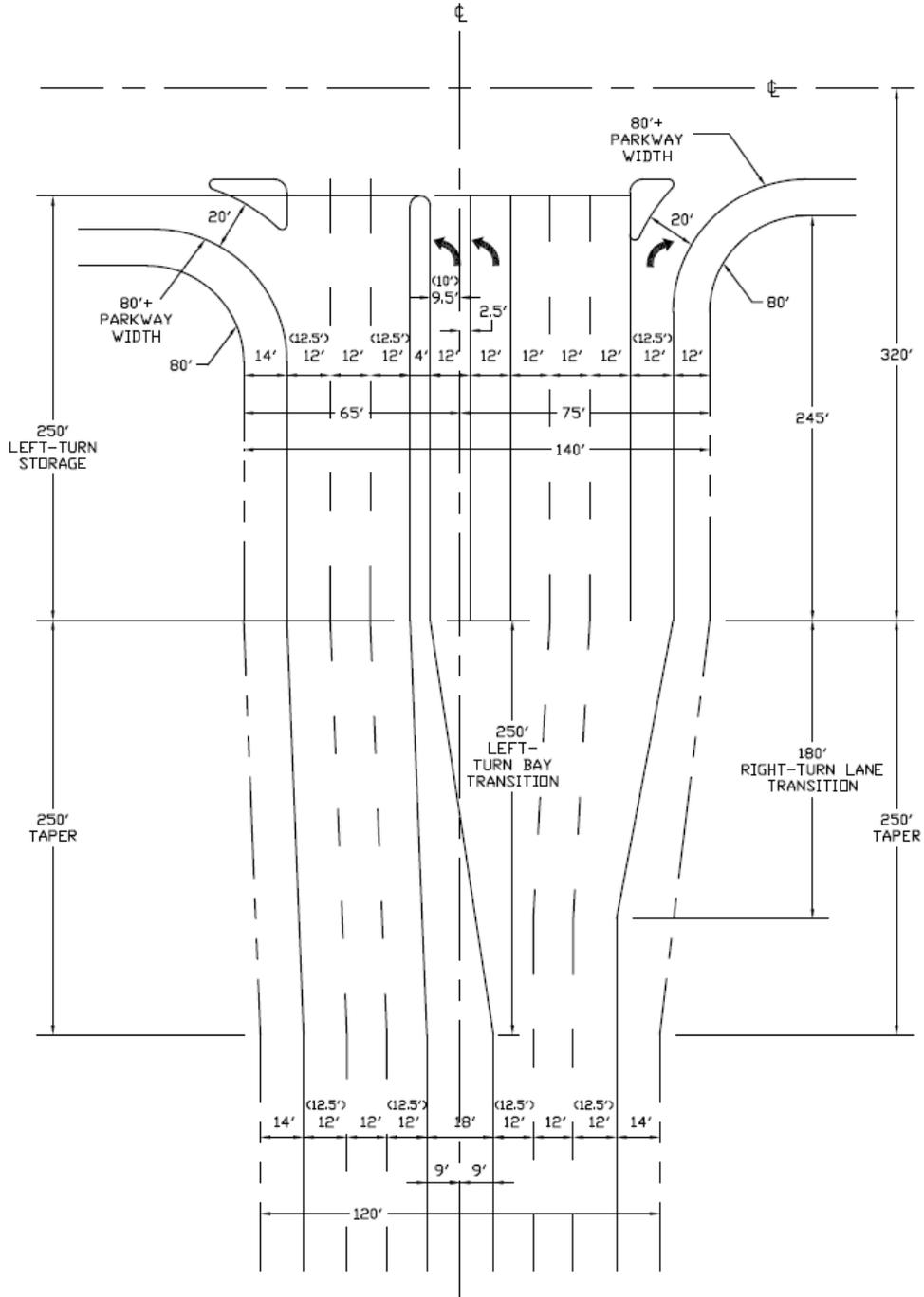
180' RIGHT-TURN LANE TRANSITION

- * Lane widths in parentheses () are back of curb dimensions
- * All transitions shall be designed using reverse curves
- * Parkway dimension may vary at intersection flare
- * Islands should be placed 2'-3' from outside edge of through lane traffic

N.T.S.

6 LANE DIVIDED APPROACH

INTERSECTING WITH 7U, 6D, 4D

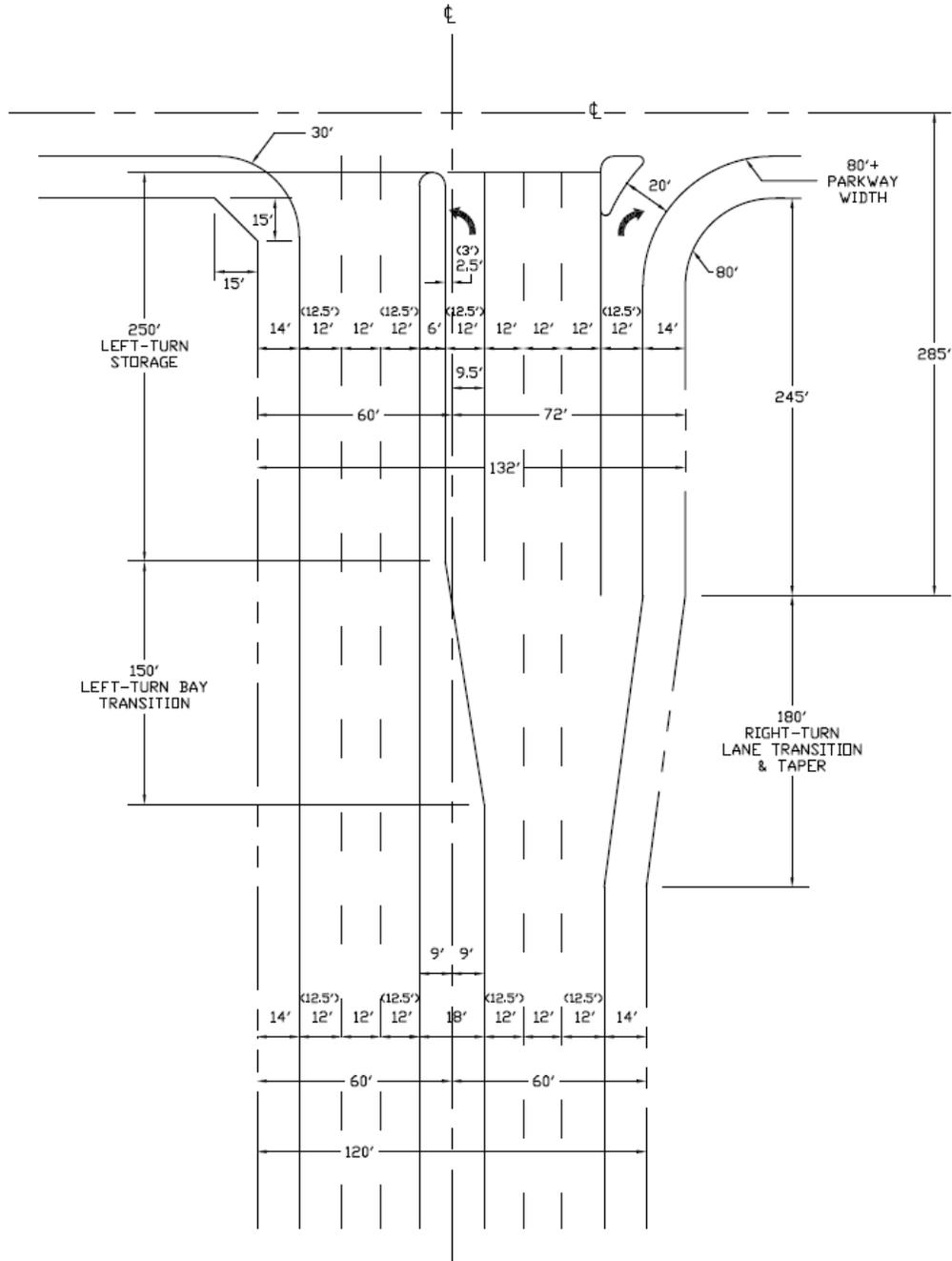


- * Lane widths in parentheses () are back of curb dimensions
- * All transitions shall be designed using reverse curves
- * Parkway dimension may vary at intersection flare
- * Islands should be placed 2'-3' from outside edge of through lane traffic

N.T.S.

6 LANE DIVIDED APPROACH

INTERSECTING WITH 4U

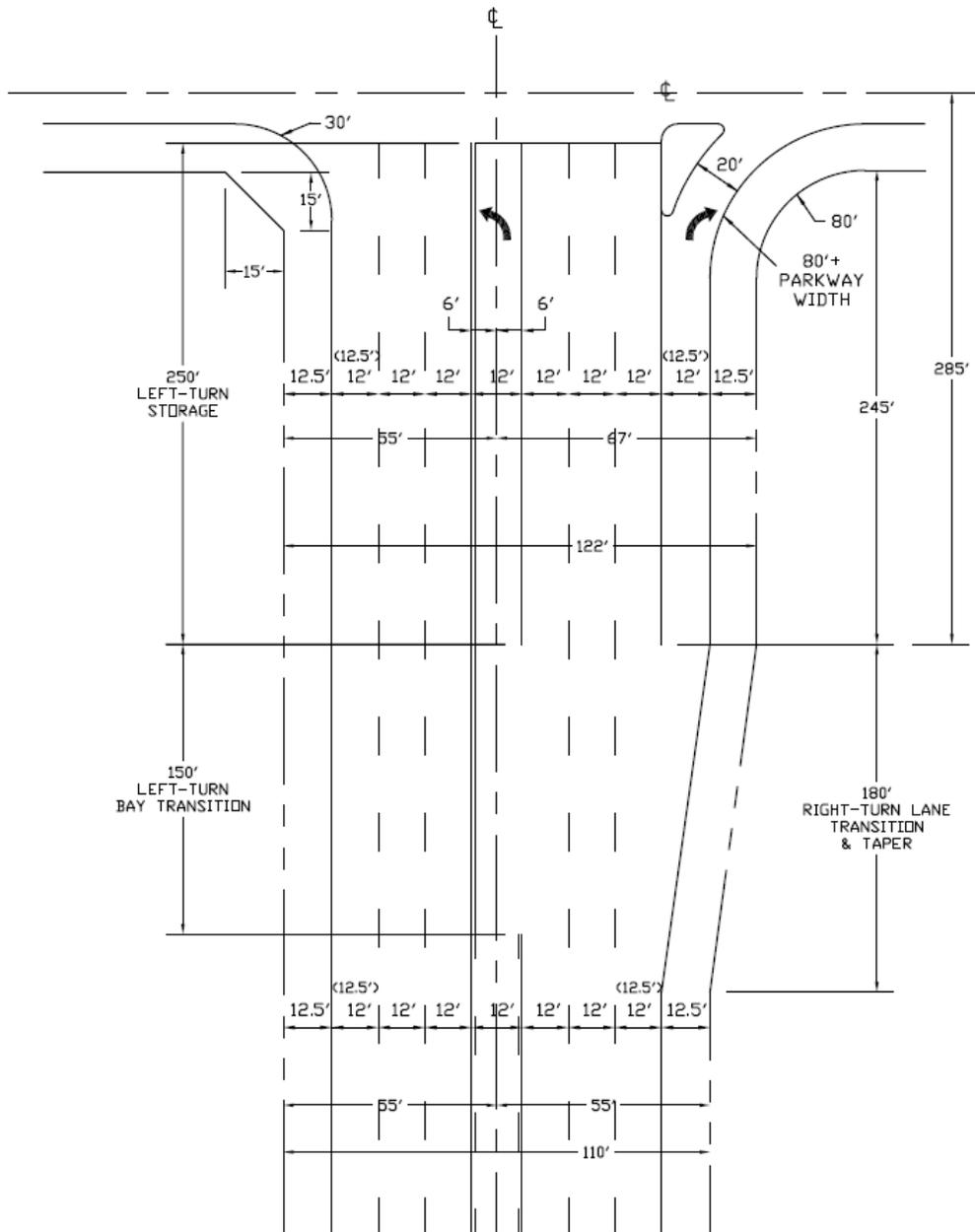


- * Lane widths in parentheses () are back of curb dimensions
- * All transitions shall be designed using reverse curves
- * Parkway dimension may vary at Intersection flare
- * Islands should be placed 2'-3' from outside edge of through lane traffic

N.T.S.

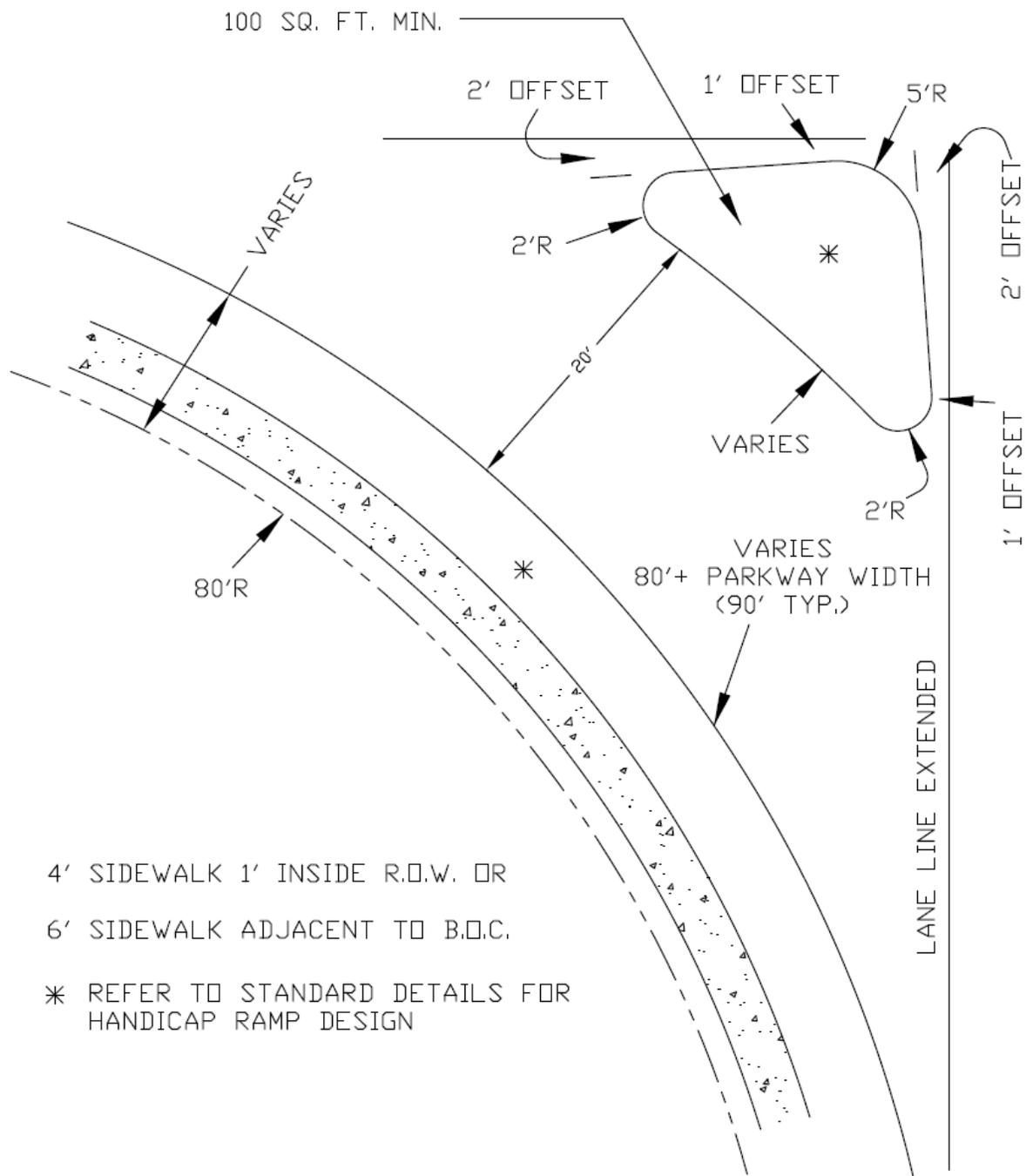
7 LANE UNDIVIDED APPROACH

INTERSECTING WITH 4U



- * Lane widths in parentheses (<) are back of curb dimensions
- * All transitions shall be designed using reverse curves
- * Parkway dimension may vary at Intersection flare
- * Islands should be placed 2'-3' from outside edge of through lane traffic

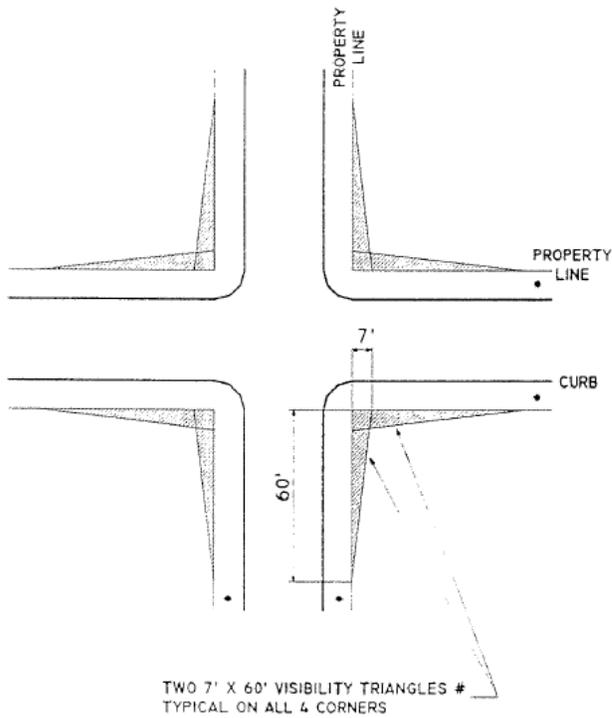
N.T.S.



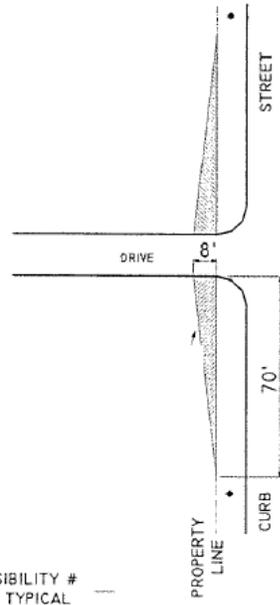
TYPICAL ISLAND DETAIL

APPENDIX G

SIGHT DISTANCE CRITERIA



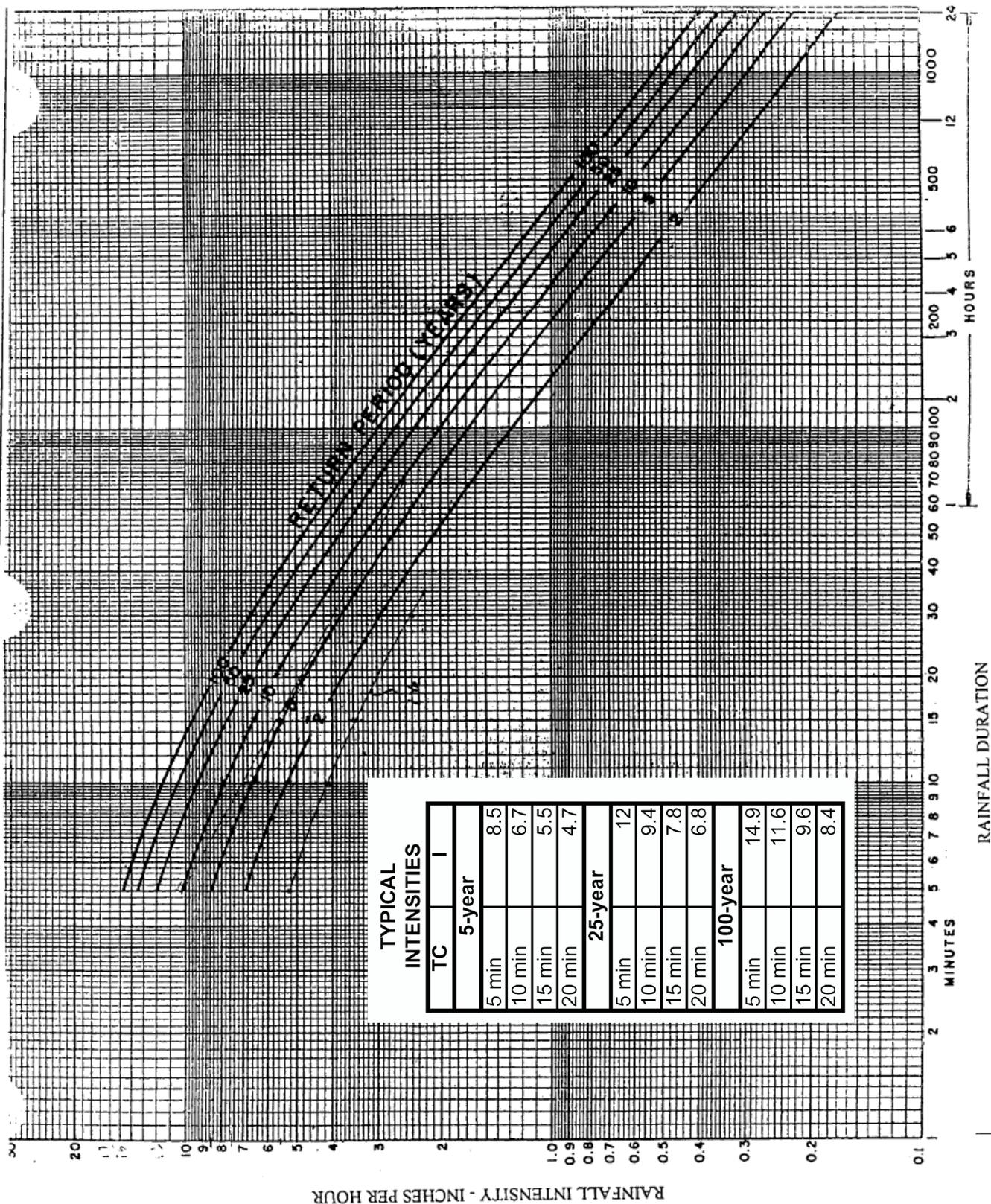
DRIVEWAY AT ANY PUBLIC STREET



* - VARIABLE DISTANCE. THIS DISTANCE IS DEPENDENT UPON HORIZONTAL AND VERTICAL CURVATURE OF THE STREET AND SHALL BE CALCULATED IN ACCORDANCE WITH THE LATEST EDITION OF THE AASHTO HANDBOOK.

- NOTHING OVER 2' IN HEIGHT, AS MEASURED FROM THE TOP OF THE CURB, IS ALLOWED WITHIN THESE VISIBILITY TRIANGLES.

APPENDIX H
TECHNICAL PAPER 40
(IDF CURVE)



TYPICAL INTENSITIES

TC	I
5-year	
5 min	8.5
10 min	6.7
15 min	5.5
20 min	4.7
25-year	
5 min	12
10 min	9.4
15 min	7.8
20 min	6.8
100-year	
5 min	14.9
10 min	11.6
15 min	9.6
20 min	8.4

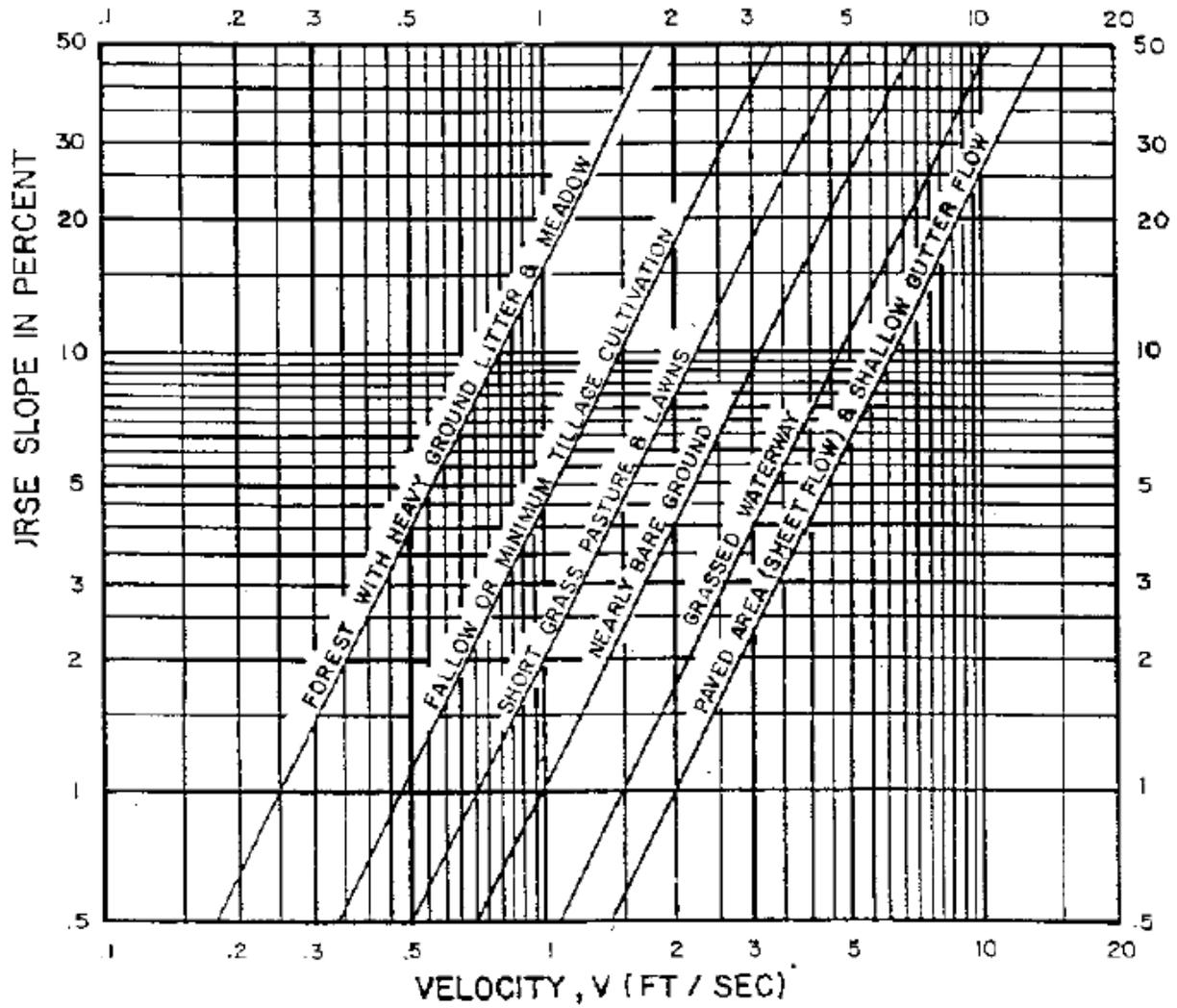
RAINFALL INTENSITY - INCHES PER HOUR

RAINFALL DURATION

MINUTES

HOURS

APPENDIX I
FLOW VELOCITY



BRIDGE DIVISION HYDRAULIC MANUAL
2-24

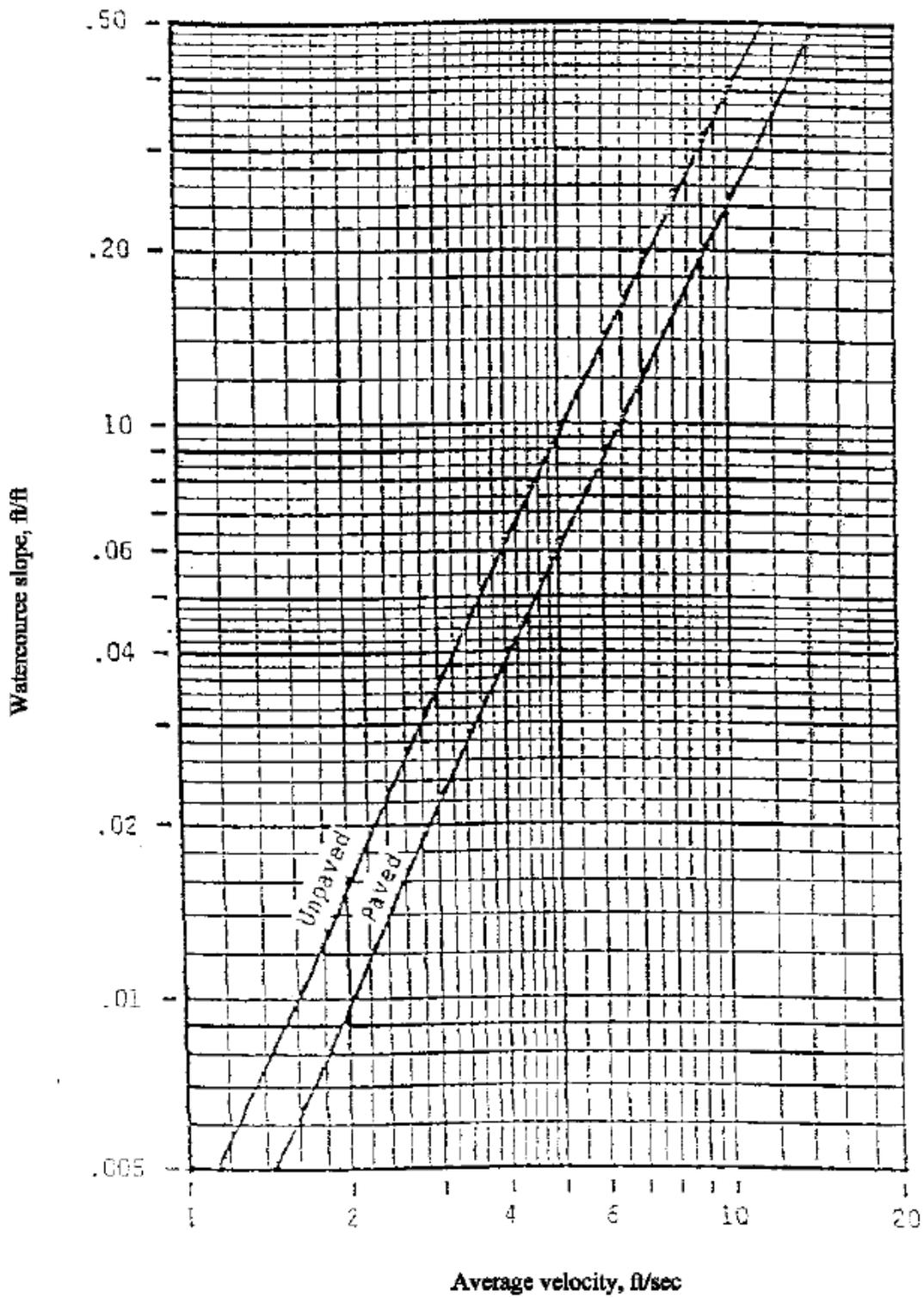
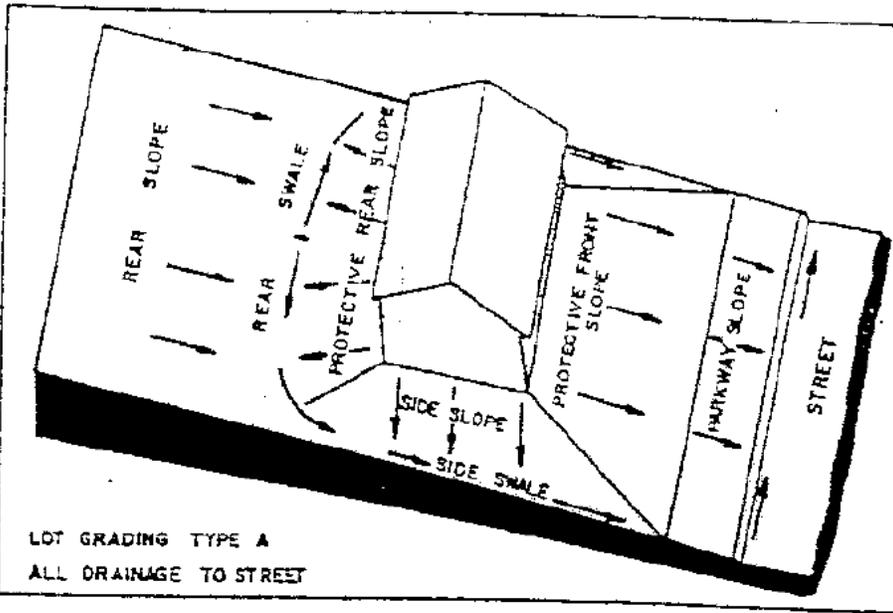


Figure 3-1.-Average velocities for estimating travel time for shallow concentrated flow.

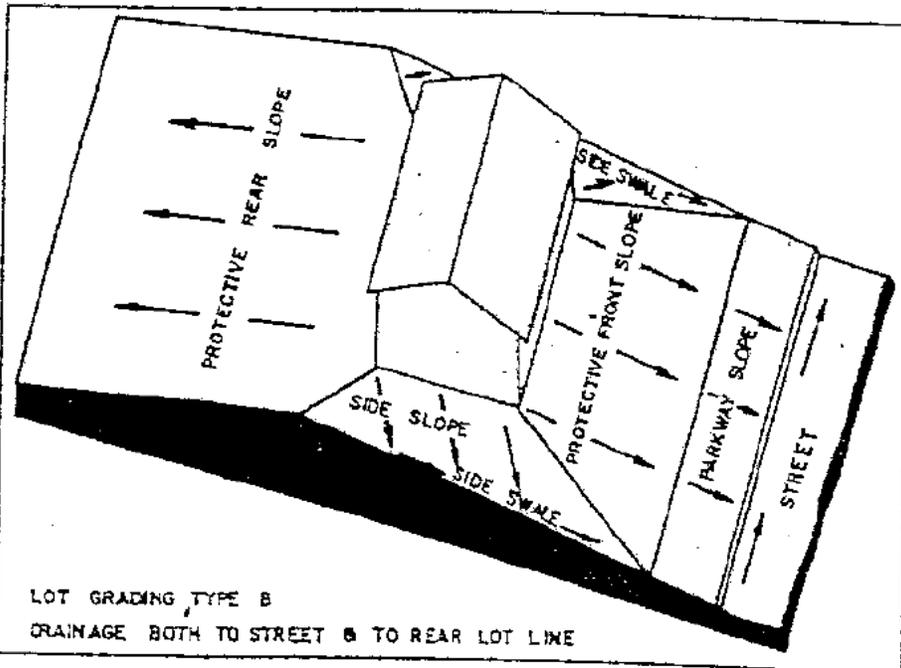
(210-VI-TR-55, Second Ed., June 1986)

APPENDIX J

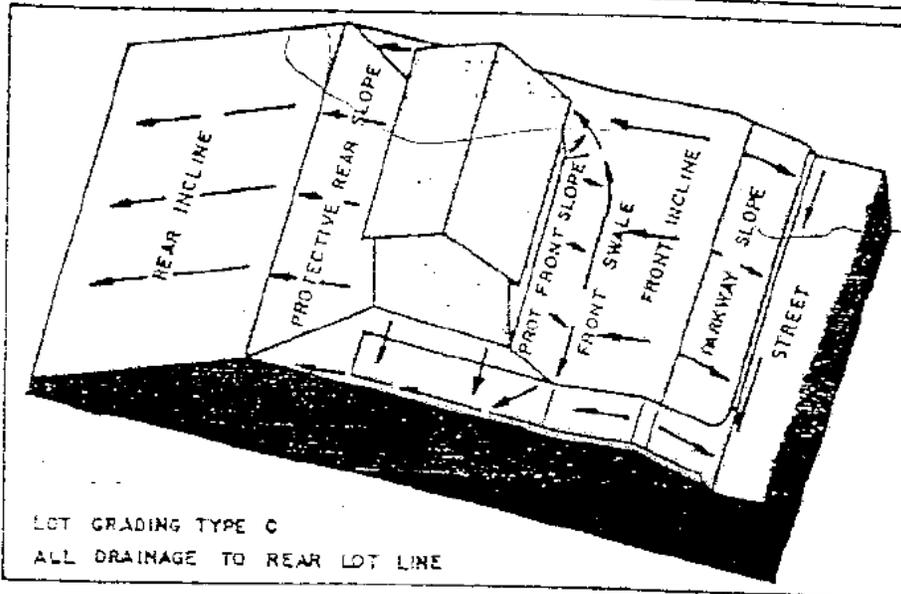
HUD FIGURES



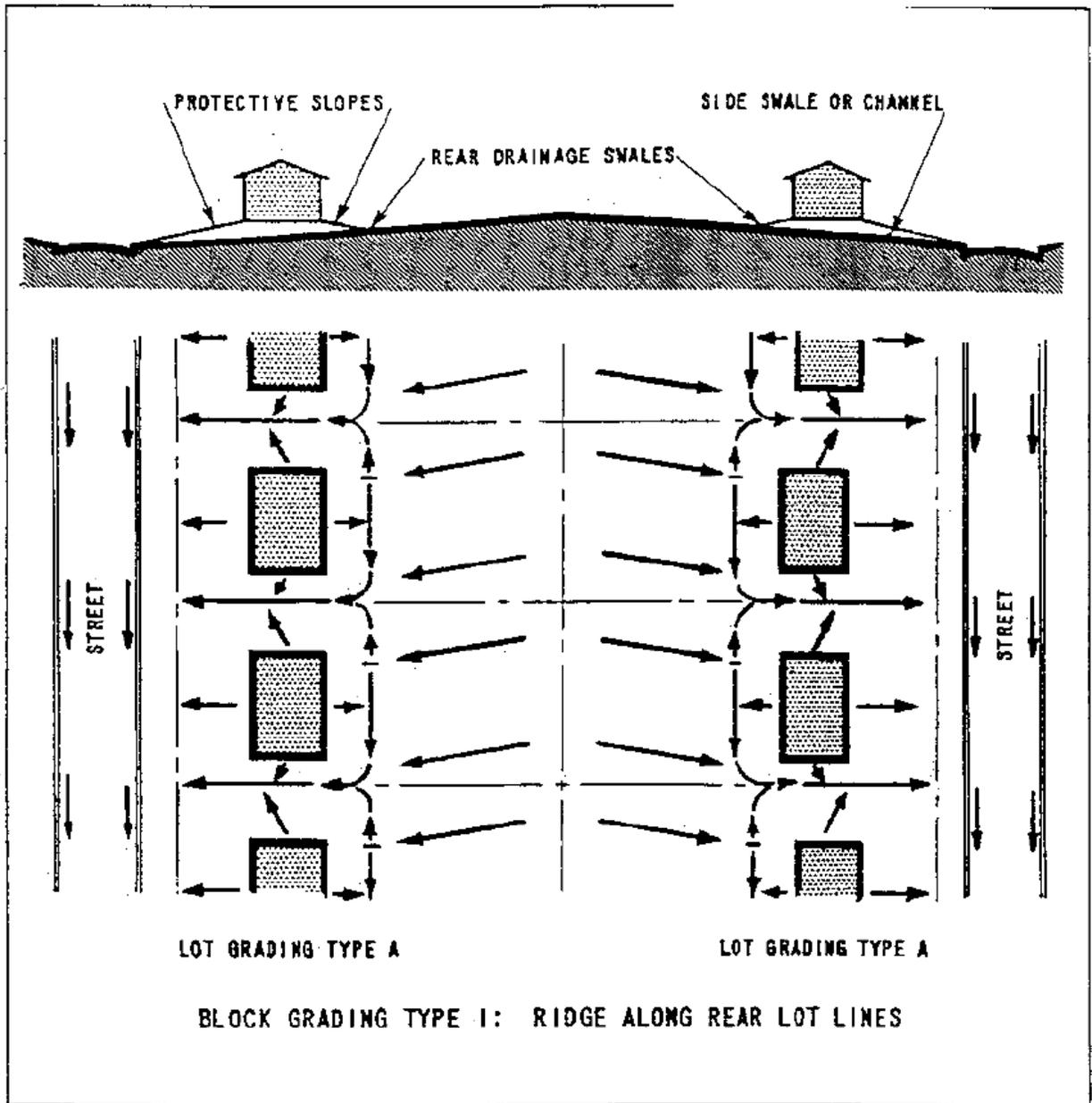
LOT GRADING TYPE A
ALL DRAINAGE TO STREET



LOT GRADING TYPE B
DRAINAGE BOTH TO STREET & TO REAR LOT LINE



LOT GRADING TYPE C
ALL DRAINAGE TO REAR LOT LINE



BLOCK GRADING TYPES

Block Grading Type 1 has a ridge along rear lot lines and each lot is graded to drain surface water directly to the street independent of other properties. It is the most simple and desirable type of block grading. Topography, however, will often require other block grading types.

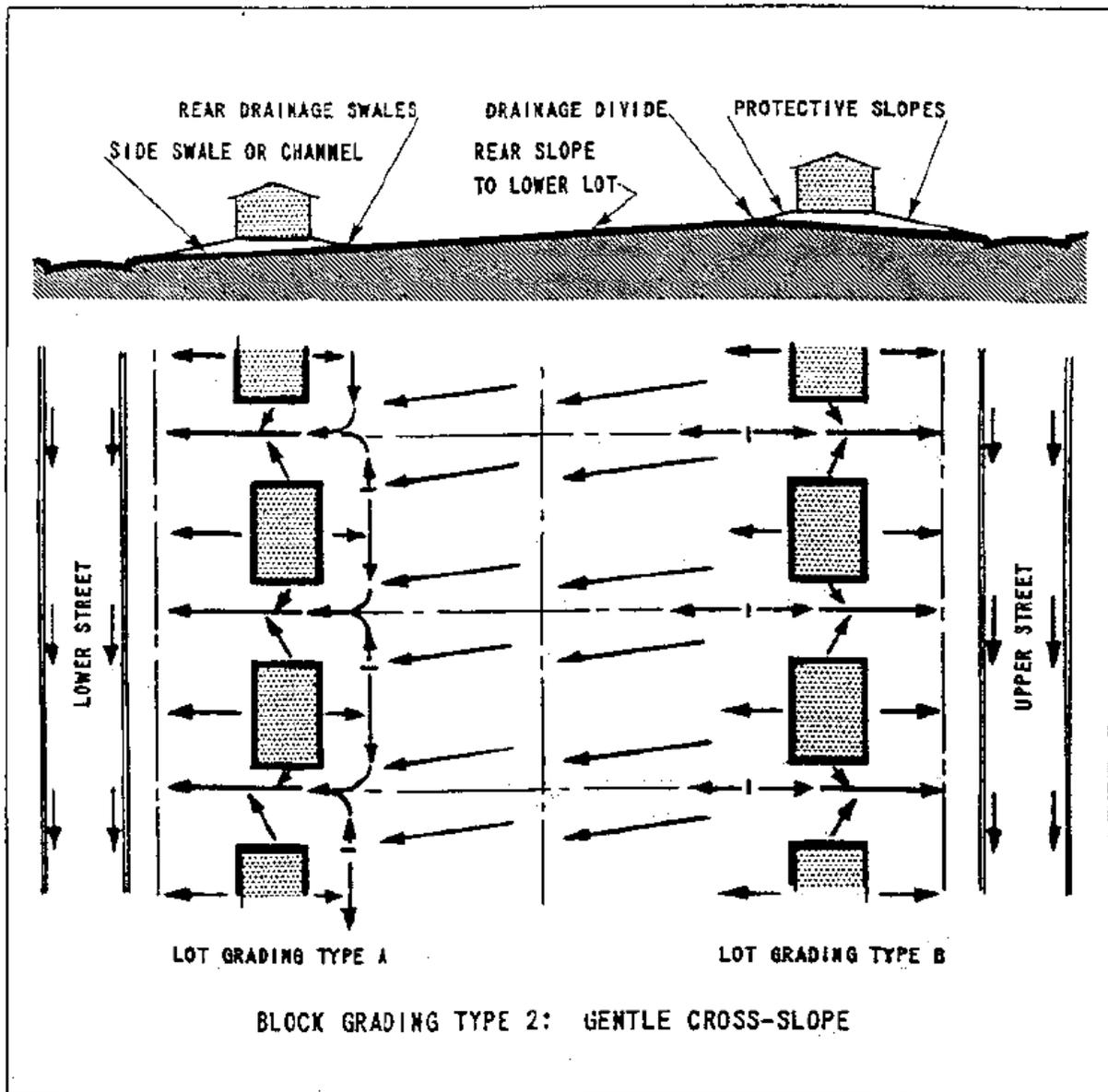
Block Grading Type 2 for a gentle cross-slope involves drainage of some surface water from lots of the high side of the block across the lower tier of lots. Difficulties are not encountered, however, if slopes are gentle and if the water always drains over short routes to the streets and does not concentrate or accumulate

in volume at any point inside the block.

Block Grading Type 3 for steep cross-slopes and Type 4 for a valley along rear lot lines require special provision for block drainage and erosion control.

Erosion is controlled by provision of intercepting drainage swales in easements at the top of the rear lot incline or at intermediate locations along it, and by treatment of the steep slope itself.

Drainage easements in Block Types 3 and 4 must have alignment, width and improvements appropriate for the expected use and maintenance. Assurance of permanent and adequate outfall is essential. The easements must be permanently



For Lot Grading Type B which drains both to the street and to the rear lot line, only side-yard swales are needed. They should extend back of the line of the rear building wall; then splash blocks from rear roof downspouts should be placed to direct roof water to the side swales for drainage directly to the abutting street. Thus the amount of water carried on the rear slope to easements or other properties is kept as small as possible. This reduces erosion and disposal problems.

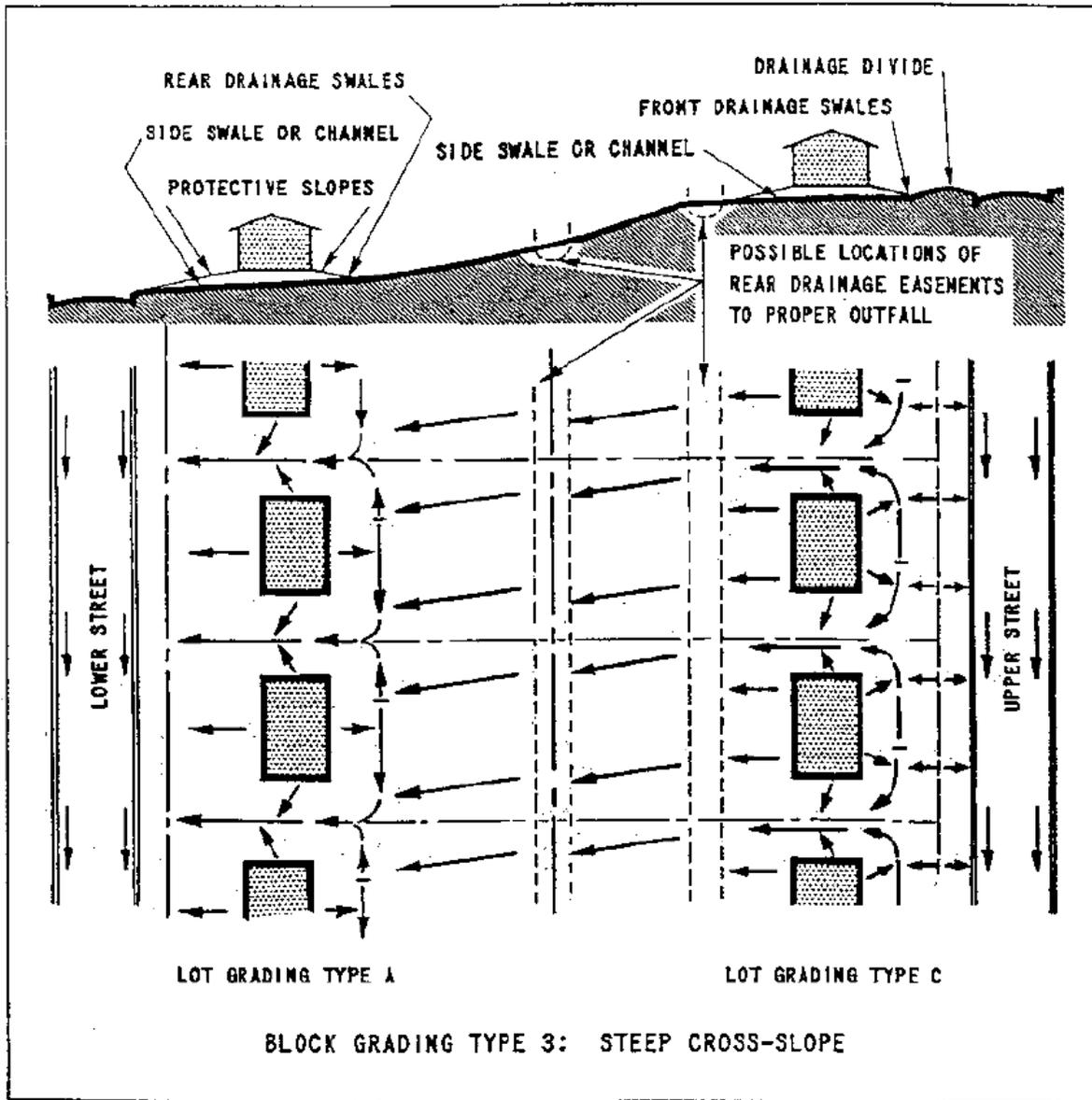
In Lot Grading Type C draining entirely to the rear lot line, front swales are essential to carry surface water from the front yard to side-

yard swales which carry it to the rear for disposal in easements or across other properties. Proper cross-section of the street gutter, curb and parkway strip are essential to stop street water from flowing onto the lot.

Easements and erosion involving Lot Types B and C are discussed above with Block Grading Types 3 and 4.

For lots with steep cross-slopes due to street gradients, similar lot grading types are used, the lot cross-slopes being taken up by walls or steep slopes along side lot lines or by changing grade levels along the front and rear house walls.

Where high slopes occur along side or rear lot

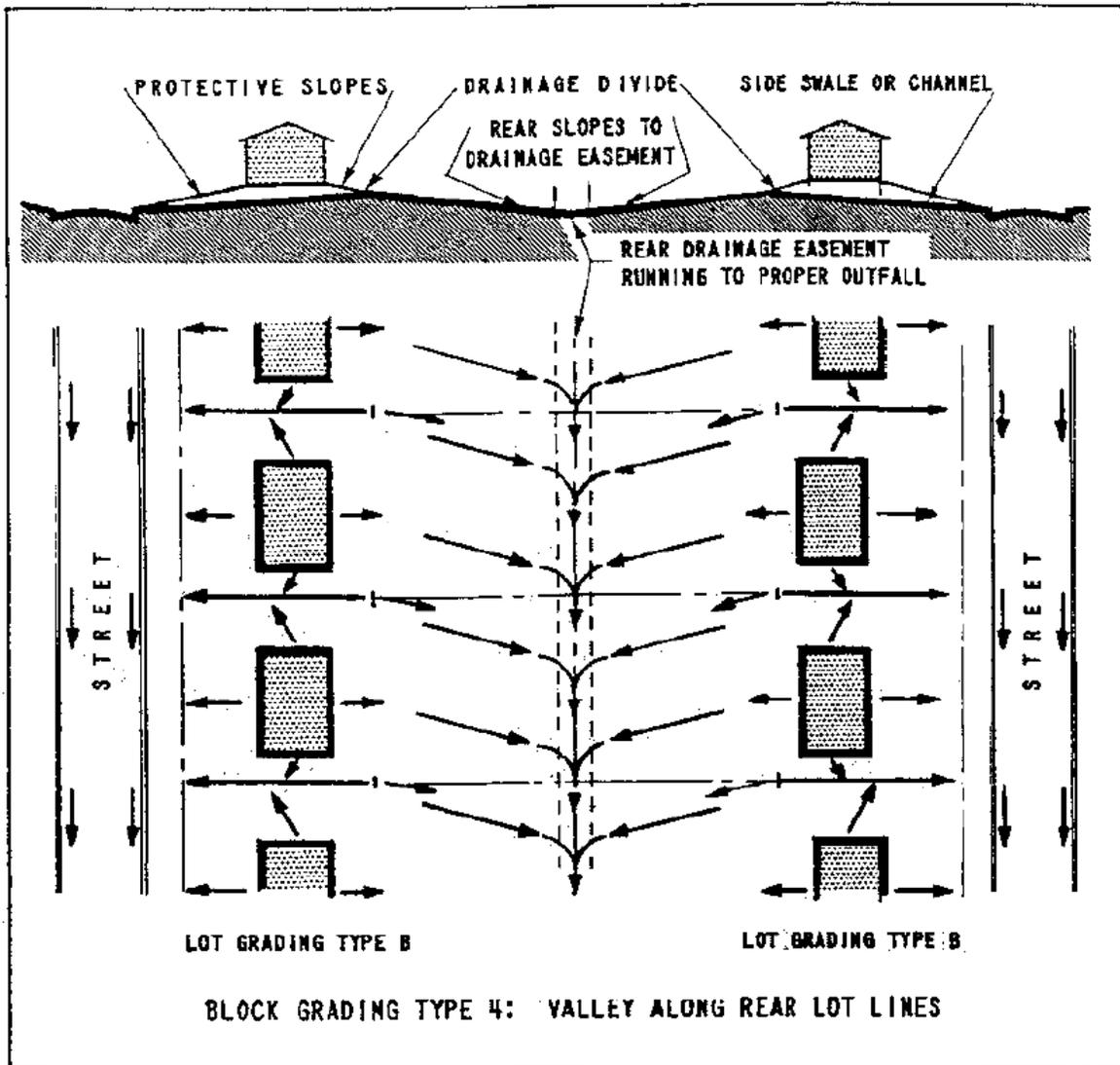


point along the house wall where the outside finish grade controls the floor elevation. In the case of no street curbs, the starting point and elevation should be the normal curb location and the street center-line elevation.

The minimum street-to-floor rise for any lot is found by adding and subtracting the required rises and permitted falls along the lot grading control line for the property. The method is illustrated by the sample computation accompanying each of the three lot grading diagrams. For actual building operations, the relationship should be figured out specifically for each lot or group of typical lots because such factors as building setback,

building depth, lot width and swale gradient may change the relationship considerably.

Minimum gradients for grass swales and other unpaved areas depend upon practical limits on precision in grading and maintaining land surfaces and upon the capacity of the ground to percolate water held back by surface texture and depressions. A gradient of 1/4 inch-per-foot (2%) is a practical minimum in areas subject to ground frost. Flatter gradients are usable, however, where the supplementary ground percolation at all seasons is adequate to prevent any prolonged saturation of soil or standing water. For example, 1/8 inch per foot (1%) is satisfactory on



ADJUSTMENTS TO EACH PROPERTY

After the minimum lot grading control line and minimum street-to-floorrise have been determined, they should be adjusted upward as suitable for existing topography and other conditions of each property.

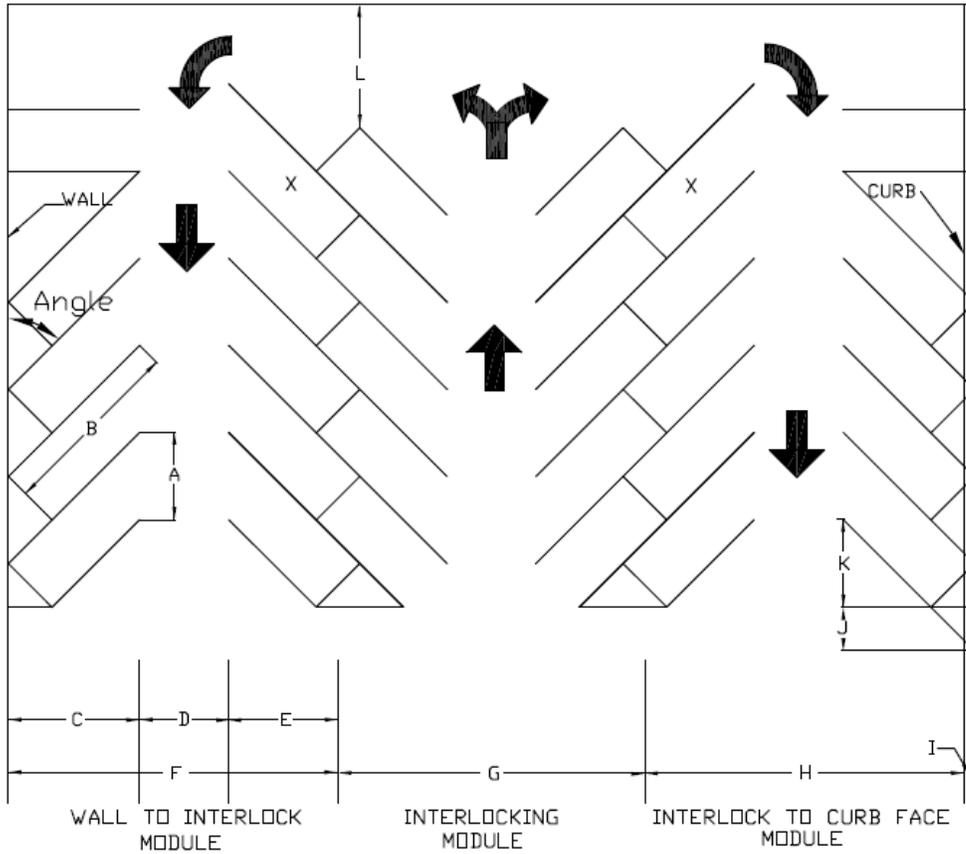
For a house with a basement, check is made of elevations of drains for basement floor and any basement plumbing fixtures. For a house with a crawl space, floor elevation is checked for height of access space and drainage of interior ground (MPS 803-3). For a concrete slab house, floor elevation is checked against excessive depth of fill under the slab (MPS 808-4).

Then general lot grading is checked for feasibility and suitability.

Proposed grades at any necessary additional key points are determined, and all grades are further adjusted as needed. These additional points and adjustments cover such items as grades of walk and driveway, variation of outside finish grade along building walls, width and gradients of usable yard areas, and transition to grades of adjoining properties.

After all key elevations have been properly determined by these adjustments in the planning stage, then execution of good grading on the ground is relatively easy. Care must be taken primarily to set grade stakes correctly at key points and to build and grade to them in accordance with the practices outlined in this data sheet and in the FHA Minimum Property Standards.

APPENDIX K
PARKING LOT LAYOUT



DIMENSION	Key	0° (FT)	30° (FT)	45° (FT)	60° (FT)	75° (FT)	90° (FT)
Stall width, parallel to aisle	A	9	18	12.7	10.4	9.3	9
Stall length of line	B	24	33.6	27	23.2	20.4	18
Stall depth to wall	C	9	16.8	19.1	20.1	19.7	18
Aisle width, one-way	D	12	13	13	18	22	24
Aisle width, two-way		24	19	20	22	23	24
Stall depth, interlock	E	9	12.9	15.9	17.9	18.5	18
Module, wall to interlock	F	30	42.7	48	56	60.2	60
Module, interlocking	G	30	38.8	44.7	53.7	59.1	60
Module, interlock to curb face	H	30	41.7	43.2	51.9	57.1	60
Module, curb face to curb face		30	40.7	41.7	50.1	55.1	58
Bumper, Overhang (typical)	I	0	1.5	1.5	1.8	2	2
Offset	J		9	6.3	2.7	0.5	0
Setback	K	24	15.6	11	8.3	5	0
Cross aisle, One-way	L	18	18	18	18	18	18
Cross aisle, two-way		24	24	24	24	24	24

X = STALL NOT ACCESSIBLE IN CERTAIN LAYOUTS.

L	PARKING LOT LAYOUT	
CITY OF BURLESON		
ORIGINAL	2/11/08	SWC
REVISION		
REVISION		
REVISION		

APPENDIX L

EASEMENT/RIGHT-OF-WAY USE AGREEMENT

INSTRUCTIONS FOR COMPLETING
EASEMENT & RIGHT-OF-WAY USE AGREEMENT

The forms shall be signed (in black ink only) by a legal partner, corporate officer, or individual owner of the land. An authorized agent of the landowner must submit a Power of Attorney.

PLEASE READ THE FOLLOWING CAREFULLY:

APPLICATION: The application shall be completely filled out, signed and notarized in black ink. Item No. 3 on the application should be checked at the Engineering Services Maproom for existing utilities in the easement.

AGREEMENT: The agreement shall be individually completed, signed and notarized in black ink. Do not submit copies of signatures and notary acknowledgments. In the blanks of the heading paragraph, please describe specifically the intended use of the easement or right-of-way.

EXHIBIT NO. 1: This instrument shall be a very precise metes and bounds description of the part of an easement or right-of-way to be used. This information is best provided by a registered land surveyor. The City staff is not authorized to prepare this information.

EXHIBIT NO. 2: Please place all of the information required in the heading of this exhibit on the 8½" x 11" attached sheet of paper. You may submit additional 8½" x 11" sheets as necessary. (NOTE: Carefully line, dimension, and provide the appropriate courses about area of easement described in Exhibit No. 1 on this exhibit.) Please limit the area of usage of the easement/right-of-way to only that needed to accommodate your needs. You may reduce large plans or plat, providing the final document is legible. City staff will make the decision about legibility.

EXHIBIT NO. 3: Please provide a detail and/or cross-section of the private facilities to be placed in the right-of-way/easement.

EXHIBIT NO. 4: This will need to be signed by all utilities that serve the area regardless of whether they have utility equipment in the easement. This will need to be done before submitting to the City of Burleson.

NOTES:

1. You or your surveyor may contact Engineering Services, 817-426-9833 for more information about these forms.
2. After this agreement is filled out, you will need to return it to Public Works.
3. Please allow approximately 2 to 3 weeks for review of the agreement.
4. The applicant will be notified by letter at such time as a decision is made.
5. The filing fee shall be paid by the applicant prior to filing with the County.

APPLICATION

Application for the Use of a Portion of Right-of-Way/Easement in the _____ Addition to the City of Burleson, Texas.
Street Address: _____ (if applicable)

DATE: _____

The undersigned hereby makes application for the joint use of that portion of the public utility easement/drainage easement/right-of-way situated in the above named addition, and particularly described in Exhibit No. 1 of the attached agreement. In support of this application, the undersigned represent and warrant the following:

1. The undersigned will hold the City of Burleson harmless, and indemnify it against all suits, costs, expenses, and damages that may arise or grow out of my use of the easement/right-of-way.
2. The reason for the use of the easement/right-of-way is as follows:

3. Such public utility easement/drainage easement/right-of-way has been and is being used as follows:

I respectfully request your favorable consideration of this application for joint use of the easement/right-of-way described and will authorize the execution of the attached agreement.

Printed Name: _____
 Signed: _____
 Name: _____
 Mailing Address: _____
 Telephone Number: _____
 Fax Number: _____

THE STATE OF TEXAS §
 COUNTY OF _____ §

BEFORE ME, the undersigned authority, on this the ____ day of _____, 2004, personally appeared _____, known to me to be a credible person and one of the signers of the foregoing application, and who, after being by me duly sworn, did upon his/her oath, state that the information contained in such application is true and correct to the best of his/her knowledge and belief.

NOTARY SEAL:
Texas

 Notary Public in and for the State of
 My Commission Expires: _____

EXHIBIT NUMBER 1

Being that portion of that certain easement/right-of-way situated in _____
_____ Addition/Survey to the City of Burleson,
_____ County, Texas, and being more particularly described by metes and bounds as
follows:

NOTE: DO NOT PLACE DRAWING OR GRAHICS ON THIS PAGE.

EXHIBIT NUMBER 2

The following is a detail drawing depicting the area or portion of the easement/right-of-way and property described in Exhibit Number 1, a plat of the utility easement/drainage easement/right-of-way to be subject of the joint use agreement in the above numbered application showing the surrounding area to the nearest streets in all directions, abutting lots, the block or blocks in which the portion of the utility easement/drainage easement/right-of-way sought to be the subject of joint use agreement is situated, and the addition or additions in which the portion of the easement/right-of-way sought to be joint use is situated.

This drawing shall include a north arrow, legal description of the subject property and adjoining properties. The type of easement shall be designated on this drawing.

EXHIBIT NUMBER 3

The following is a detail and/or cross section drawing of the improvement(s) in the easement/right-of-way to be subject of the joint use agreement in the above numbered application.

EXHIBIT NUMBER 4

The undersigned public utility companies, **using or entitled to use** under the terms and provisions of agreements with the City of Burleson, that portion of the public utility easement/drainage easement/utility easement/right-of-way sought to be used in Application for joint use of the utility easement/drainage easement/utility easement/right-of-way, do hereby consent to the joint use of the described portion of such utility easement/drainage easement/utility easement/right-of-way in Lot(s) _____, Block(s) _____ of the _____ Addition to the City of Burleson, _____ County, Texas.

Street name: _____

TXU ELECTRIC

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

SBC

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

CHARTER CABLE

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

BETHESDA WATER SUPPLY CORP.

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

JOHNSON COUNTY SPECIAL UTILITY DISTRICT

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

PATHWAY COMMUNICATIONS

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

UNITED COOPERATIVE SERVICES

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

CITY OF BURLESON PUBLIC WORKS

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

ATMOS ENERGY CORP.

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

OTHER

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

UTILITY CONTACT INFORMATION

Oncor Electric Delivery (Electric)

3500 El Campo
Fort Worth, Texas 76107

Terry Sears 817-443-3432
PMDS Utility Designer Sr.
terry.sears@oncor.com

Atmos Energy (Gas)

100 W. Morningside Drive
Fort Worth, Texas 76110

Bob Davison 817-215-4704
bob.davison@atmosenergy.com

AT&T Telephone Company

1116 Houston St.
Room 1410
Fort Worth, Texas 76102

Tommy Ellison (817) 338-5357
Engineering Department
te5574@att.com

Charter Communications

15100 Trinity Blvd., Suite 500
Fort Worth, Texas 76155

Greg Piatt 817-298-3625

Johnson County Special Utility District

2849 Hwy 171 South
P.O. Box 509
Cleburne, TX 76033-0509

Ronnie Nichols 817-558-9522
nicholsr@jcsud.com

Pathway Communications

427 N Broadway St
Joshua, TX 76058-3413

Ricky Allen 817-484-2222
Fax 817-447-0169
ricky@usapathway.com
cc: Robert Strawn
robert@aciglobal.com

Bethesda Water Supply Corporation

P.O. Box 130
509 South Burleson Blvd.
Burleson, TX 76097

Carl Novack 817-295-2131
Fax 817-447-9370

United Cooperative Services

P.O. Box 16
Cleburne, TX 76033

Jason Dillard 817-556-4055
Jason@united-cs.com

City of Burleson

141 W. Renfro
Burleson, TX 76028

Mandy Clark 817-426-9616
Fax 817-426-9363
mclark@burlesontx.com

EASEMENT & RIGHT-OF-WAY USE AGREEMENT

THE STATE OF TEXAS §

COUNTY OF JOHNSON §

That the City of Burleson, hereinafter referred to as "City", and its franchised Utility Companies, herein referred to as "Utilities", do consent and agree to permit _____, herein after referred to as "Applicant", to use an easement/right-of-way dedicated to City. Such easement/right-of-way being described in Exhibit Number 1, to be used for the purposes of _____ upon the following conditions:

I.

That Applicant, his successors or assigns shall maintain and keep in slightly condition all of the easement area and the improvements situated thereon; and, that City and Utilities shall not become responsible for such maintenance at any time in the future. Applicant shall repair any damage to City or Utility facilities caused by Applicant within a reasonable time.

II.

That Applicant shall and does hereby agree to indemnify and hold harmless City and Utilities from any and all damages, loss or liability of any kind whatsoever by reason of injury to property or third person occasioned by its use of the easement/right-of-way or act of omission, neglect or wrong doing of Applicant, his officers, agents, employees, invitees or other persons, with regard to the improvements and maintenance of such improvements; and the Applicant shall, at his own cost and expense, defend and protect City and Utilities against any and all such claims and demands.

III.

That Applicant shall arrange for all activities and improvements in the easements to be discontinued and/or removed within thirty (30) days of notification by City. The cost associated with the discontinuing of such activities, and the removal of such improvements, as well as property adjacent to the easement/right-of-way necessitated by such discontinuation of the easement/right-of-way use, shall be borne by the Applicant.

IV.

That Applicant, his successors or assigns shall not seek compensation from City or Utilities for loss of the value of the improvements made hereunder when such improvements are required to be removed by Applicant.

V.

This agreement shall be filed of record in the Deed Records of Johnson or Tarrant County, Texas, and shall bind all future owners of this lot and shall for all purposes be considered a covenant running with the land.

IN TESTIMONY WHEREOF, Applicant executes this Easement/Right-of-Way Use Agreement on this _____ day of _____, 20____.

CITY OF BURLESON:

APPLICANT:

By:_____

By:_____

Printed Name:_____

Printed Name:_____

Title:_____

Title:_____

NOTE: PLEASE COMPLETE APPROPRIATE ACKNOWLEDGEMENT ONLY.

THE STATE OF TEXAS

§

CORPORATE ACKNOWLEDGMENT

COUNTY OF TARRANT

§

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared _____, known to me to be the person and officer whose name is subscribed to the foregoing instrument and acknowledged to me that same was the act of said _____, a corporation, and that he executed same for the purposes and consideration therein expressed and in the capacity therein stated.

GIVEN UNDER MY HAND AND SEAL OF OFFICE this the _____ day of _____, 20____.

Notary Seal:

Notary Public in and for the
State of Texas

My Commission Expires:_____

THE STATE OF TEXAS

§

INDIVIDUAL ACKNOWLEDGMENT

COUNTY OF TARRANT

§

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared _____, known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed same for the purposes and consideration therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE this the _____ day of _____, 20____.

Notary Seal:

Notary Public in and for the
State of Texas

My Commission Expires:_____

NOTE: PLEASE COMPLETE APPROPRIATE ACKNOWLEDGEMENT ONLY.

THE STATE OF TEXAS §

ACKNOWLEDGMENT

COUNTY OF JOHNSON §

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared _____, known to me to be the person and officer whose name is subscribed to the foregoing instrument and acknowledged to me that same was the act of said _____, and that he executed same for the purposes and consideration therein expressed and in the capacity therein stated.

GIVEN UNDER MY HAND AND SEAL OF OFFICE this the _____ day of _____, 20____.

Notary Seal:

Notary Public in and for the
State of Texas

My Commission Expires:_____

THE STATE OF TEXAS §

INDIVIDUAL ACKNOWLEDGMENT

COUNTY OF JOHNSON §

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared _____, known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed same for the purposes and consideration therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE this the _____ day of _____, 20____.

Notary Seal:

Notary Public in and for the
State of Texas

My Commission Expires:_____

APPENDIX M

EASEMENT/RIGHT-OF-WAY
ABANDONMENT APPLICATION



ABANDONMENT OF PUBLIC RIGHT-OF-WAY/EASEMENT APPLICATION

MINIMUM SUBMITTAL REQUIREMENTS

- Abandonment Fee (\$550 for right-of-way, \$250 for easement)
- A completed copy of the Abandonment of Public ROW/Easement Application
- All exhibits processed (except for Exhibit No. 4, which will be processed by staff).
- A copy of a recent (within 90 days) deed or title insurance policy showing the names of the owners, or, an older deed or titles with a Nothing Further Certificate.
- For unplatted property, a signed, sealed and dated metes and bounds description and a diagram of the property showing the location of the abandonment.
- For platted property, a copy of the plat showing the lot, block, subdivision, and recording information.
- Corporate or partnership owners must furnish a copy of a corporate resolution or other proof of authority to sign on behalf of the corporation, partnership, or joint venture.

APPLICATION

ADDRESS: _____

LEGAL DESCRIPTION: _____

APPLICANT (Primary Contact for the Project):

Name: _____ email: _____

Street Address: _____

City: _____ State: _____ Zip Code: _____

Phone Number: _____ Fax Number: _____

PROPERTY OWNER'S INFORMATION (If different from above):

Name: _____ email: _____

Street Address: _____

City: _____ State: _____ Zip Code: _____

Phone Number: _____ Fax Number: _____

The applicant has prepared this application and certifies that the facts stated hereing and exhibits attached hereto are true and correct.

Signature of Owner

Date

Abandonment Location: _____

**APPLICATION FOR
THE ABANDONMENT OF A
PUBLIC RIGHT-OF-WAY/EASEMENT**

Date: _____

Location of Right-of-way/Easement to be Abandoned:

Property Owner's Name and Address: _____

Property Owner's Phone Number: _____

Property Owner's email: _____

TO THE MAYOR AND CITY COUNCIL OF THE CITY OF BURLESON:

The undersigned hereby makes application for the abandonment of that portion of the above right-of-way particularly described in Exhibit No. 1, attached. In support of this application, the undersigned represents and warrants the following:

1. The undersigned will hold the City of Burleson harmless, and indemnify it against all suits, costs, expenses, and damages that may arise or grow out of such abandonment.
2. Attached, marked Exhibit No. 1, are two sealed metes and bounds descriptions (dividing the area in half) of the area sought to be abandoned, prepared by a Registered Public Surveyor.
3. Attached, marked Exhibit No. 2, are two copies of a plat or detailed sketch of that portion of the public right-of-way/easement sought to be abandoned and the surrounding area to the nearest streets in all directions, showing the abutting lots and block, and the subdivision in which the above described right-of-way/easement is situated, together with the record owners of such lots.
4. Attached, marked Exhibit No. 3, is the consent of all public utilities to the abandonment.
5. Attached, marked Exhibit No. 4, is the consent of the City of Burleson staff to the abandonment.
6. Attached, marked Exhibit No. 5, is the consent of all the abutting property owners, except the following: (if none, so state)

Abandonment Location: _____

7. Such public right-of-way/easement should be abandoned because:

8. Such public right-of-way/easement has been and is being used as follows:

I swear that all of the information contained in this application is true and correct to the best of my knowledge and belief.

Owner's Signature:

Date:

STATE OF TEXAS

ACKNOWLEDGEMENT

COUNTY OF JOHNSON

Subscribed and sworn to me, a Notary Public, this _____ day of _____, 20____,
by _____.

Notary Public in and for the State of Texas

EXHIBIT NO. 1

Attached is a sealed copy of the metes and bounds description of the public right-of-way or easement situated in _____ Addition/Subdivision/Survey to the City of Burleson, Johnson County, Texas, sought to be abandoned.

EXHIBIT NO. 2

Attached is a copy of a plat or detailed sketch of the public right-of-way/easement sought to be abandoned in the above-mentioned application, showing the surrounding area to the nearest streets in all directions, abutting lots, the block or blocks in which the portion of the public right-of-way/easement sought to be vacated is situated, and the addition or subdivision in which the portion of the public right-of-way/easement sought to be abandoned is situated. Also, the names of record owners of the abutting lots are shown.

**EXHIBIT NO. 3
EASEMENT ABANDONMENT
UTILITY COMPANY SIGN OFF SHEET**

The undersigned public utility companies, using or entitled to use under the terms and provisions of agreements with the City of Burleson, that portion of the public utility easement sought to be abandoned, do hereby consent to the joint use of the described portion of such utility easement in Lot(s) _____, Block(s) _____ of the _____ Addition to the City of Burleson, _____ County, Texas.

TXU ELECTRIC

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

SBC

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

CHARTER CABLE

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

BETHESDA WATER SUPPLY CORP.

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

**JOHNSON COUNTY RURAL WATER
SUPPLY CORP.**

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

PATHWAY COMMUNICATIONS

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

UNITED COOPERATIVE SERVICES

By: _____
(Please Print)

Title: _____
(Please Print)

Signature: _____

ATMOS ENERGY

By: _____

Title: _____
(Please Print)

Signature: _____

NOTE: ONLY UTILITY COMPANIES THAT PROVIDE SERVICE IN THE AREA REQUESTED FOR USE MUST COMPLETE THIS EXHIBIT.

Abandonment Location: _____

EXHIBIT NO. 4

The undersigned, City staff of the City of Burleson, certify that they have carefully considered the Application for Abandonment of the public right-of-way/easement referred to above from the standpoint of the City of Burleson ordinances and with respect to present and future needs of the City of Burleson and see no objection to the requested abandonment from the City's standpoint.

Assistant Director of Public Works/Utilities
City of Burleson

Assistant Director of Public Works/Streets and Solid Waste
City of Burleson

Assistant Director of Public Works/Engineering
City of Burleson

Director of Community Development
City of Burleson

Fire Marshal
City of Burleson

Building Official
City of Burleson

EXHIBIT NO. 5

The undersigned owners of property abutting upon that portion of the public right-of-way/easement named and described in the Application for Abandonment of a Public Right-of-Way/Easement referred to above, do hereby consent to such abandonment.

Name: _____

Address: _____

Phone Number: _____

Signature: _____

STATE OF TEXAS

COUNTY OF _____

BEFORE ME, the undersigned, a Notary Public in and for said County and State, on this day personally appeared _____, known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and considerations therein.

WITNESS MY HAND AND SEAL OF OFFICE THIS THE ____ DAY OF _____, 20__.

Notary Public in and for the State of Texas

Name: _____

Address: _____

Phone Number: _____

Signature: _____

STATE OF TEXAS

COUNTY OF _____

BEFORE ME, the undersigned, a Notary Public in and for said County and State, on this day personally appeared _____, known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and considerations therein.

WITNESS MY HAND AND SEAL OF OFFICE THIS THE ____ DAY OF _____, 20__.

Notary Public in and for the State of Texas

Attach as many copies of this sheet as necessary.

Abandonment Location: _____

UTILITY CONTACT INFORMATION

Oncor Electric Delivery (Electric)

3500 El Campo
Fort Worth, Texas 76107

Terry Sears 817-443-3432
PMDS Utility Designer Sr.
terry.sears@oncor.com

Atmos Energy (Gas)

100 W. Morningside Drive
Fort Worth, Texas 76110

Bob Davison 817-215-4704
bob.davison@atmosenergy.com

AT&T Telephone Company

1116 Houston St.
Room 1410
Fort Worth, Texas 76102

Tommy Ellison (817) 338-5357
Engineering Department
te5574@att.com

Charter Communications

15100 Trinity Blvd., Suite 500
Fort Worth, Texas 76155

Greg Piatt 817-298-3625

Johnson County Special Utility District

2849 Hwy 171 South
P.O. Box 509
Cleburne, TX 76033-0509

Ronnie Nichols 817-558-9522
nicholsr@jcsud.com

Pathway Communications

427 N Broadway St
Joshua, TX 76058-3413

Ricky Allen 817-484-2222
Fax 817-447-0169
ricky@usapathway.com
cc: Robert Strawn
robert@aciglobal.com

Bethesda Water Supply Corporation

P.O. Box 130
509 South Burleson Blvd.
Burleson, TX 76097

Carl Novack 817-295-2131
Fax 817-447-9370

United Cooperative Services

P.O. Box 16
Cleburne, TX 76033

Jason Dillard 817-556-4055
Jason@united-cs.com

City of Burleson

141 W. Renfro
Burleson, TX 76028

Mandy Clark 817-426-9616
Fax 817-426-9363
mclark@burlesontx.com

APPENDIX N

STANDARD CONSTRUCTION NOTES

The following notes are typical notes that should be placed on construction plan when applicable. This list is not all-inclusive. The plan reviewer may request that additional notes, specific to the site, be placed on the plans.

1. The contractor shall contact the City's Chief Inspector at 817-917-8966 at least 48 hours prior to beginning construction.
2. Construction shall be in accordance with current City of Burleson standard details and specifications and in accordance with the North Central Texas Council of Governments' *Public Works Construction Standards*.
3. No vertical facilities or meter boxes will be allowed to be located within the sidewalks.
4. All trees in the right-of-way must be removed prior to acceptance of the construction. If there are specific trees that are proposed to be saved, then the design needs to be modified to accommodate the trees, either by revising the layout or adding easements to contain the sidewalk.
5. Minimum depth of cover over all water mains shall be three and one-half feet.
6. The minimum horizontal separation between any water main and a storm drain facility shall be equal to two and one-half feet or half the depth of the water line, whichever is greater.
7. The minimum horizontal separation between any water main and a sanitary sewer main shall be nine feet measured from outside edge of pipe to outside edge of pipe.
8. When a water main crosses over a sanitary sewer main and the vertical separation is less than nine feet, then the sanitary sewer shall have one joint (20 feet) of PVC pipe conforming to ASTM D-3035, SDR-26 installed centered on the water line. In addition, the joint shall have a minimum of 12 inches of cement stabilized (two-sack minimum) backfill directly above the sanitary sewer pipe.
9. When a water main must cross under a sanitary sewer main, the minimum separation shall be 24 inches. In addition, the sanitary sewer shall have installed one joint (20 feet) of ductile iron pipe centered on the water main.
10. The minimum horizontal separation between any sanitary sewer main and a storm drain facility shall be equal to two and one-half feet or one-half times the depth of the sanitary sewer or storm drain, whichever is greater.

11. All waterline fittings shall incorporate Megalug mechanical joint restraints or approved equal.
12. Prior to grading, the contractor or developer must obtain a grading permit from the City. The grading permit will require 48 hours notice to the City and that all erosion control measures be installed prior to any grading.

APPENDIX O

LETTER OF PERMISSION

**LETTER OF PERMISSION
FOR GRADING
OR
CONCENTRATION OF FLOW**

(This form may be modified for specific site conditions or agreements with the offsite owner. This form is intended as a general template and must be customized for each project.)

I (owner), as owner of Lot ____, Block ____, of _____ Addition ((address)), in the City of Burleson, Texas, do hereby grant permission to (developer), the developer of Lot(s) ____, Block ____ of _____ Addition for grading improvements to be performed on our property as shown on the attached exhibit *(or concentration of flow as shown on the attached plan sheet)*. I have reviewed the plans and fully understand the intent of this proposed work. In addition to the grading, I also give the developer or the City, the permanent ability to re-grade the area to maintain the drainage as shown in the plan. I understand that, once graded, the routine maintenance of the area is my responsibility.

It is fully understood by this document that both the property owner and the City of Burleson agree that all grading work necessary for conveying storm water as described will be at the developer's expense. It is also fully understood by both parties that this permission to grade does not constitute a permanent easement and will cease when, and if, this portion of the described property is developed in accordance with the City of Burleson Subdivision and Development Ordinance in the future.

The City of Burleson will have the right, but not the obligation, to enter the property as often as necessary to correct drainage problems with may occur.

(owner)

STATE OF TEXAS

COUNTY OF JOHNSON

BEFORE ME, the undersigned authority in and for Johnson County, Texas on this day personally appeared (owner), known to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed the foregoing instrument for the purposes and consideration therein expressed, and in the capacity therein stated.

Given under my hand and seal of office, this _____ day of _____, 20__.

Notary Public in and for the State of Texas

My Commission Expires:

Type or Print Notary's Name

APPENDIX P

TXDOT UTILITY PERMIT QUESTIONNAIRE

SUBMITTAL REQUIREMENTS FOR TXDOT UTILITY PERMITTING

1. State Roadway Impacted: _____

Project Description: _____

2. Project location map as an adobe.pdf.

3. Applicable project plans as adobe.pdf. (NOTE: File size limit of 5 MB)

4. Project start date (approx.): _____

Project end date (approx.): _____

5. Give the approximate distance of proposed work (measured along state road) from centerline of a street that intersects the state road)

Distance: _____ LF from

Intersecting street: _____

6. Complete the following checklist:

Is the location of the proposed utility line clearly shown on the plans?

Yes

No

N/A

Comment: _____

Are other existing utility lines in the vicinity shown on the plans and have you included vertical elevations and horizontal alignments for these existing utilities based on the department's survey datum?

Yes

No

N/A

Comment: _____

Are the utility plans legible, drawn to scale, and accurately dimensioned?

Yes No N/A

Comment: _____

Is the location of the proposed utility line clearly shown on the plans?

Yes No N/A

Comment: _____

Are the right of way line and edge of highway pavement clearly shown on plans?

Yes No N/A

Comment: _____

For lines to be installed parallel to the highway, have you included the design, proposed location, vertical elevations, and horizontal alignments of the utility facility based on the department's survey datum, the relationship to existing highway facilities?

Yes No N/A

Comment: _____

For installations parallel to the highway, does the installation alignment change? Alignment changes need to be justified and reasonable.

Yes No N/A

Comment: _____

For lines crossing the highway, crossing intersecting streets/county roads, or passing through the protected root area of desirable trees, is it clearly shown that the line will be installed by boring? In addition, casing should be shown under highways and paved city street/county road intersections.

Yes No N/A

Comment: _____

For aerial installations, do the plans clearly show and differentiate between existing poles and new poles?

Yes No N/A

Comment: _____

For gas crossings, are all encased gas lines showing vent pipes at right of way line and all gas pipes clearly marked with owner's signs?

Yes No N/A

Comment: _____

APPENDIX Q

FLOODPLAIN DEVELOPMENT PERMIT

FLOODPLAIN DEVELOPMENT PERMIT

**City of Burleson, Texas
Community No. 485459**

Date _____

Permit Number _____

Owner	Name:		
	Address:		
	City :	State:	Zip:
	Home Telephone Number : () -		
	Alternate Telephone Number: () -		

Contractor	Contact Name:		
	Company Name:		
	Local Address:		
	Local Telephone Number: () -		
	Pager/Cell Phone Number: () -		
	Permanent Address:		
	City :	State:	Zip:
	Years in Business:		

Site	Street Address:		City:	County:	
	Subdivision:		Lot#:	Block#:	
	Abstract:		Tract#		
	Existing Sewage Treatment: <input type="checkbox"/> Municipal or On-Site Sewer Facilities? <input type="checkbox"/> Yes <input type="checkbox"/> No (If yes, specify type) <input type="checkbox"/> Aerobic Treatment <input type="checkbox"/> Drain Field <input type="checkbox"/> ET Bed <input type="checkbox"/> Other (Describe):				

Type of Development	Activity: <input type="checkbox"/> New <input type="checkbox"/> Repair <input type="checkbox"/> Remodel <input type="checkbox"/> Relocation <input type="checkbox"/> Addition <input type="checkbox"/> Demolition			
	Type of Structure: <input type="checkbox"/> Residential (1-4 Family) <input type="checkbox"/> Residential (more than 4 family)			
	<input type="checkbox"/> Non-Residential (Flood-Proofing? <input type="checkbox"/> Yes <input type="checkbox"/> No)			
	<input type="checkbox"/> Mobile/Manufactured Home (In Manufactured Home Park? <input type="checkbox"/> Yes <input type="checkbox"/> No)			
<input type="checkbox"/> Storage Shed <input type="checkbox"/> Business <input type="checkbox"/> Garage (Detached? <input type="checkbox"/> Yes <input type="checkbox"/> No)				
<input type="checkbox"/> Commercial (Name & Type):				
Type of Foundation (Specify): <input type="checkbox"/> Building on Slab				
<input type="checkbox"/> Building on Piers, Piles or Columns				
<input type="checkbox"/> Building with Basement				
Estimated Cost of Project: \$				

THIS PERMIT SHALL BECOME NULL AND VOID IF THE PROPOSED FLOOD PLAIN DEVELOPMENT IS NOT COMPLETED WITHIN 12 MONTHS FROM THE ISSUANCE DATE OF THIS PERMIT.

Other Development Activities	<input type="checkbox"/> Fill <input type="checkbox"/> Mining <input type="checkbox"/> Drilling <input type="checkbox"/> Grading <input type="checkbox"/> Excavation (other than for structure)
	<input type="checkbox"/> Drainage Improvements (including culvert work)
	<input type="checkbox"/> Road, Street or Bridge Construction
	<input type="checkbox"/> Subdivision (New or Expansion) Name: _____
	<input type="checkbox"/> Individual Water or Sewer System
	<input type="checkbox"/> Other (Please Specify): _____

Timeframe	Date to Begin Construction: _____

	Date for Foundation to be Completed: _____

Timeframe	Estimated Date of Completion: _____

Attachments	<input type="checkbox"/> 8X10 copy of flood map <input type="checkbox"/> Septic tank permit (if applicable)
	<input type="checkbox"/> Site plans with elevations (Show locations of proposed development with horizontal dimensions) <input type="checkbox"/> Electrical Permit (if applicable)
	<input type="checkbox"/> Foundation plans with elevations <input type="checkbox"/> Plumbing Permit (if applicable)
	<input type="checkbox"/> Map to Site <input type="checkbox"/> Wetlands Permit (if applicable)
	<input type="checkbox"/> CLOMA/CLOMR (if applicable)

I certify that the information shown on this application is accurate and true. I realize that I may need to provide more information and documentation on costs or other items if needed. I understand that I am **not** to begin development until the development permit has been issued or I will be in violation of the community's regulations and may be subject to fines as prescribed by ordinance.

Owners Signature: _____ Date: _____

FLOODPLAIN DEVELOPMENT PERMIT

Permit Number _____
Date _____

Page 3

To Be Filled Out by the Floodplain Administrator

Floodplain
Determination

The proposed development is located on FIRM Panel No. _____, Dated: _____

The proposed development is: Substantial improvement Yes No

The Proposed Development:

Is NOT located in a Special Flood Hazard Area (Notify the applicant that the application review is complete and NO FLOODPLAIN DEVELOPMENT PERMIT IS REQUIRED).

Is located in a Special Flood Hazard Area.
FIRM zone designation is _____.

100-Year flood elevation at the site is: _____ Ft. NGVD (MSL)
 Unavailable

Elevation Required by the Community _____

Freeboard Required by Community _____

The proposed development is located in a floodway.
FIRM Panel No. _____ Dated: _____

Permit applicant shall provide additional information.
(Provide applicant a copy of page 4 for submittals required)

An elevation certificate is required is not required.

If an elevation certificate is required, permit applicant shall provide a completed elevation certificate to the City for review, prior to final inspection of the structure.

FLOODPLAIN DEVELOPMENT PERMIT

Permit Number _____
Date _____

To Be Filled Out by the Floodplain Administrator

Additional Information Required

The applicant must provide the documents checked below before the application can be processed:

- A site plan showing the location of all existing structures, water bodies, adjacent roads, lot dimensions and proposed development.
- Development plans, drawn to scale, and specifications, including where applicable details for anchoring structures, proposed elevation of lowest floor (including basement), types of water resistant materials used below the first floor and details of enclosures below the first floor. Also. _____
- Subdivision or other development plans (If the subdivision or other development exceeds 50 lots or 5 acres, whichever is the lesser, the the applicant must provide 100-year flood elevations if they are not otherwise available).
- Plans showing the extent of watercourse relocation and/or landform alterations.
- Top of new fill elevation _____ Ft. NGVD (MSL).
- Floodproofing protection level (non-residential only) _____ Ft. NGVD (MSL). For floodproofed structures applicant must attach certification from registered engineer or architect.
- Certification from a registered engineer that the proposed activity in a regulatory floodway will not result in any increase in the height of the 100-year flood. A copy of all data and calculations supporting this finding must also be submitted.

Other:

FLOODPLAIN DEVELOPMENT PERMIT

Permit Number _____

Page 5

Date _____

To Be Filled Out by the Floodplain Administrator

Permit Determination	<p>I have determined that the proposed activity: A. <input type="checkbox"/> Is B. <input type="checkbox"/> Is not</p> <p>in conformance with provisions of the Flood Damage Prevention Ordinance of the City of Burleson. The permit is issued subject to the conditions attached to and made part of this permit.</p>
	<p>SIGNED _____ DATE _____ Floodplain Administrator City of Burleson, Texas</p>

INSPECTIONS	<p>Date _____</p> <p><input type="checkbox"/> Preliminary <input type="checkbox"/> Complaint <input type="checkbox"/> During Construction <input type="checkbox"/> Complaint Violation Noted (if any)</p>
	<p>Date _____</p> <p><input type="checkbox"/> Preliminary <input type="checkbox"/> Complaint <input type="checkbox"/> During Construction <input type="checkbox"/> Complaint Violation Noted (if any)</p>
	<p>Date _____</p> <p><input type="checkbox"/> Preliminary <input type="checkbox"/> Complaint <input type="checkbox"/> During Construction <input type="checkbox"/> Complaint Violation Noted (if any)</p>

THIS PERMIT SHALL BECOME NULL AND VOID IF THE PROPOSED FLOOD PLAIN DEVELOPMENT IS NOT COMPLETED WITHIN 12 MONTHS FROM THE ISSUANCE DATE OF THIS PERMIT.

FLOODPLAIN DEVELOPMENT PERMIT

THIS PERMIT SHALL BECOME NULL AND VOID IF THE PROPOSED FLOOD PLAIN DEVELOPMENT IS NOT COMPLETED WITHIN 12 MONTHS FROM THE ISSUANCE DATE OF THIS PERMIT.

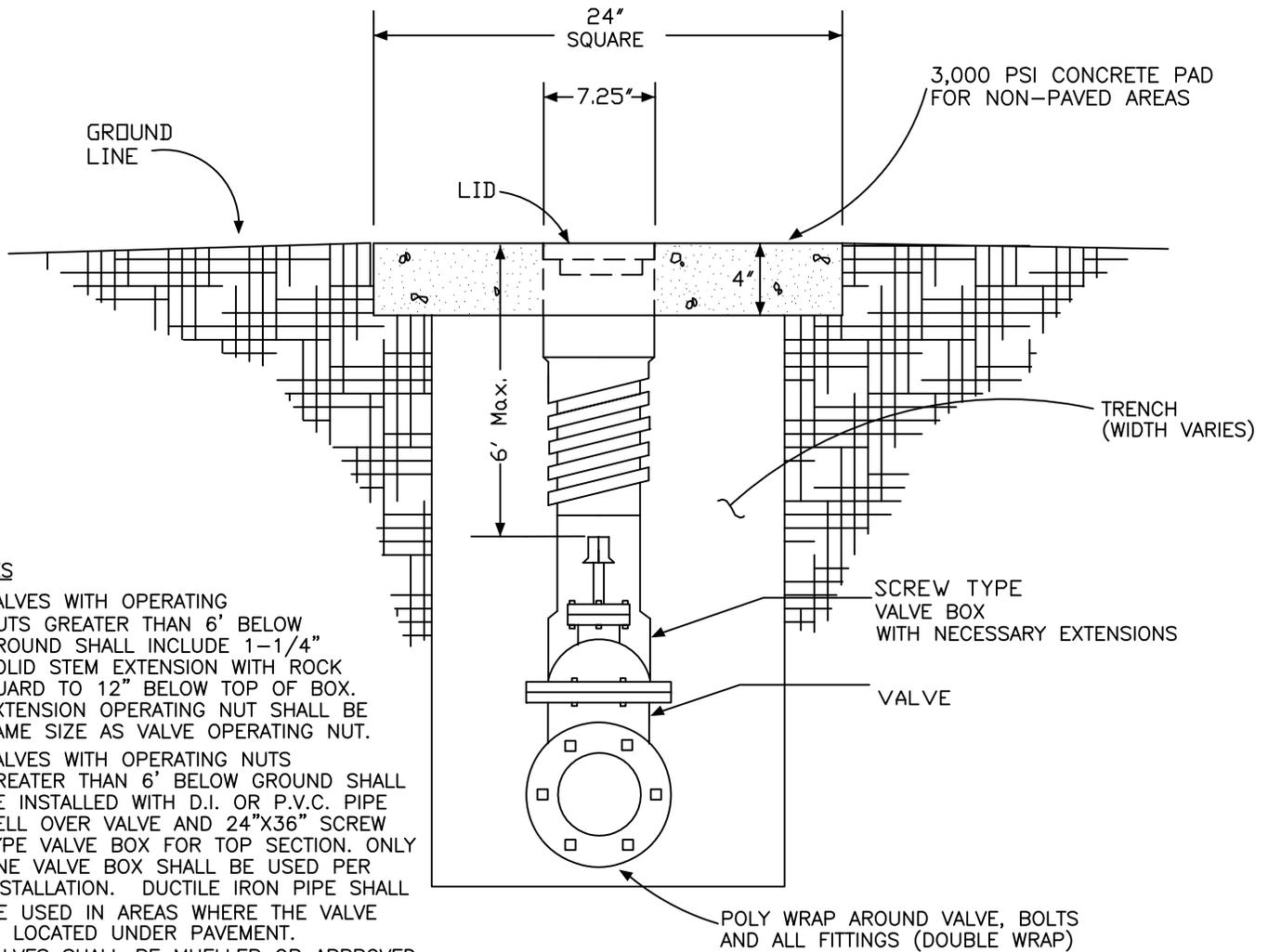
APPENDIX R

STANDARD DETAILS

Water Details
Sanitary Sewer Details
Paving Details
Drainage Details

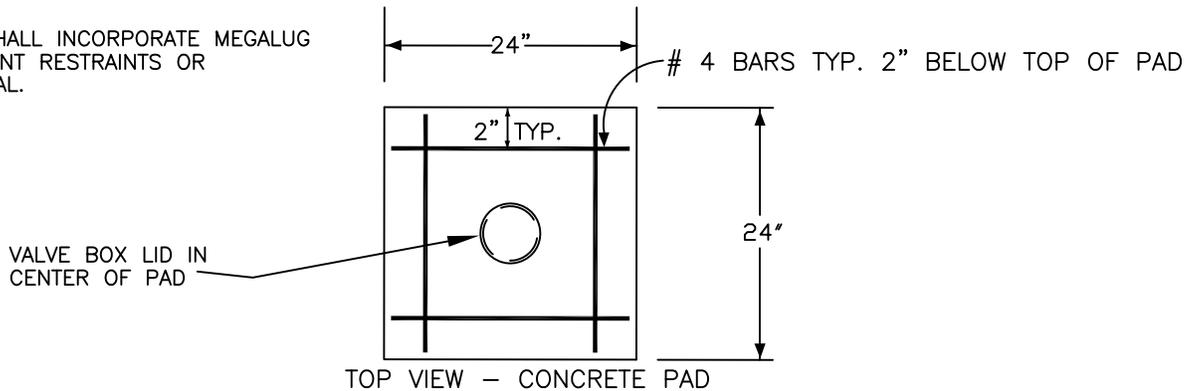
WATER SYSTEM DETAILS

W-01	Gate Valve
W-02	Fire Hydrant
W-03	Fire Hydrant Assembly
W-04	Horizontal Thrust Blocking
W-05	Water Main Embedment
<u>Services:</u>	
W-06	1" Service with two 3/4" Outlets (bullhead)
W-07	1" water service for 1" and 3/4" Outlets
W-08	2" Water Service for 2" and 1 1/2" Outlets or 2" flush point
W-9	Meter Vault and Appurtenances (3" and larger)
W-10	Vertical Tie-Down Block Detail
W-11	Automatic Water Distribution Flushing System
W-12	Combination Air Valve Installation
W-13	Combination Air Valve Installation Offset from Pipe
W-14	Existing Street Backfill and Repair
W-15	Street Backfill Prior to Street Construction



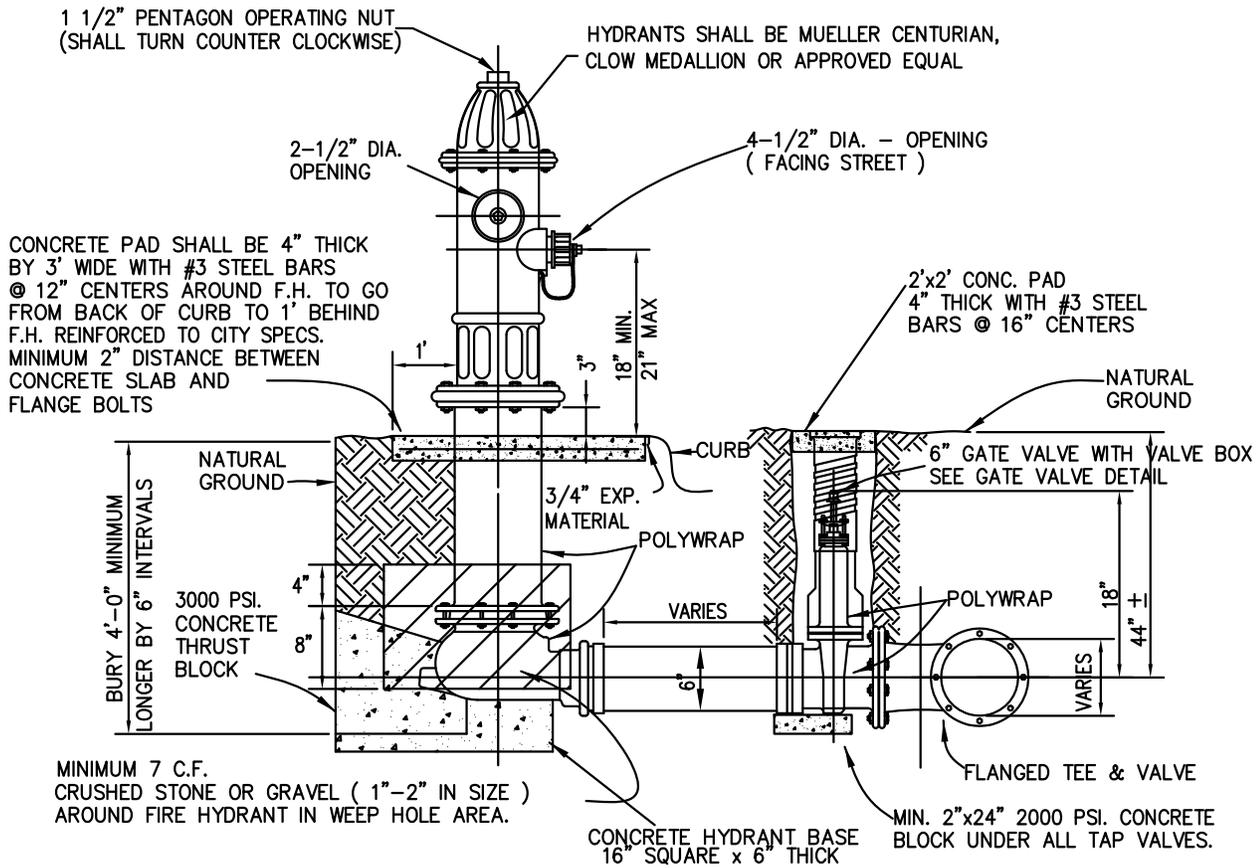
NOTES

1. VALVES WITH OPERATING NUTS GREATER THAN 6' BELOW GROUND SHALL INCLUDE 1-1/4" SOLID STEM EXTENSION WITH ROCK GUARD TO 12" BELOW TOP OF BOX. EXTENSION OPERATING NUT SHALL BE SAME SIZE AS VALVE OPERATING NUT.
2. VALVES WITH OPERATING NUTS GREATER THAN 6' BELOW GROUND SHALL BE INSTALLED WITH D.I. OR P.V.C. PIPE BELL OVER VALVE AND 24"X36" SCREW TYPE VALVE BOX FOR TOP SECTION. ONLY ONE VALVE BOX SHALL BE USED PER INSTALLATION. DUCTILE IRON PIPE SHALL BE USED IN AREAS WHERE THE VALVE IS LOCATED UNDER PAVEMENT.
3. VALVES SHALL BE MUELLER OR APPROVED EQUAL RESILIENT WEDGE GATE VALVE, EPOXY COATED.
4. UNLESS OTHERWISE NOTED ON PLANS, SET VALVE AND BOX AT CURB RETURN.
5. VALVE BOXES AND PADS SHALL BE INSTALLED AT FINISHED GRADE. SLOPE CONCRETE PAD SURFACE SLIGHTLY AWAY FROM LID.
6. ALL FITTINGS SHALL INCORPORATE MEGALUG MECHANICAL JOINT RESTRAINTS OR APPROVED EQUAL.



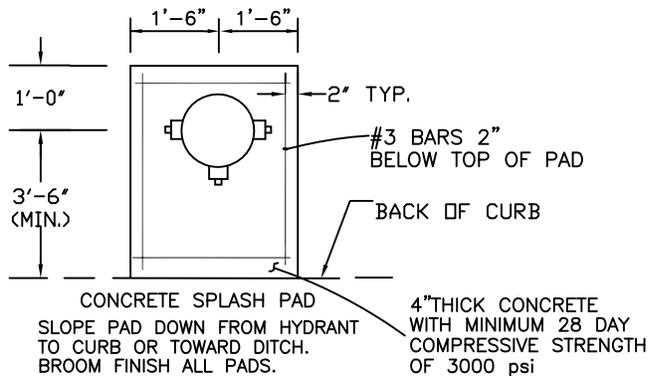
TOP VIEW - CONCRETE PAD
 PADS ARE FOR NON-PAVED AREAS ONLY.
 BROOM FINISH ALL PADS.

W-01	GATE VALVE	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

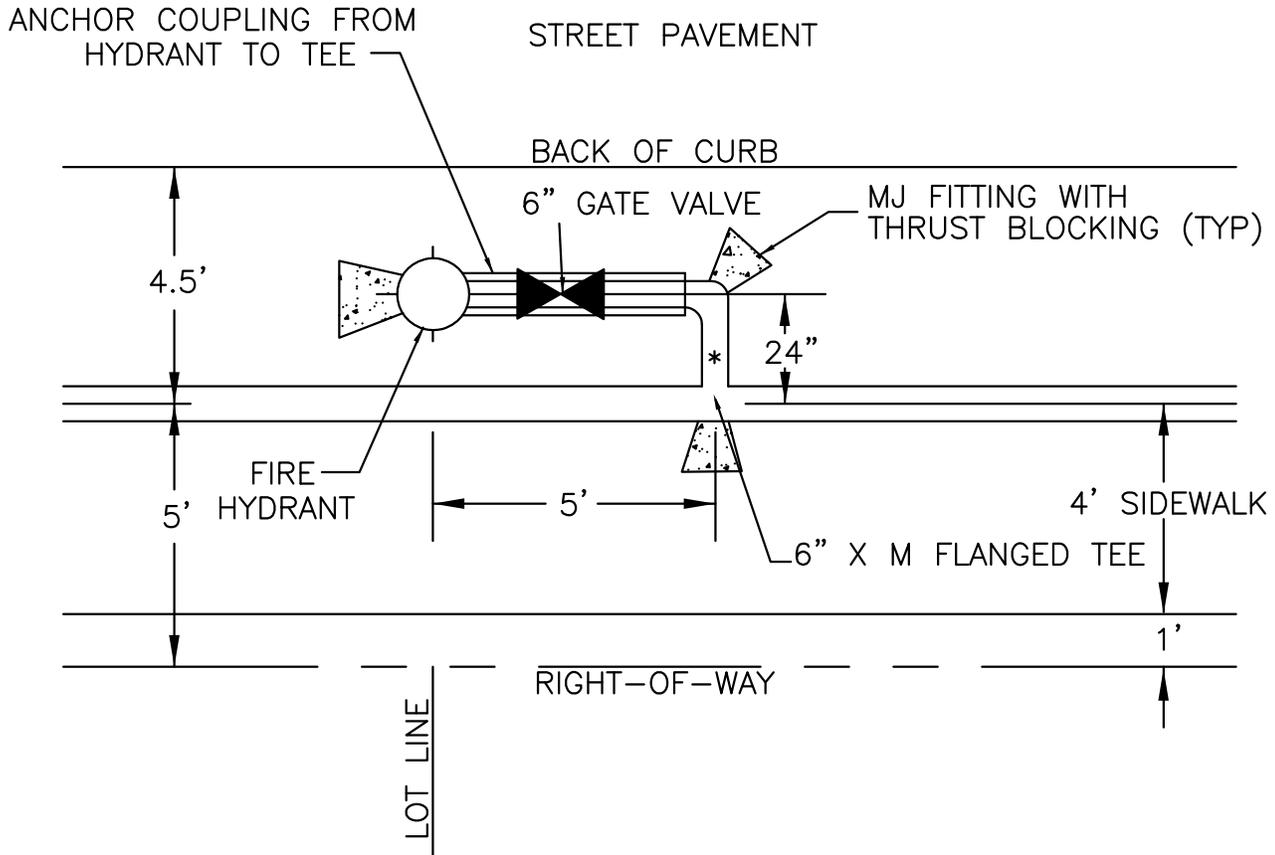


NOTES:

1. FIRE HYDRANTS SHALL NOT BE INSTALLED IN EXISTING OR PROPOSED SIDEWALKS
2. FIRE HYDRANTS SHALL BE INSTALLED PRIMED ONLY. THEY SHALL BE PAINTED AFTER INSTALLATION.
3. FIRE HYDRANTS SHALL BE COATED WITH 2 COATS BENJAMIN MOORE PAINT RUST INHIBITOR #16378 ALUMINUM OR EQUAL.
4. DOUBLE WRAP ALL D.I. FITTINGS WITH POLY WRAP INCLUDING BOLTS AND NUTS.
5. INSTALL RESTRAINED OFFSET BENDS OR "GRADELOCK" FITTINGS ON FIRE HYDRANT SUPPLY LINE SO FIRE HYDRANT BURY DEPTH IS NO GREATER THAN SIX FEET.
6. ALL FITTINGS SHALL INCORPORATE MEGALUG MECHANICAL JOINT RESTRAINTS OR APPROVED EQUAL.
7. SWIVEL SOLID ADAPTER ON CONCRETE CYLINDER PIPE FLANGED OUTLET.



W-02	FIRE HYDRANT	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



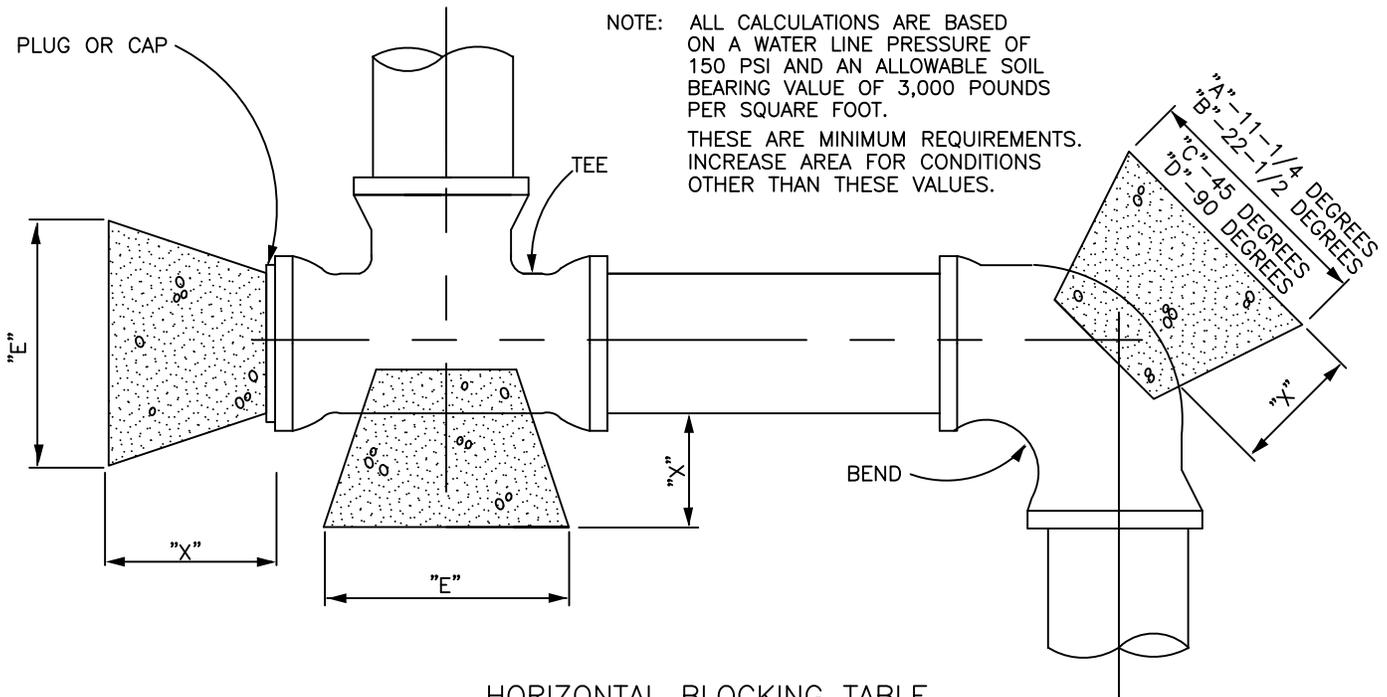
M = MAIN SIZE

* GATE VALVE MAY BE LOCATED EITHER AS SHOWN OR AT THE TEE.

W-03	FIRE HYDRANT ASSEMBLY	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

PLUG OR CAP

NOTE: ALL CALCULATIONS ARE BASED ON A WATER LINE PRESSURE OF 150 PSI AND AN ALLOWABLE SOIL BEARING VALUE OF 3,000 POUNDS PER SQUARE FOOT. THESE ARE MINIMUM REQUIREMENTS. INCREASE AREA FOR CONDITIONS OTHER THAN THESE VALUES.



HORIZONTAL BLOCKING TABLE

PIPE SIZE	"X" DIM. IN. FT.	11-1/4 DEGREES		22-1/2 DEGREES		45 DEGREES		90 DEGREES		TEE & PLUG	
		"A"	MIN. AREA	"B"	MIN. AREA	"C"	MIN. AREA	"D"	MIN. AREA	"E"	MIN. AREA
4"	1.5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.06	1.00	1.00
6"	1.5	1.00	1.00	1.00	1.00	1.14	1.30	1.55	2.40	1.30	1.70
8"	1.5	1.00	1.00	1.08	1.18	1.52	2.31	2.07	4.27	1.74	3.02
10"	1.5	1.00	1.00	1.35	1.84	1.90	3.61	2.58	6.66	2.17	4.71
12"	1.5	1.00	1.33	1.63	2.65	1.86	5.19	3.10	9.60	2.61	6.79
14"	1.5	1.03	1.81	1.90	3.60	2.66	7.07	3.61	13.06	3.04	9.24
16"	2.0	1.18	2.36	2.17	4.71	3.04	9.23	4.13	17.06	3.47	12.06
18"	2.0	1.33	2.99	2.44	5.96	3.42	11.69	4.65	21.59	3.91	15.27
20"	2.0	1.48	3.70	2.71	7.35	3.80	14.43	5.16	26.66	4.34	18.85
21"	2.0	1.55	4.07	2.85	8.11	3.99	15.91	5.42	29.39	4.56	20.78
24"	2.0	1.77	5.32	3.25	10.59	4.56	20.77	6.20	38.39	5.21	27.14
27"	2.5	1.99	6.73	3.66	13.40	5.13	26.29	6.97	48.58	5.86	34.35
30"	2.5	2.22	8.31	4.07	16.55	5.70	32.46	7.74	59.98	6.51	42.41
33"	2.5	2.44	10.06	4.47	20.02	6.27	39.28	8.52	72.57	7.16	51.31
36"	2.5	2.66	11.97	4.88	23.83	6.84	46.74	9.29	86.37	7.81	61.07
39"	3.0	2.88	14.05	5.29	27.97	7.41	54.86	10.07	101.36	8.47	71.68
42"	3.0	3.10	16.30	5.69	32.43	7.98	63.62	10.85	117.56	9.12	83.13

NOTE: CLASS "B" CONCRETE 2,000 PSI SHALL BE USED FOR ALL BLOCKING UNLESS OTHERWISE NOTED ON STANDARD DETAILS AND / OR PLANS.

THE MINIMUM VERTICAL DIMENSION OF ALL BLOCKING SHALL BE 1.5 TIMES THE PIPE DIAMETER WITH AT LEAST 0.75 TIMES THE PIPE DIAMETER EXTENDING BOTH ABOVE AND BELOW THE PIPE CENTERLINE. THIS DIMENSION DETERMINES THE "A" DIMENSION FOR 11-1/4° BENDS.

FOR 22-1/2°, 45°, 90°, AND TEES AND PLUGS, THE VERTICAL DIMENSION SHALL BE EQUAL TO THE HORIZONTAL DIMENSION SHOWN TO PRODUCE THE REQUIRED MINIMUM AREA.

ALL MINIMUM AREAS ARE IN SQUARE FEET.

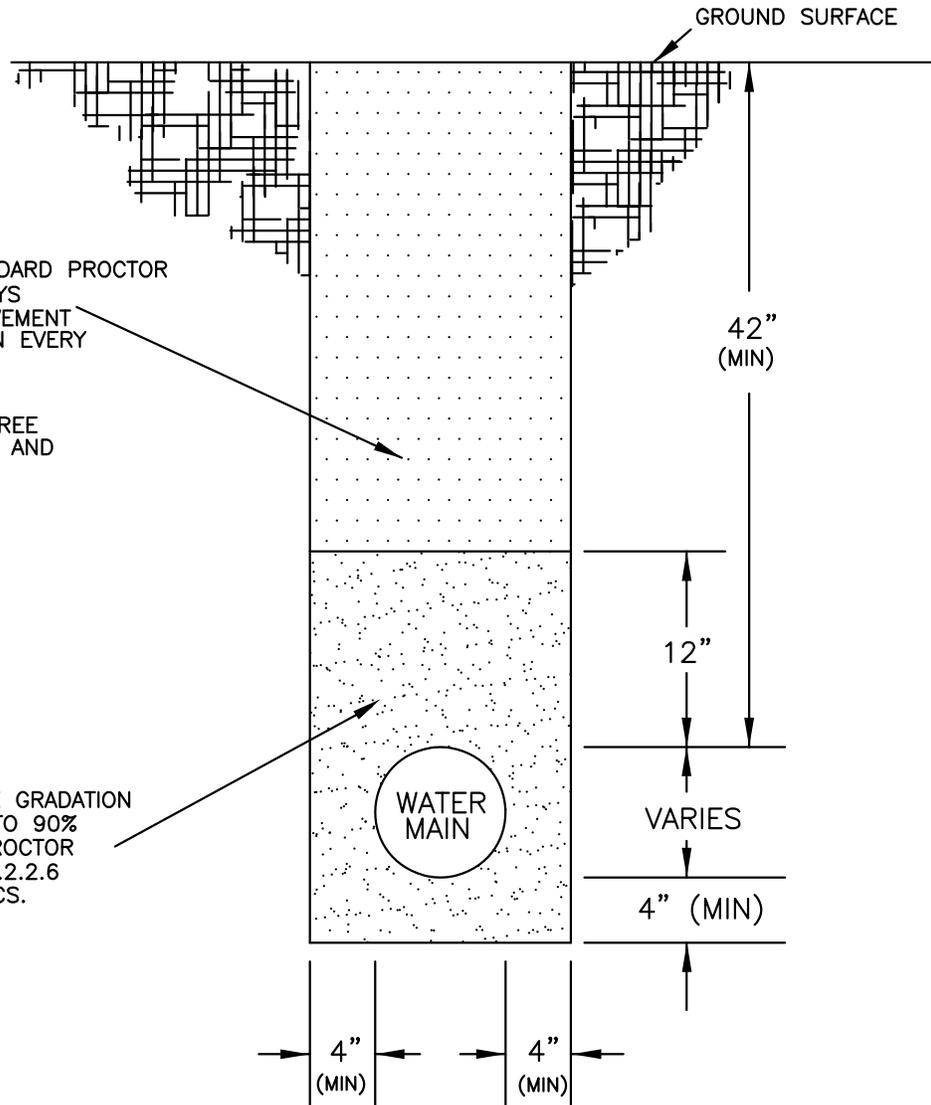
BLOCKING TO BE AGAINST UNDISTURBED TRENCH WALLS AND BOTTOM.

DOUBLE WRAP ALL D.I. FITTINGS INCLUDING BOLTS AND NUTS WITH POLY WRAP AND TAPE IN PLACE.

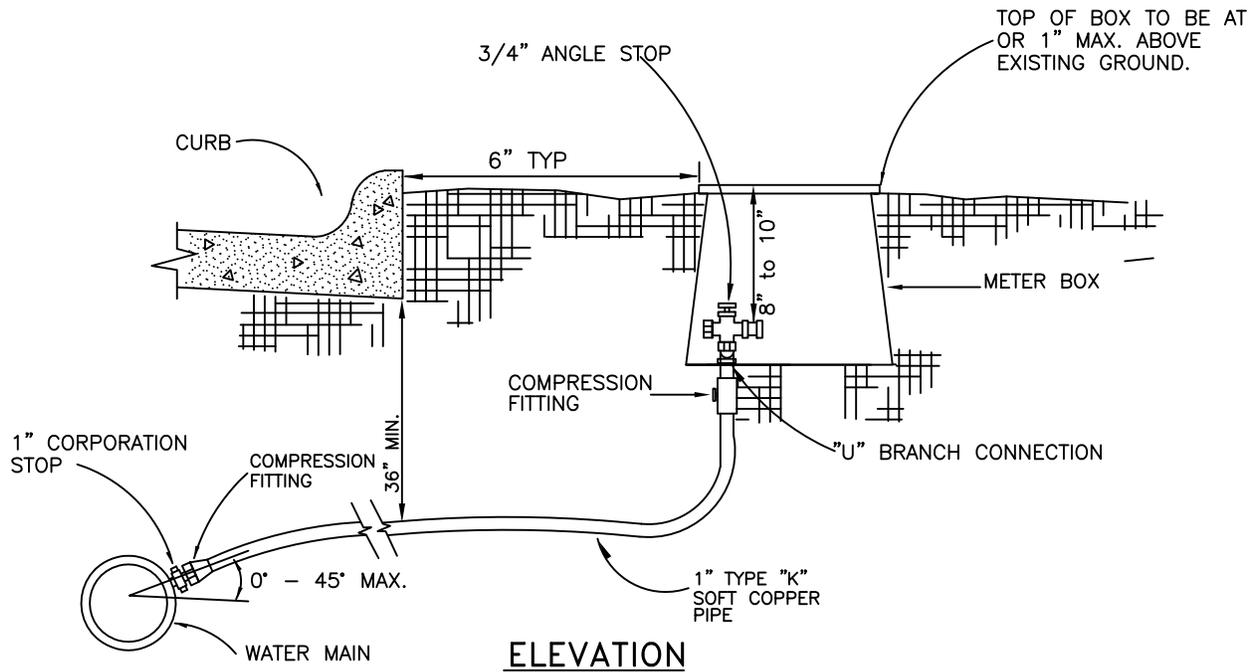
W-04	HORIZONTAL THRUST BLOCKING	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

BACKFILL
 NATIVE MATERIAL
 COMPACTION BASED ON STANDARD PROCTOR
 90% COMPACTION IN PARKWAYS
 95% COMPACTION UNDER PAVEMENT
 TEST DENSITY EVERY 300' ON EVERY
 SECOND LIFT.
 SECTION 504.2.3.3
 NCTCOG SPECS.
 NATIVE MATERIAL SHALL BE FREE
 OF STONES, RUBBISH, ROOTS AND
 OTHER OBJECTIONAL DEBRIS

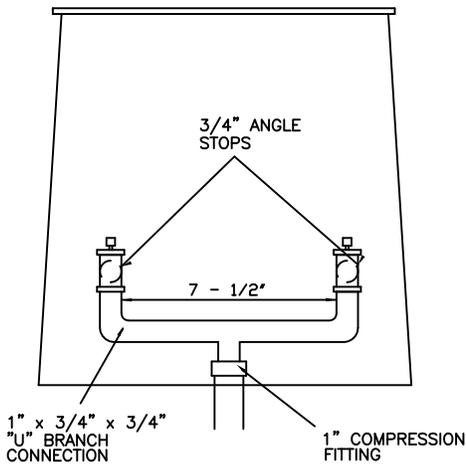
EMBEDMENT
 CLASS B-3
 SAND - FINE GRADATION
 COMPACTED TO 90%
 STANDARD PROCTOR
 SECTION 504.2.2.6
 NCTCOG SPECS.



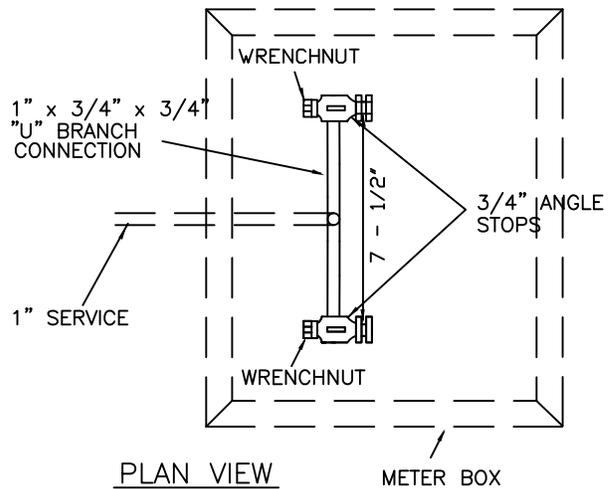
W-05	WATER MAIN EMBEDMENT	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



ELEVATION



SECTION



PLAN VIEW

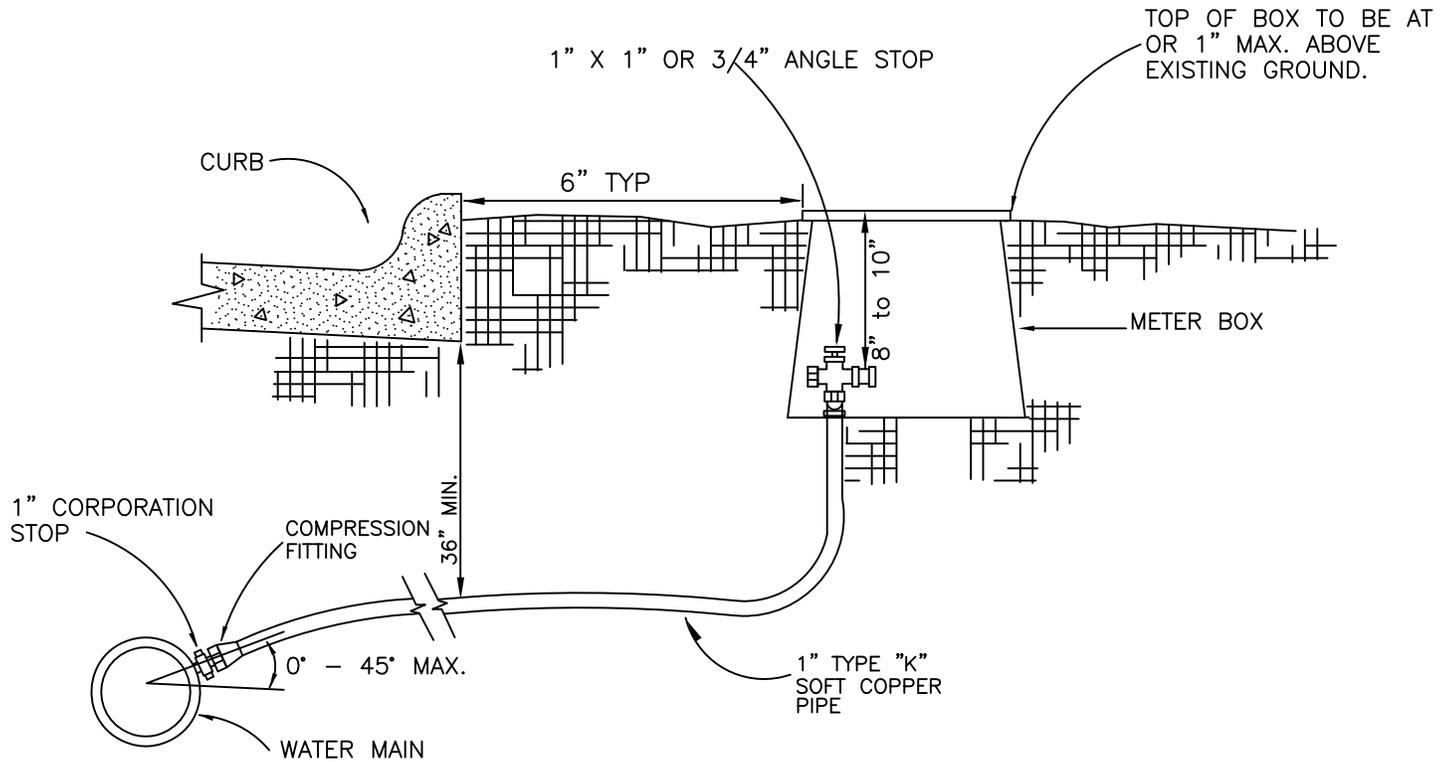
METER BOX

*** THE CITY OF BURLESON PUBLIC WORKS DEPARTMENT SHALL MAKE ALL WATER LINE TAPS UNLESS OTHERWISE APPROVED.

NOTES

1. WHERE TAPPING EXISTING MAINS OR PVC WATER MAINS, DOUBLE STAINLESS STEEL STRAP, EPOXY-COATED SADDLES SHALL BE USED.
2. COPPER SERVICES SHALL BE CONTINUOUS WITH NO JOINTS FROM CORP. STOP TO QUARTER BEND.
3. ALL COPPER FITTINGS SHALL BE COMPRESSION FITTINGS.
4. METERS SHALL NOT BE INSTALLED IN EXISTING OR PROPOSED SIDEWALK OR DRIVEWAYS.
5. METER BOX SHALL BE:
 ALLIANCE 16AMR2.DU.SB (NON-TRAFFIC)
 ROTEC DFW38C-14-KSBSM (TRAFFIC)
6. ANGLE STOPS SHALL BE FULL ROTATION WITH LOCK RINGS AND METER SPUD.
7. CONTRACTOR SHALL PROVIDE AND INSTALL ANGLE BALL METER VALVES AT THE CONNECTION POINT OF THE "U" BRANCH PIECES AND WATER METERS. ANGLE BALL METER VALVES SHALL HAVE A VALVE SIZE OF 3/4", A SERVICE LINE CONNECTION OF 3/4", AND FIT A METER SIZE OF 5/8" X 3/4" AND 3/4" AND SHALL OTHERWISE MEET THE SPECIFICATIONS OF CATALOG NO. BA13-332W AS MANUFACTURED BY THE FORD METER BOX COMPANY OR EQUAL.
8. "U" BRANCH PIECES, AT A MINIMUM SHALL HAVE A PACK JOINT INLET FOR COPPER OR PLASTIC TUBING, BE DESCRIBED AS A 1" CTS P.J. X TWO (2) 3/4" MALE IRON PIPE OUTLETS, HAVE A 7 1/2" STANDARD SPACING, AND OTHERWISE MEET THE SAME SPECIFICATIONS OF CATALOG NUMBER U48-43 AS MANUFACTURED BY THE FORD METER BOX COMPANY OR EQUAL.

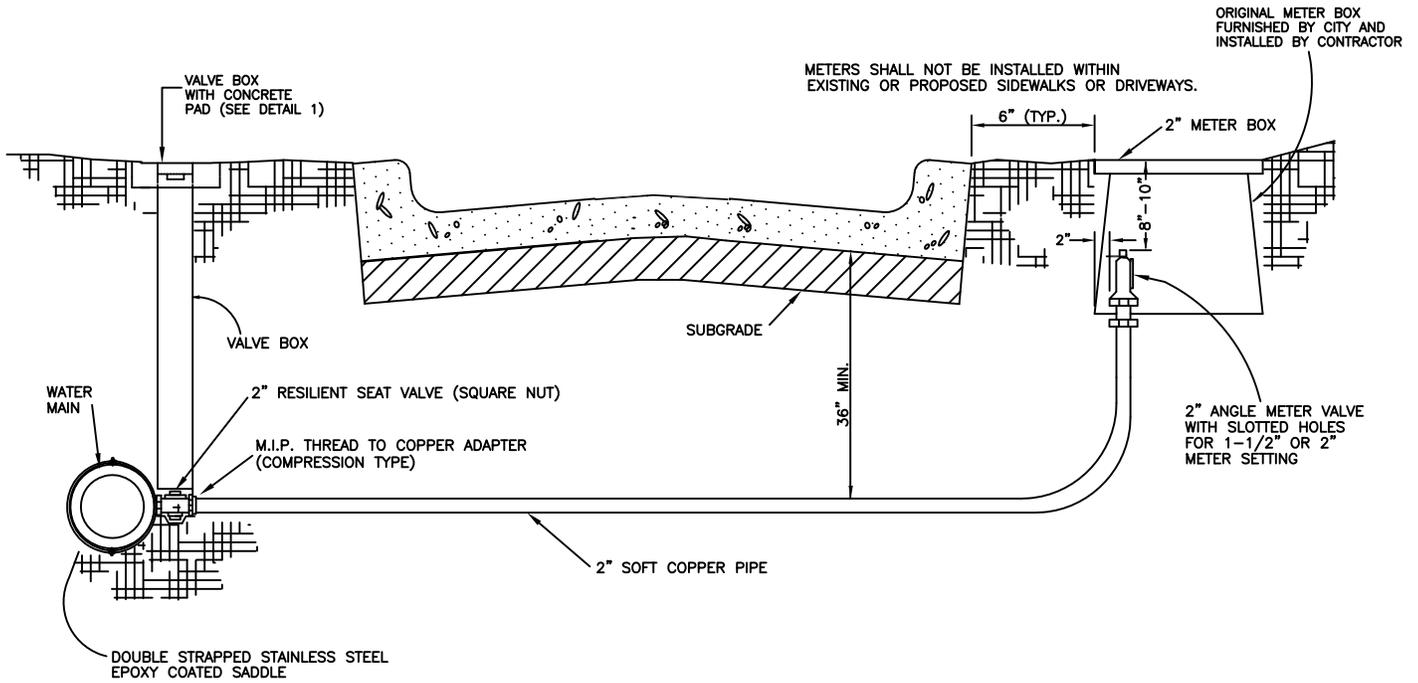
W-06	DOUBLE WATER SERVICE (BULLHEAD) (1" SERVICE WITH TWO 3/4" OUTLETS)	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



NOTES

1. WHERE TAPPING EXISTING MAINS OR PVC WATER MAINS, DOUBLE STAINLESS STEEL STRAP, EPOXY-COATED SADDLES SHALL BE USED.
2. COPPER SERVICES SHALL BE CONTINUOUS WITH NO JOINTS FROM CORP. STOP TO QUARTER BEND.
3. ALL COPPER FITTINGS SHALL BE COMPRESSION FITTINGS.
4. METERS SHALL NOT BE INSTALLED IN EXISTING OR PROPOSED SIDEWALK OR DRIVEWAYS.
5. METER BOX SHALL BE:
ALLIANCE 1200.SBTR (NON-TRAFFIC)
ROTEC DFW36C-SBSM (TRAFFIC)
6. ANGLE BALL METER VALVES SHALL BE INSTALLED AND SHALL MEET THE SPECIFICATIONS OF CATALOG NO. BA13-332W AS MANUFACTURED BY THE FORD METER BOX COMPANY OR EQUAL.
7. ANGLE STOPS SHALL BE FULL ROTATION WITH LOCK RINGS AND METER SPUD.

W-07	SINGLE WATER SERVICE (1" SERVICE FOR 1" & 3/4" OUTLETS)	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



NOTES

1. DOUBLE STRAPPED BRONZE, STAINLESS STEEL, OR EPOXY COATED DUCTILE IRON SADDLES SHALL BE USED TO TAP ALL MAINS.
2. COPPER SERVICES SHALL BE CONTINUOUS WITH NO INTERMEDIATE FITTINGS ALLOWED.
3. ALL COPPER FITTINGS SHALL BE COMPRESSION FITTINGS.
4. INSTALL 2" PIPE AND TAP FOR BOTH 1 1/2" AND 2" METER INSTALLATIONS.
5. DOUBLE WRAP BRONZE STRAPS WITH POLY WRAP.

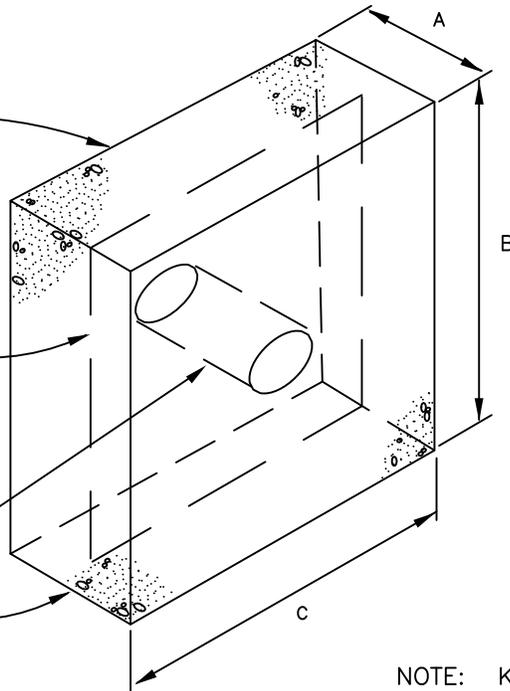
W-08	2" WATER SERVICE/FLUSH POINT (2" SERVICE FOR 1 1/2" & 2" OUTLETS)	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

CLASS "B" (2,000 PSI)
CONCRETE UNLESS OTHERWISE
NOTED ON STANDARD DETAILS
AND/OR PLANS.

#4 BAR @
12" O.C.

POLY WRAP PIPE

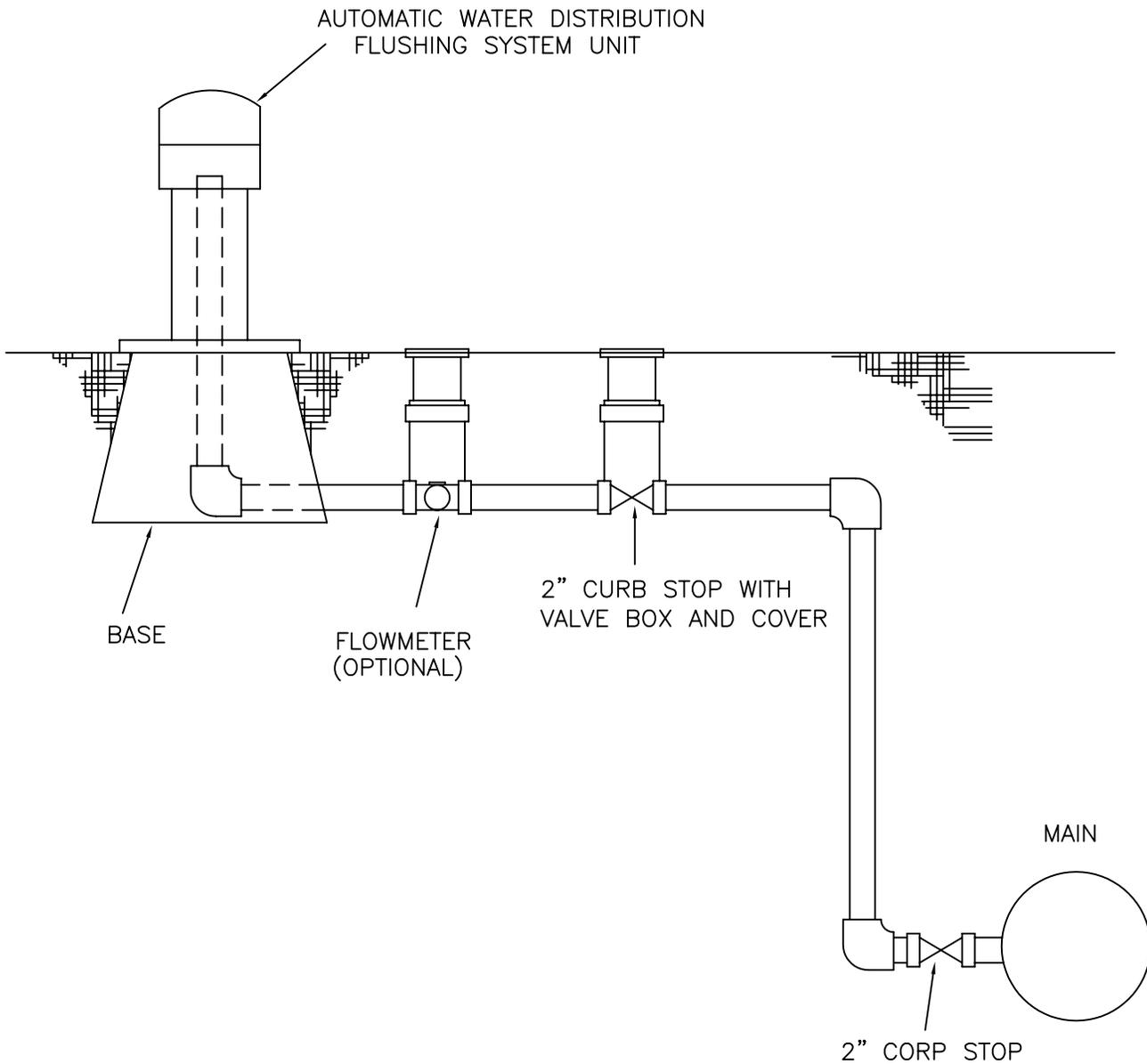
FORM AS
NECESSARY



NOTE: KEEP CONCRETE CLEAR OF
PIPE JOINTS & BOLTS.

BENDS		90°	45°	22-1/2°	11-1/4°
PIPE NOMINAL DIA. (in.)	*VOL. REQ'D. C.F.	28.27	22.61	11.33	5.65
	6 A FT.	1.75	1.5	1.0	0.75
	B FT.	4.0	3.88	3.36	2.75
	C FT.	4.0	3.88	3.36	2.75
	*VOL. REQ'D. C.F.	50.27	40.21	20.11	10.05
	8 A FT.	2.0	1.75	1.5	1.0
	B FT.	5.0	4.8	3.66	3.2
	C FT.	5.0	4.8	3.66	3.2
	*VOL. REQ'D. C.F.	78.54	62.83	31.41	15.71
	10 A FT.	2.25	2.0	1.75	1.5
	B FT.	5.9	5.6	4.25	3.25
	C FT.	5.9	5.6	4.25	3.25
	*VOL. REQ'D. C.F.	153.94	123.15	61.57	30.79
	12 A FT.	4.0	3.5	2.0	1.75
	B FT.	6.2	6.0	5.54	4.2
	C FT.	6.2	6.0	5.54	4.2
*VOLUME CALCULATED ON THE BASIS OF CONCRETE REACTING THRUST ON THE RESPECTIVE BENDS UNDER AN INTERNAL PRESSURE OF 150 PSIG AT THE RATE OF 150 LB. WT. PER CU. FT. OF CONCRETE.					

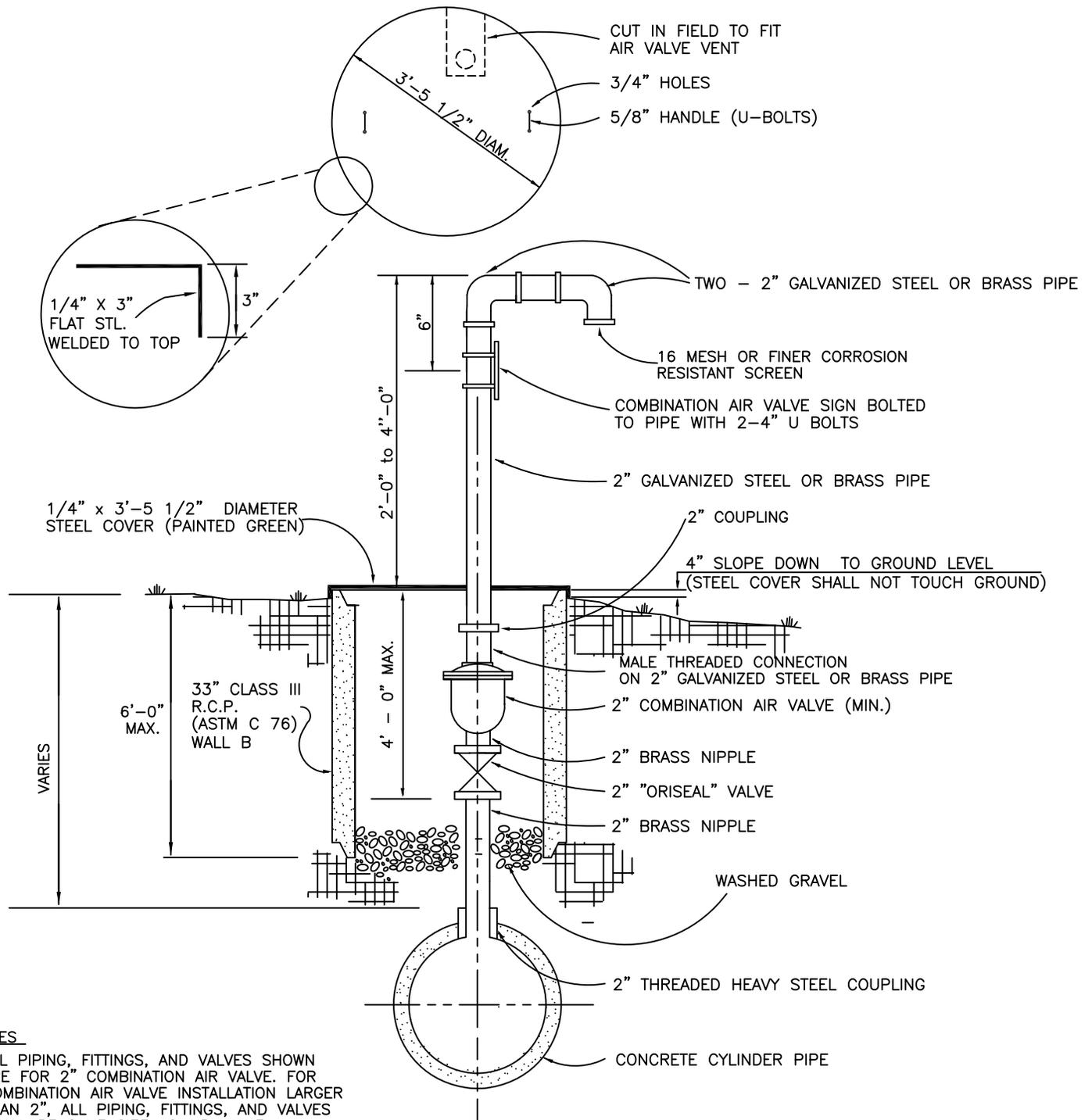
W-10	VERTICAL TIE-DOWN BLOCK	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



NOTES:

1. UNIT SHALL BE HYDRO-GUARD STANDARD INTEGRATED UNIT (HG1-INT) OR APPROVED EQUAL.
2. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
3. UNIT SHALL BE INSTALLED AT ALL DEADEND WATER MAINS.

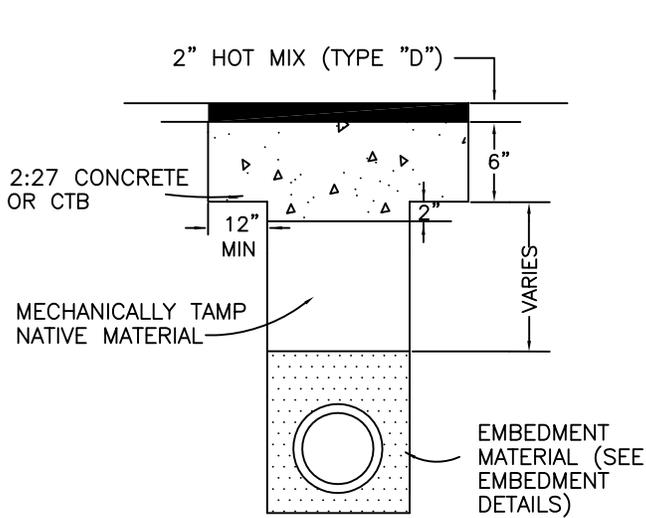
W-11	AUTOMATIC WATER DISTRIBUTION FLUSHING SYSTEM	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



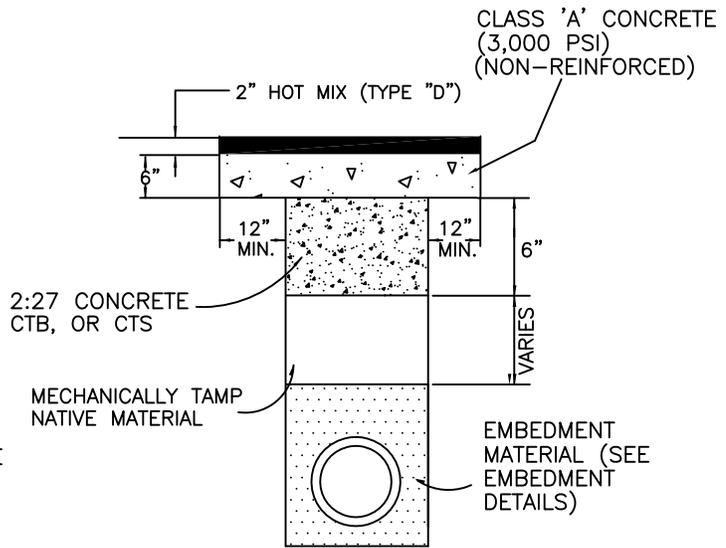
NOTES

1. ALL PIPING, FITTINGS, AND VALVES SHOWN ARE FOR 2" COMBINATION AIR VALVE. FOR COMBINATION AIR VALVE INSTALLATION LARGER THAN 2", ALL PIPING, FITTINGS, AND VALVES SHALL BE SAME SIZE AS AIR VALVE.
2. ALL ABOVE GROUND PIPING, FITTINGS, SIGNS, ETC., SHALL BE BRUSH PAINTED WITH TWO COATS OF ALUMINUM PAINT. (NO SPRAYING).

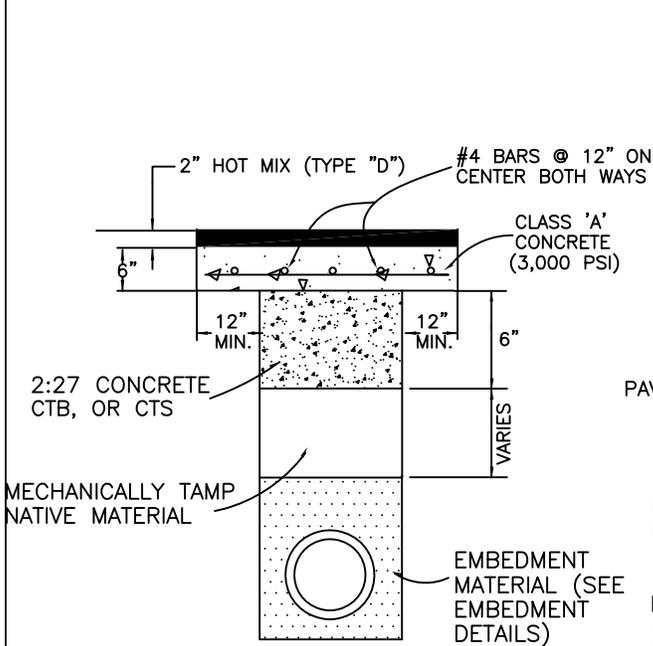
W-12	COMBINATION AIR VALVE INSTALLATION	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



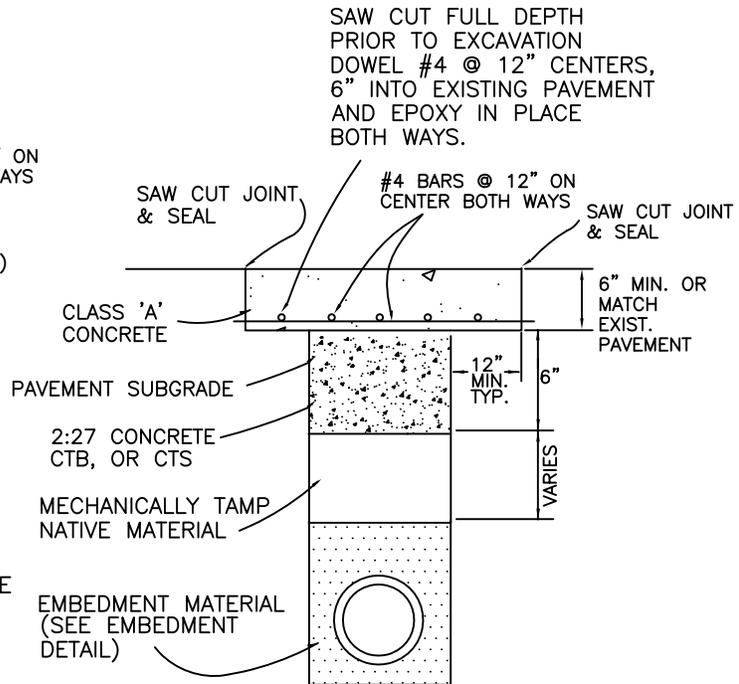
RESIDENTIAL/COUNTY ROAD



COLLECTOR STREET



MAJOR ARTERIALS
& THOROUGHFARES



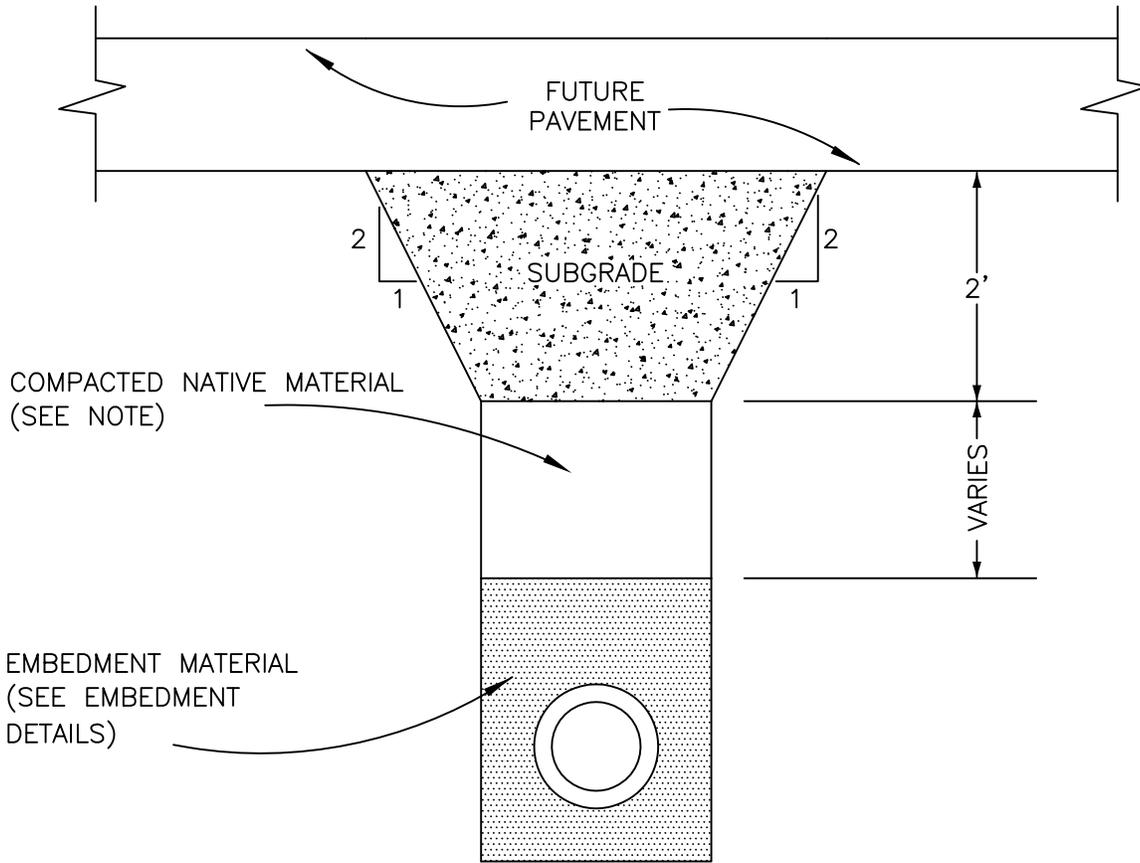
CONCRETE STREET

NOTES:

1. A SAW SHALL BE USED TO CUT ASPHALT OR CONCRETE FULL DEPTH PRIOR TO OPENING THE DITCH IN ORDER TO INSURE A NEAT STRAIGHT EDGE. SEE STANDARD SPECIFICATIONS FOR REQUIRED EMBEDMENT.

2. CTB = CEMENT TREATED BASE (CONTAINS AGGREGATE)
 CTS = CEMENT TREATED SAND
 BOTH MATERIALS SHALL BE MECHANICALLY TAMPED.

W-14	EXISTING STREET BACKFILL AND REPAIR	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



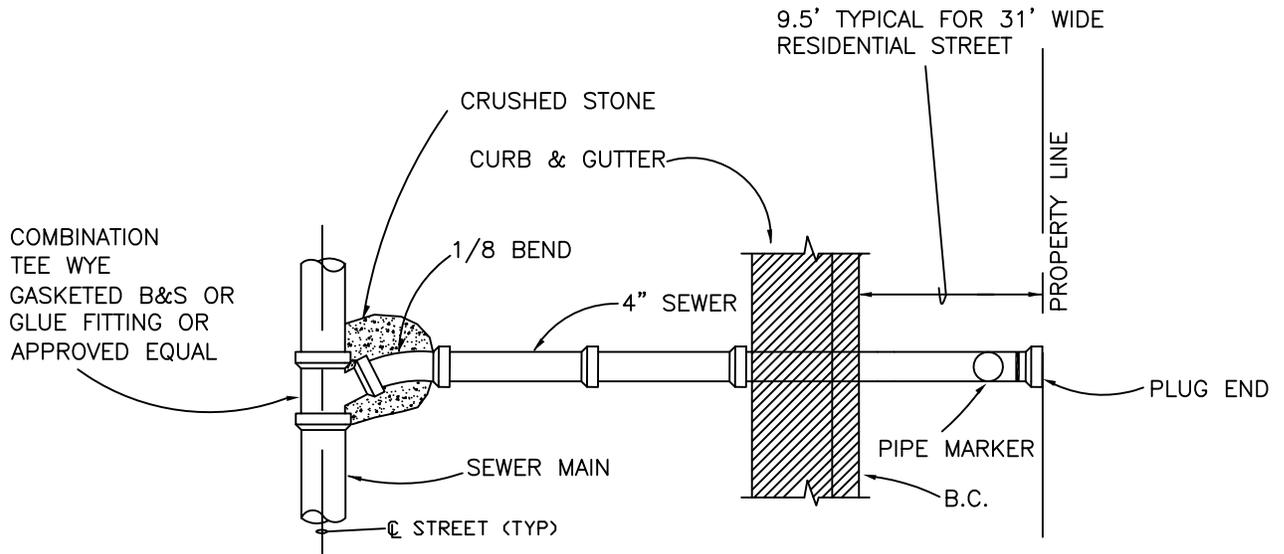
NOTE:

FOR LINES BEING LAID PRIOR TO NEW STREET CONSTRUCTION, WHICH WILL LIE BENEATH PAVEMENT OR CURB AND GUTTER, BACKFILL ABOVE PIPE EMBEDMENT SHALL CONSIST OF NATIVE MATERIAL, COMPACTED IN MAX. 6" TO 9" LIFTS (COMPACTED THICKNESS) TO 95% STANDARD PROCTOR DENSITY AT OPTIMUM MOISTURE CONTENT $\pm 2\%$.

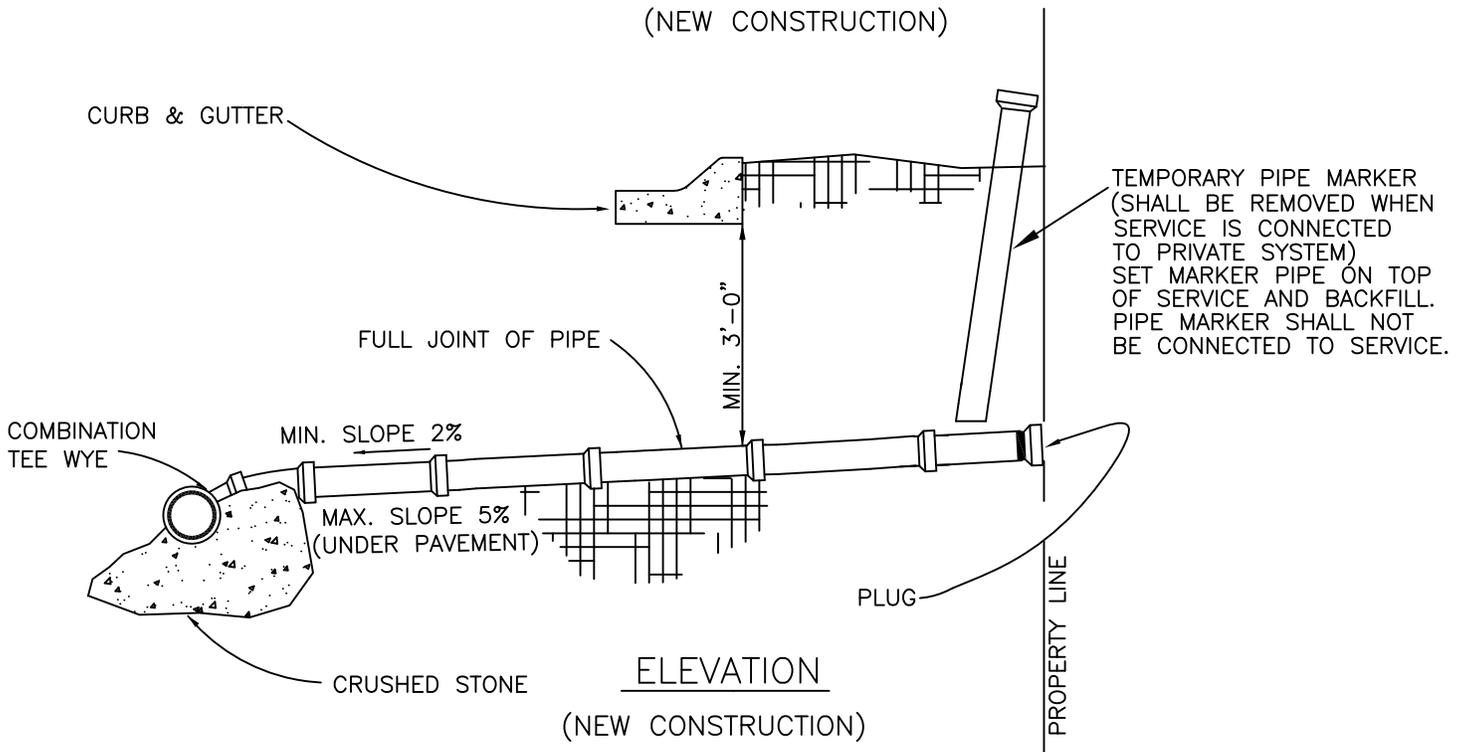
W-15	STREET BACKFILL PRIOR TO STREET CONSTRUCTION	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

SANITARY SEWER SYSTEM DETAILS

S-01	Sanitary Sewer Service
S-02	Deep Sanitary Sewer Service
S-03	Precast Concrete Sanitary Sewer Manhole
S-04	Cast in Place Sanitary Sewer Manhole
S-05	Sanitary Sewer Embedment
S-06	Watertight Manhole Frame and Cover
S-07	Cleanout
S-08	Internal Drop Manhole (new construction)
S-09	Internal Drop Manhole (existing manhole)
S-10	Concrete Encasement
S-11	Existing Street Backfill and Repair
S-12	Street Backfill Prior to Street Construction
S-13	Precast 4' Manhole/Sampling Port
S-14	Cast in Place 4' Manhole/Sampling Port
S-15	Manhole Ring and Cover



PLAN
(NEW CONSTRUCTION)



ELEVATION
(NEW CONSTRUCTION)

ALL SPLICES OF SEWER SERVICES THAT ARE NOT BELL AND SPIGOT SHALL REQUIRE A NON-SHEAR CT ADAPTER WITH HOSE CLAMPS.

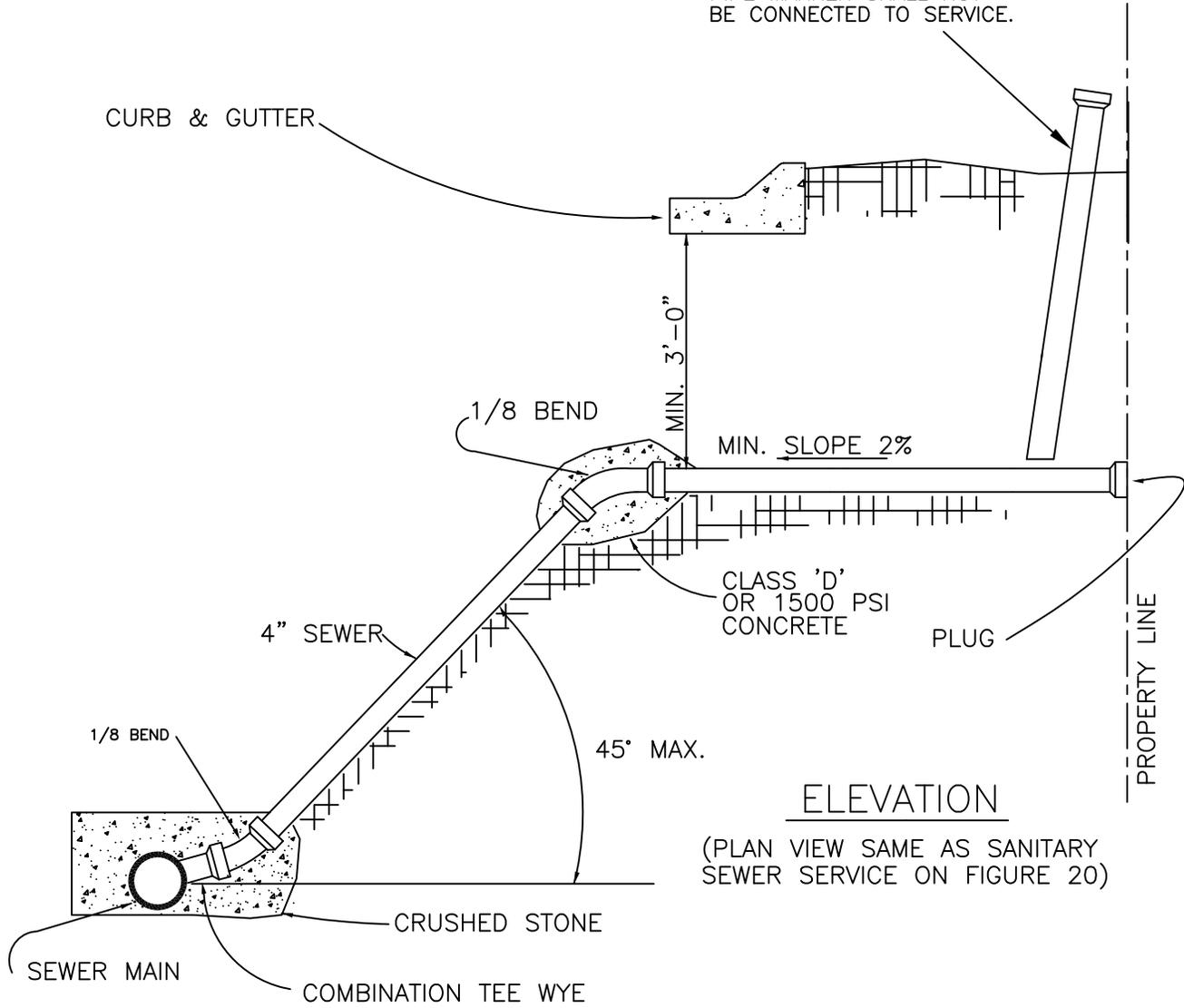
CONNECTION TO AN EXISTING MAIN:

CONNECTION TO AN EXISTING MAIN SHALL BE ACHIEVED WITH CONNECTION OF A BANDED FLEX SADDLE OR AN APPROPRIATELY SIZED RIGID WYE SADDLE. EACH FITTING SHOULD BE COMPLETELY ENCASED IN CONCRETE.

S-01	SANITARY SEWER SERVICE	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

TEMPORARY PIPE MARKER
 (SHALL BE REMOVED WHEN
 SERVICE IS CONNECTED
 TO PRIVATE SYSTEM)
 SET MARKER PIPE ON TOP
 OF SERVICE AND BACKFILL.
 PIPE MARKER SHALL NOT
 BE CONNECTED TO SERVICE.

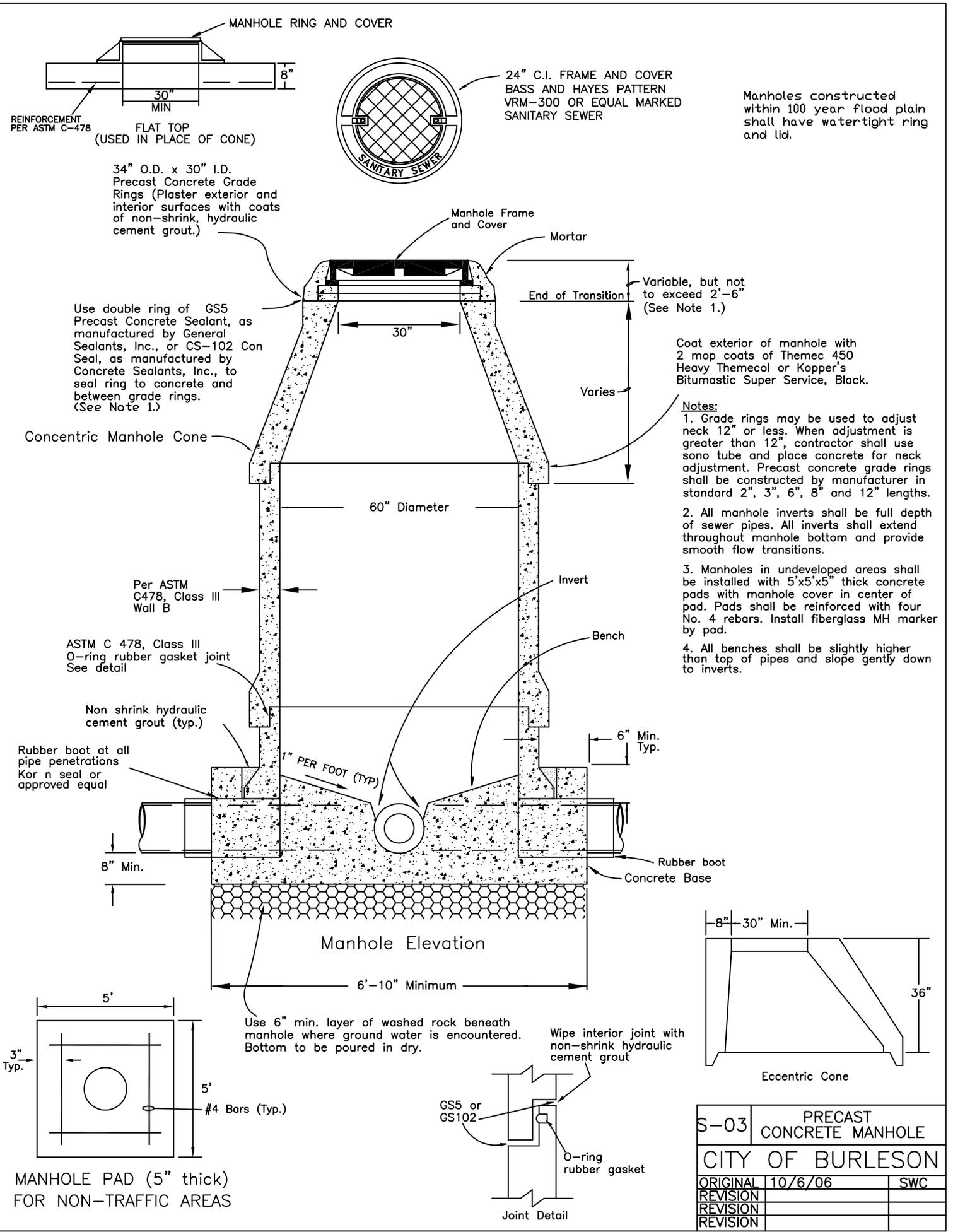
CURB & GUTTER



ELEVATION

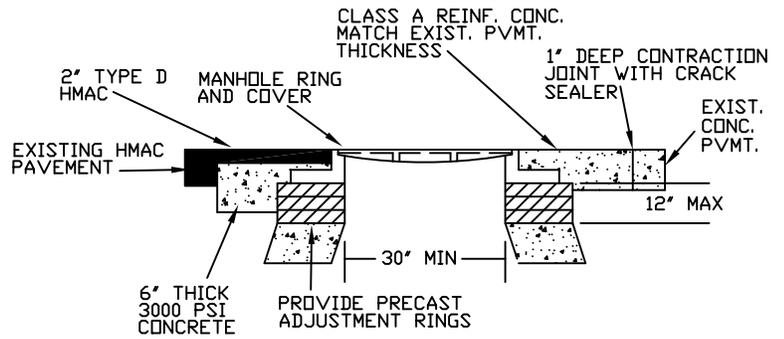
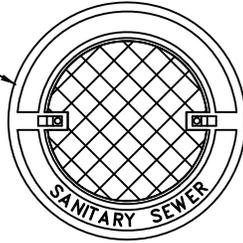
(PLAN VIEW SAME AS SANITARY
 SEWER SERVICE ON FIGURE 20)

S-02	DEEP SEWER SERVICE	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



S-03	PRECAST CONCRETE MANHOLE	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

30" Cast Iron Manhole Frame (to be furnished and installed by contractor) Bass and Hayes VRM-30 with pick bars or equal marked "sanitary sewer"



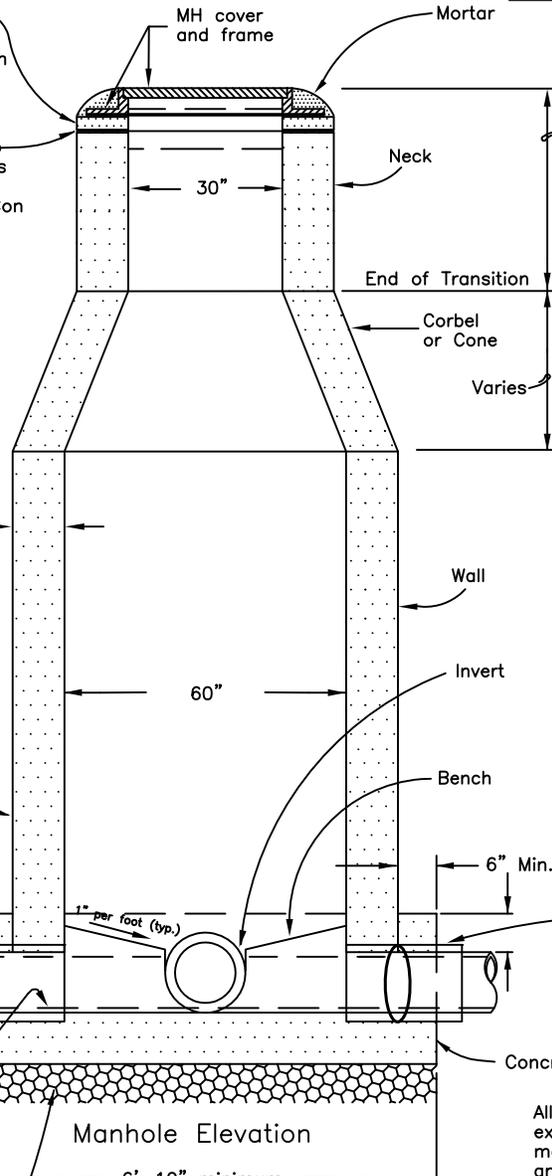
MANHOLE TOP FOR STREET INSTALLATION

34" O.D x 30" I.D. Precast Concrete Grade Rings (Plaster exterior and interior surfaces with smooth coats of non-shrink hydraulic cement grout).

Use double ring of 1/2" GS/5 Precast Concrete Sealant, as manufactured by General Sealants, Inc., or CS-102 Con Seal, as manufactured by Concrete Sealants, Inc., to seal ring to concrete and between grade rings. (See Note 1.)

All concrete shall be class A 3,000 psi compressive strength.

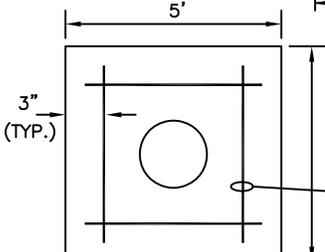
Coat Exterior of manhole with 2 map coats of Themec 450 Heavy Themecol or Koppers Bitumastic Super Service, Black.



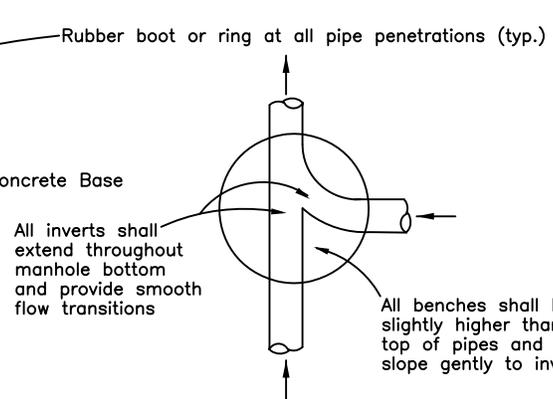
Variable, but not to exceed 2' - 6". (See Note 1.)

Notes:

1. Grade rings may be used to adjust neck 12" or less. When adjustment is greater than 12", contractor shall use sono tube and place concrete for neck adjustment. Precast concrete grade rings shall be constructed by manufacturer in standard 2", 3", 6", 8" and 12" heights.
2. Contractor shall not remove any forms until 24 hours after concrete is placed. No backfill shall begin until 96 hours after concrete is placed.
3. All manhole inverts shall be full depth of sewer pipes. All inverts shall be formed to center of manhole and shall provide smooth flow transitions.
4. Manholes in undeveloped areas shall be installed with 5'x5'x5" thick concrete pads with cover in center of pad. Pads shall be reinforced with four No. 4 rebars. Install fiberglass MH marker by pad.
5. Contractor shall rub all interior surfaces to a smooth finish.
6. Manhole to be adjusted to final grade prior to paving operation on new concrete streets.
7. Manholes constructed within 100-year flood plain shall have watertight ring and lid.



MANHOLE PAD FOR NON-TRAFFIC AREAS

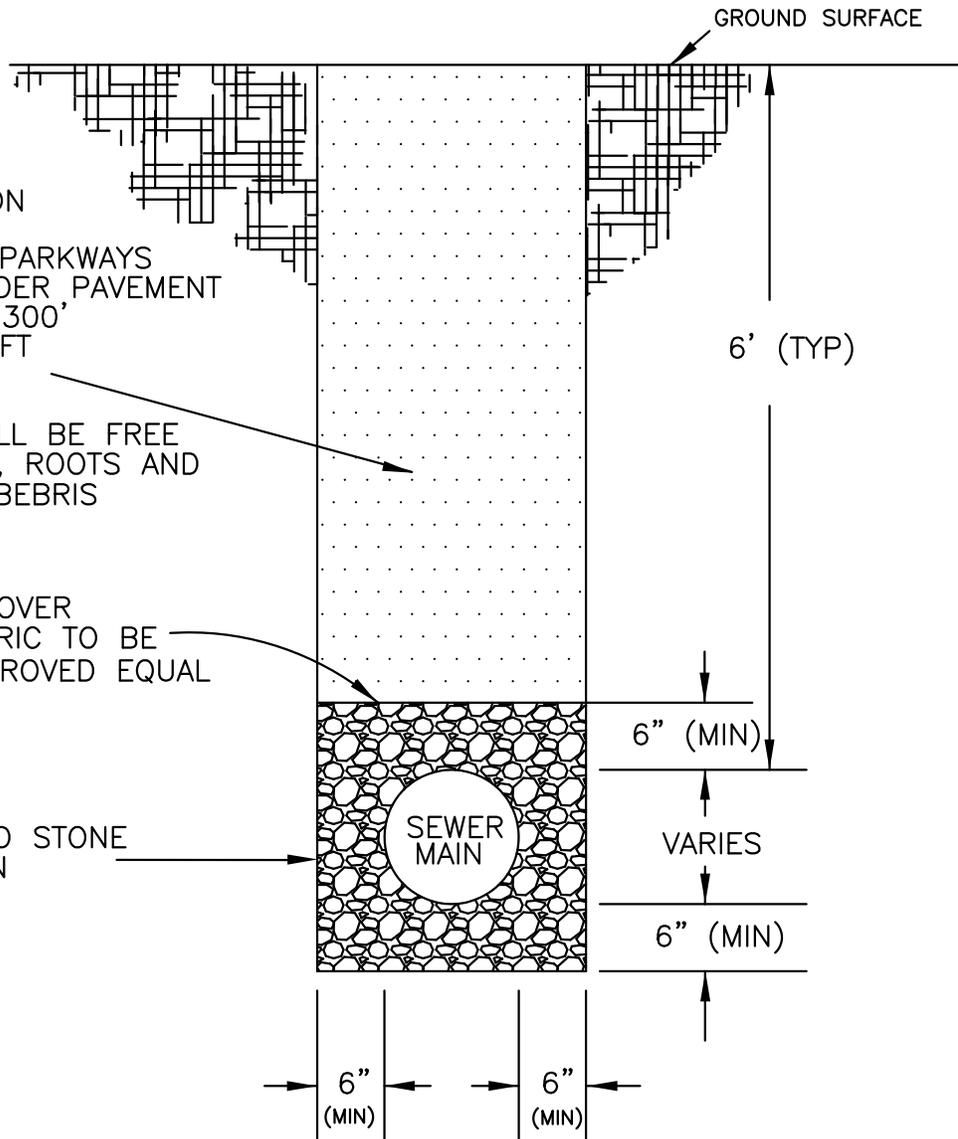


S-04	CAST IN PLACE CONCRETE MANHOLE	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

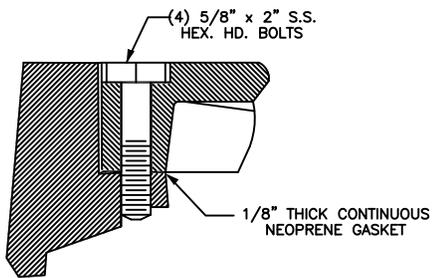
BACKFILL
 NATIVE MATERIAL
 COMPACTION BASED ON
 STANDARD PROCTOR
 90% COMPACTION IN PARKWAYS
 95% COMPACTION UNDER PAVEMENT
 TEST DENSITY EVERY 300'
 ON EVERY SECOND LIFT
 SECTION 504.2.3.3
 NCTCOG SPECS.
 NATIVE MATERIAL SHALL BE FREE
 OF STONES, RUBBISH, ROOTS AND
 OTHER OBJECTIONAL BEBRIS

FILTER CLOTH COVER OVER
 CRUSHED ROCK. FABRIC TO BE
 MIRAFI 140NG OR APPROVED EQUAL

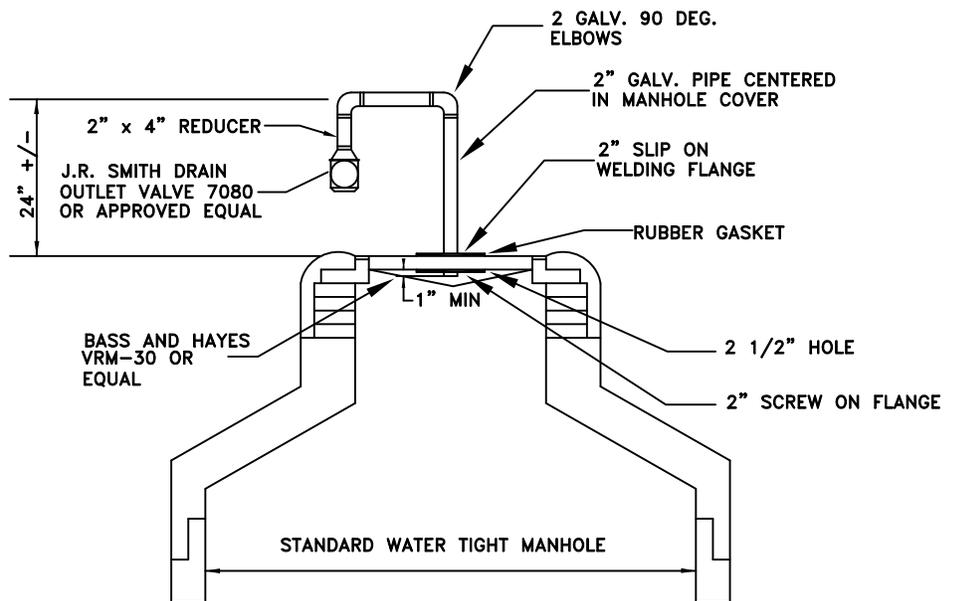
EMBEDMENT
 COMPACTED CRUSHED STONE
 STANDARD GRADATION
 SECTION 504.2.2.1
 NCTCOG SPECS.
 (3/4')



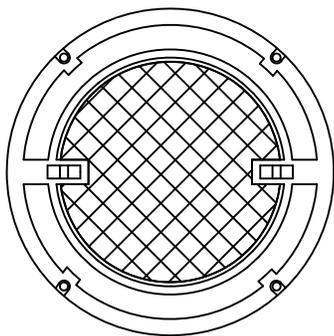
S-05	SANITARY SEWER EMBEDMENT	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



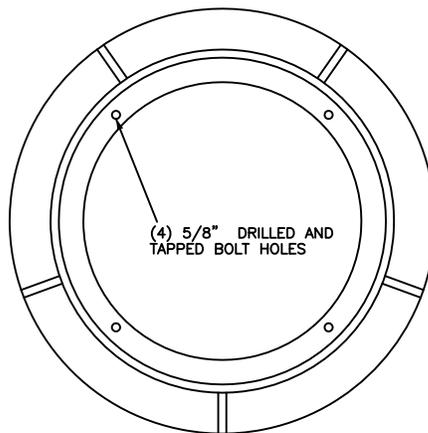
WATERTIGHT DETAIL



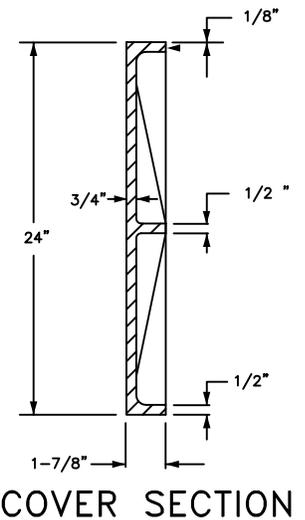
VENT FOR WATERPROOF MANHOLES



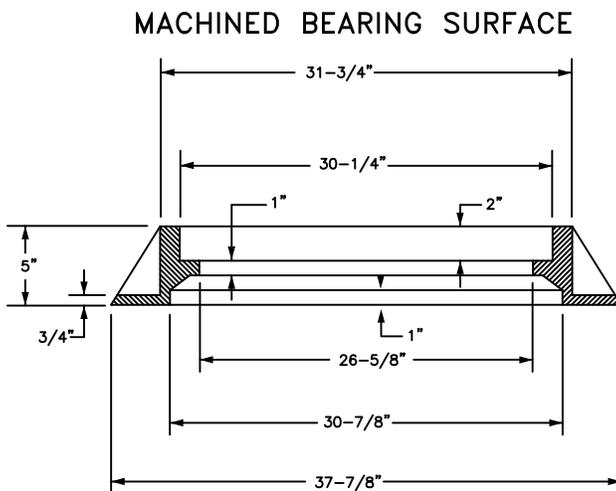
COVER FACE



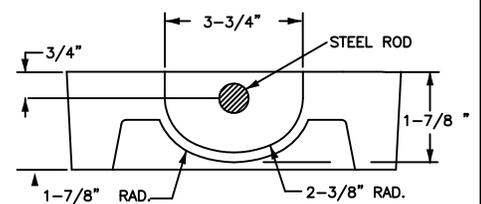
FRAME TOP VIEW



COVER SECTION



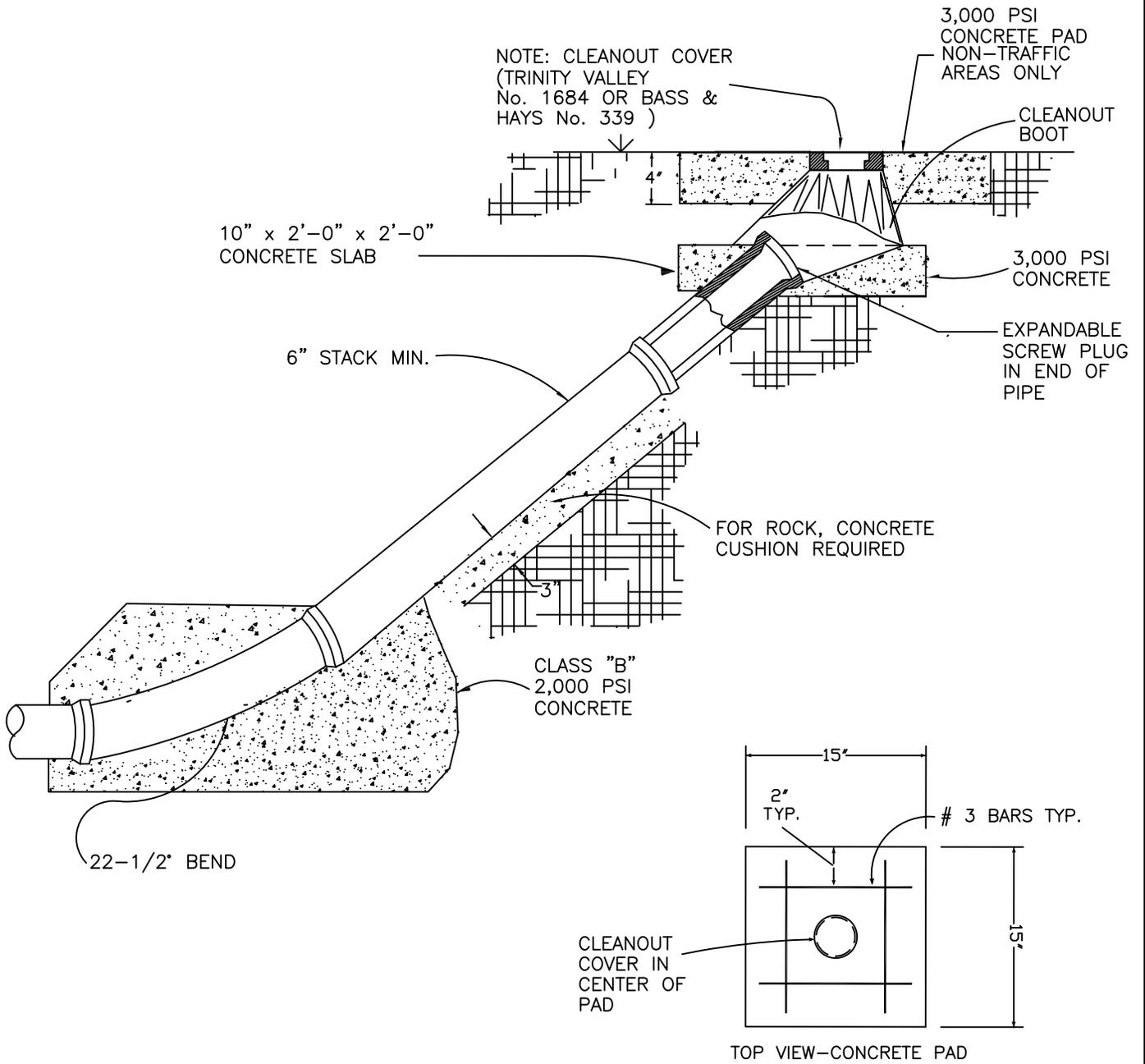
FRAME SECTION



TYPE 4A STEEL PICKBARS

PICKBAR DETAIL

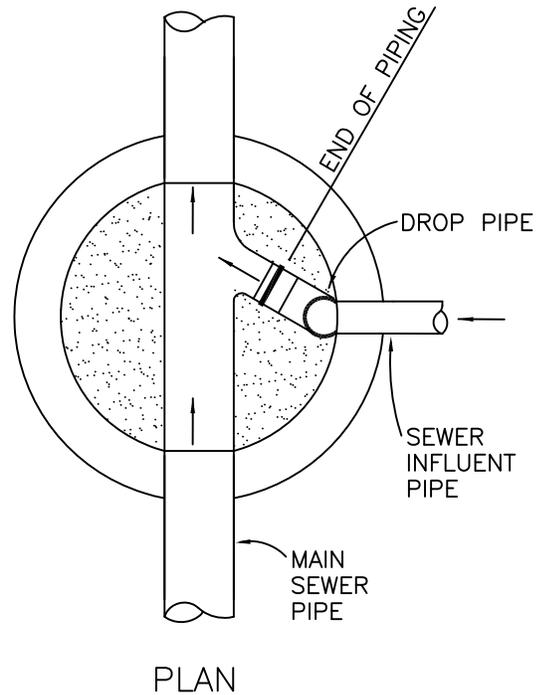
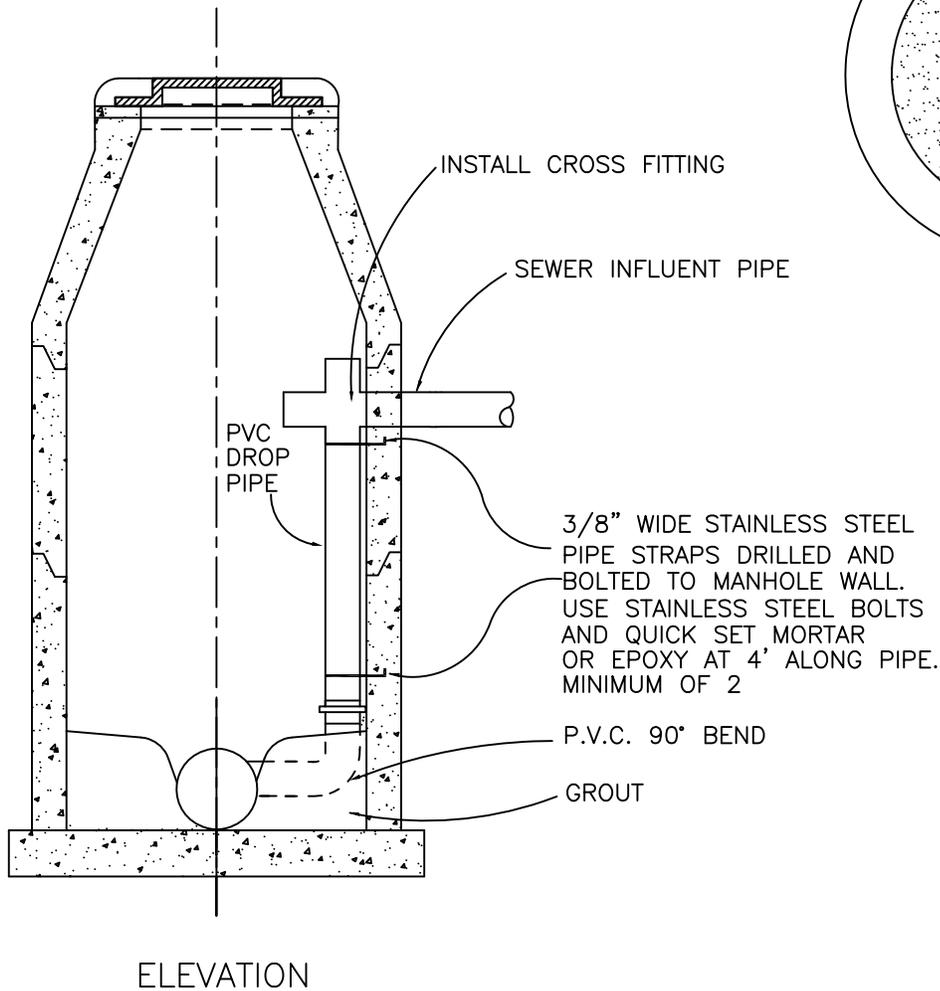
S-06	WATERTIGHT MANHOLE FRAME AND COVER	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



CLEANOUTS SHALL ONLY BE INSTALLED AT THE ENDS OF LINES THAT WILL BE EXTENDED WITH A FUTURE DEVELOPMENT PHASE.

NOTE: PROVIDE CLEANOUT PAD ON EVERY CLEANOUT NOT IN PAVEMENT

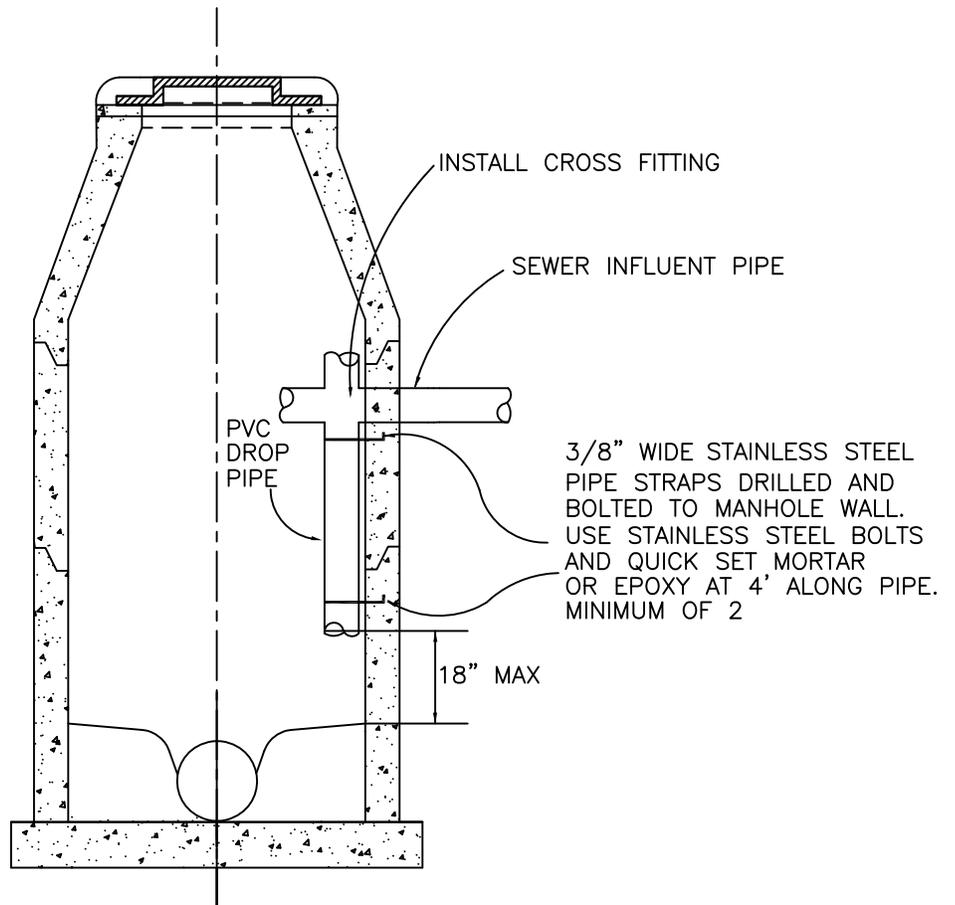
S-07	SANITARY SEWER CLEANOUT	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



NOTES

1. DROP PIPE SHALL BE ONE SIZE LARGER THAN SEWER INFLUENT PIPE.
2. ALL STANDARD MANHOLE DETAILS IN FIGURES S-03 AND/OR S-04 APPLY TO DROP MANHOLE CONSTRUCTION.
3. ALL DROP MANHOLES SHALL BE 72" DIAMETER.
4. NO DROP PIPING SHALL BE REQUIRED IF SEWER INFLUENT PIPE FLOWLINE IS 18" OR LESS ABOVE MAIN SEWER PIPE FLOWLINES OR IF MAIN SEWER PIPE BENCH IS HIGHER THAN SEWER INFLUENT FLOWLINE.

S-08	INTERNAL DROP MANHOLE NEW CONSTRUCTION	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



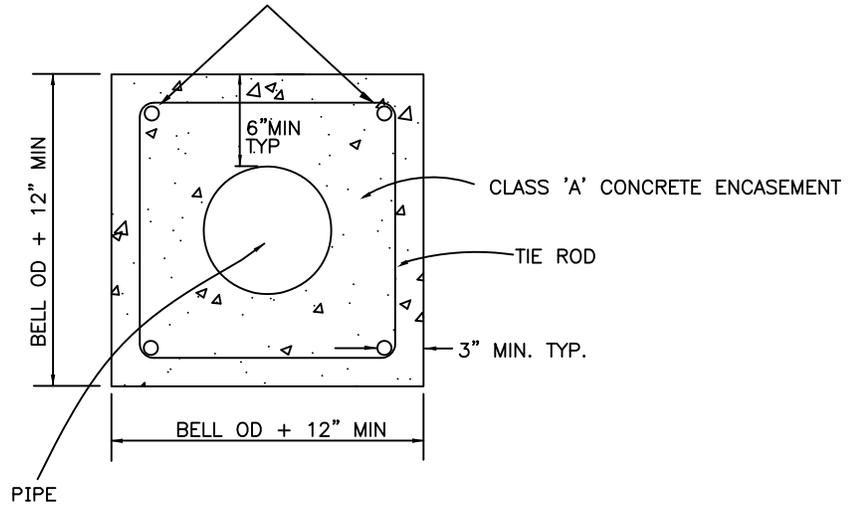
NOTES

1. DROP PIPE SHALL BE ONE SIZE LARGER THAN SEWER INFLUENT PIPE.
2. NO DROP PIPING SHALL BE REQUIRED IF SEWER INFLUENT PIPE FLOWLINE IS 18" OR LESS ABOVE MAIN SEWER PIPE FLOWLINES OR IF MAIN SEWER PIPE BENCH IS HIGHER THAN SEWER INFLUENT FLOWLINE.

S-09	INTERNAL DROP MANHOLE EXISTING MANHOLE	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

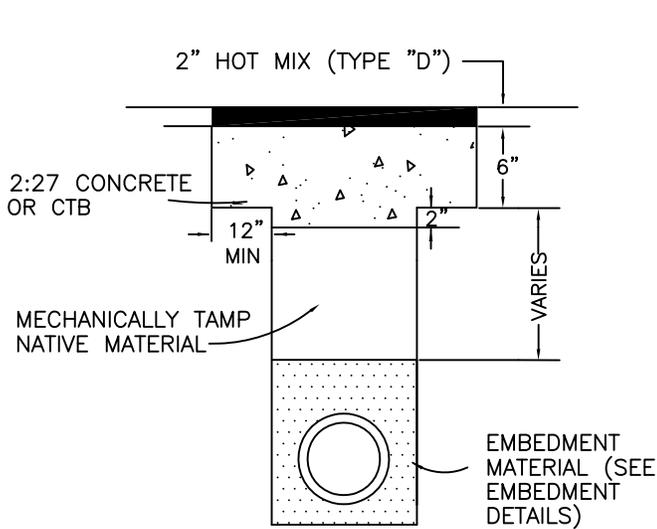


HORIZONTAL REINFORCING BARS
TO BE SPACED EQUIDISTANT
AROUND PERIMETER OF PIPE
AND TIED AT 4' INTERVALS

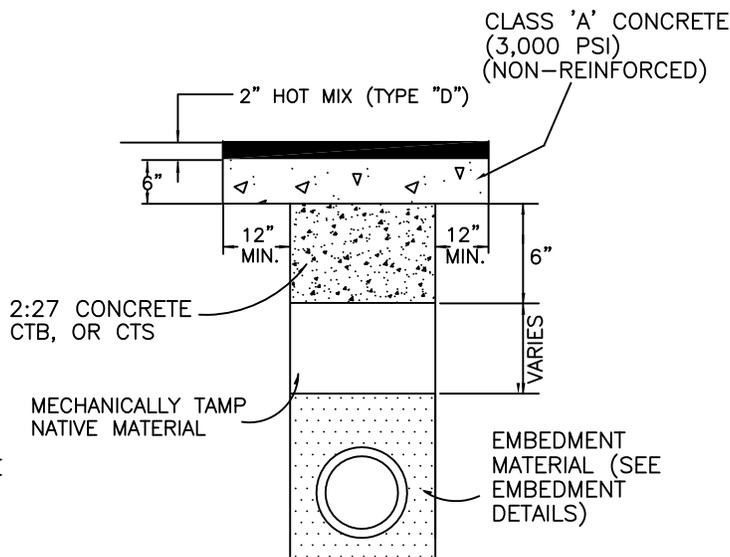


- 6" - 8" PIPE: 4 - #4 HORIZONTAL REINFORCING BARS WITH TIE RODS
- 10" - 12" PIPE: 4 - #5 HORIZONTAL REINFORCING BARS WITH TIE RODS
- 15" - 18" PIPE: 8 - #5 HORIZONTAL REINFORCING BARS WITH TIE RODS
- 20" - 30" PIPE: 8 - #6 HORIZONTAL REINFORCING BARS WITH TIE RODS

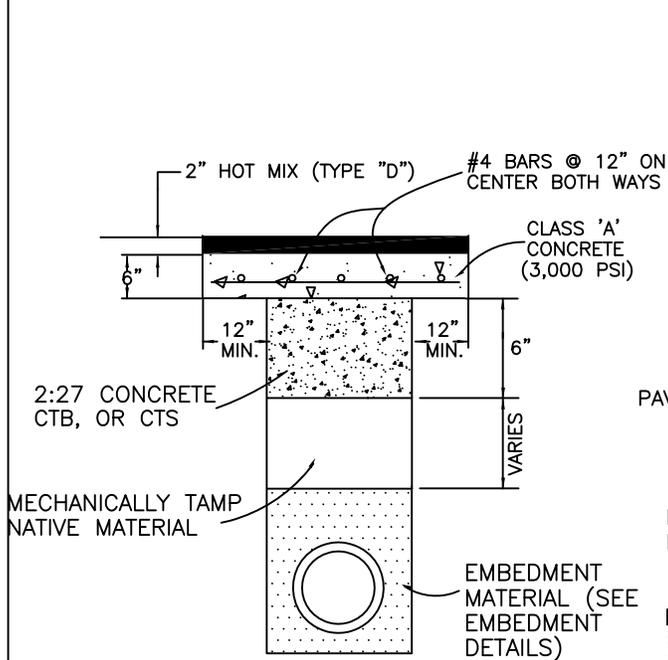
S-10	CONCRETE ENCASEMENT	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



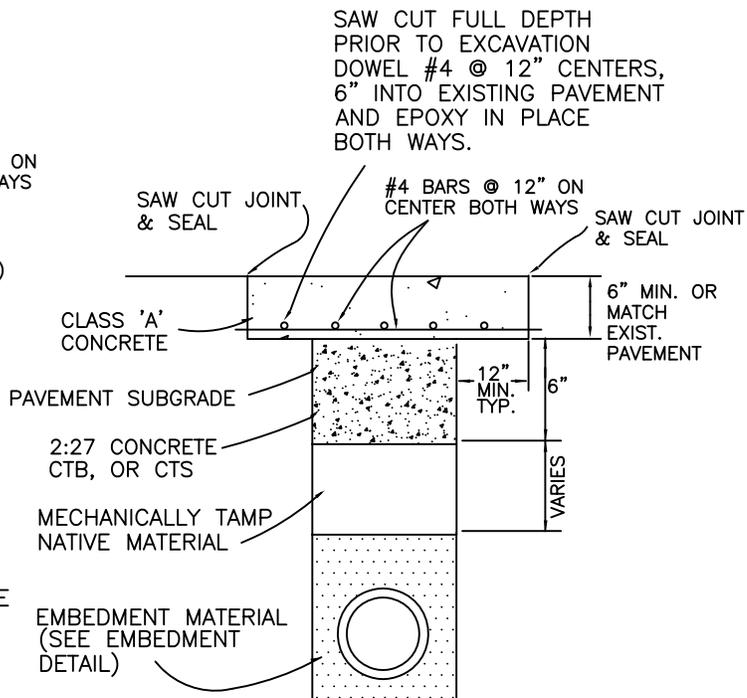
RESIDENTIAL/COUNTY ROAD



COLLECTOR STREET



MAJOR ARTERIALS & THOROUGHFARES



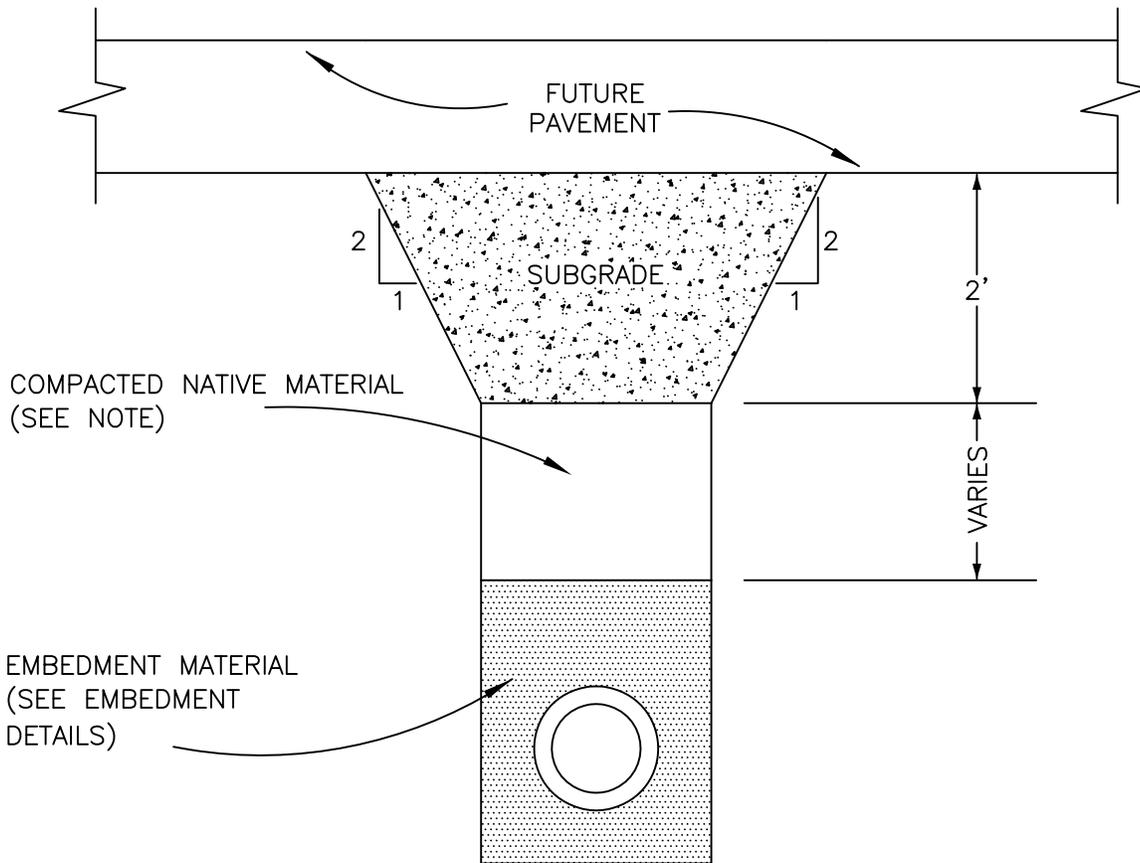
CONCRETE STREET

NOTES:

1. A SAW SHALL BE USED TO CUT ASPHALT OR CONCRETE FULL DEPTH PRIOR TO OPENING THE DITCH IN ORDER TO INSURE A NEAT STRAIGHT EDGE. SEE STANDARD SPECIFICATIONS FOR REQUIRED EMBEDMENT.

2. CTB = CEMENT TREATED BASE (CONTAINS AGGREGATE)
 CTS = CEMENT TREATED SAND
 BOTH MATERIALS SHALL BE MECHANICALLY TAMPED.

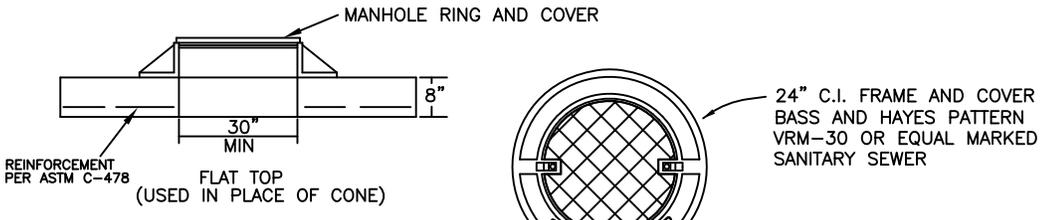
S-11	EXISTING STREET BACKFILL AND REPAIR	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



NOTE:

FOR LINES BEING LAID PRIOR TO NEW STREET CONSTRUCTION, WHICH WILL LIE BENEATH PAVEMENT OR CURB AND GUTTER, BACKFILL ABOVE PIPE EMBEDMENT SHALL CONSIST OF NATIVE MATERIAL, COMPACTED IN MAX. 6" TO 9" LIFTS (COMPACTED THICKNESS) TO 95% STANDARD PROCTOR DENSITY AT OPTIMUM MOISTURE CONTENT $\pm 2\%$.

S-12	STREET BACKFILL PRIOR TO STREET CONSTRUCTION	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

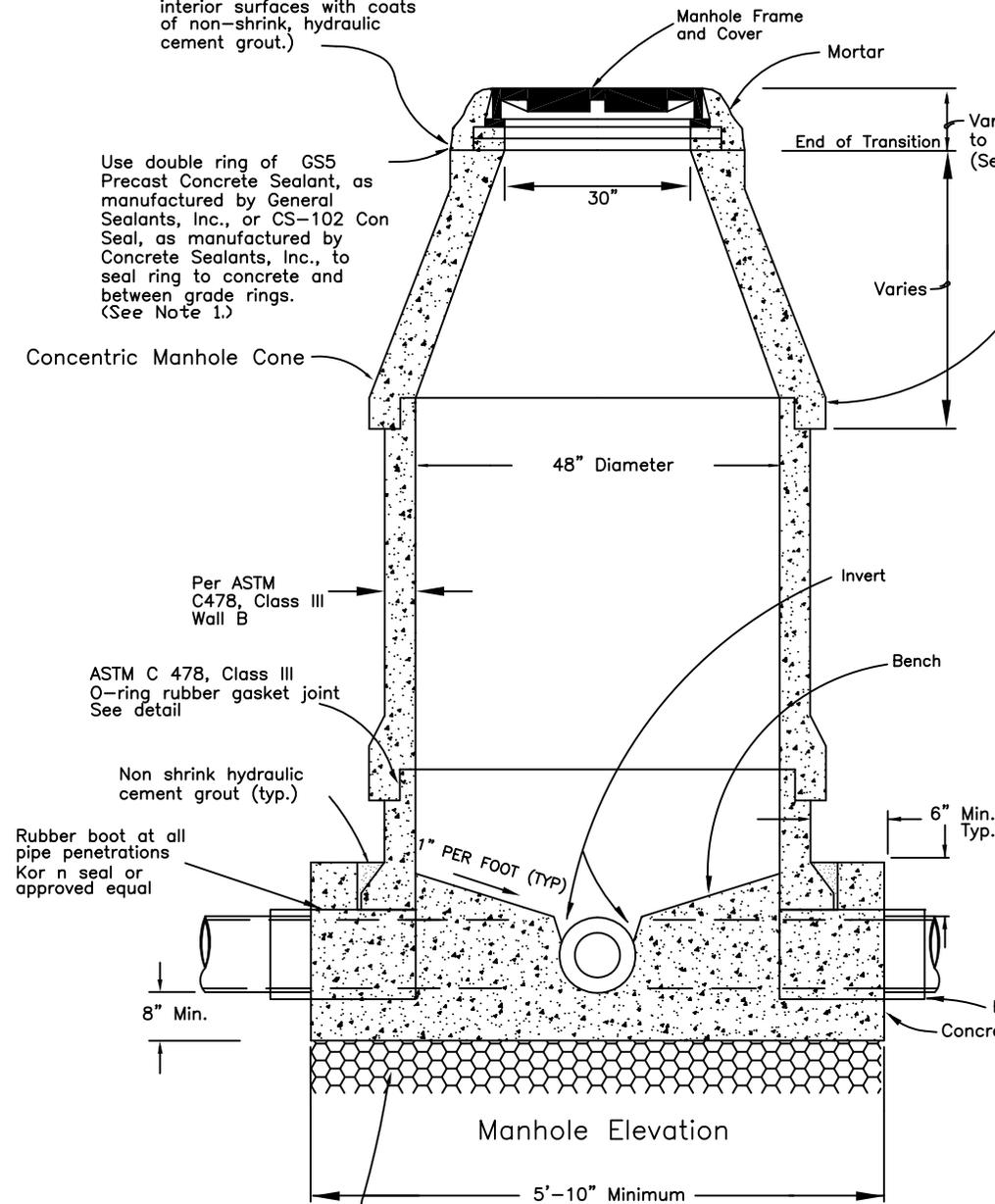


Manholes constructed within 100 year flood plain shall have watertight ring and lid.

34" O.D. x 30" I.D. Precast Concrete Grade Rings (Plaster exterior and interior surfaces with coats of non-shrink, hydraulic cement grout.)

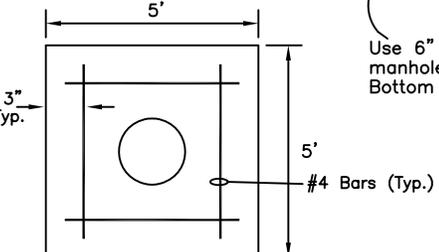
Use double ring of GS5 Precast Concrete Sealant, as manufactured by General Sealants, Inc., or CS-102 Seal, as manufactured by Concrete Sealants, Inc., to seal ring to concrete and between grade rings. (See Note 1.)

Concentric Manhole Cone



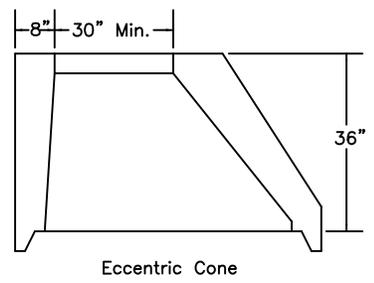
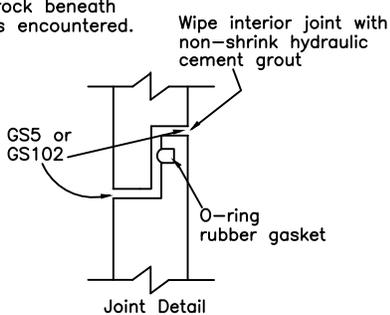
Coat exterior of manhole with 2 mop coats of Themec 450 Heavy Themecol or Kopper's Bitumastic Super Service, Black.

- Notes:
- Grade rings may be used to adjust neck 12" or less. When adjustment is greater than 12", contractor shall use sono tube and place concrete for neck adjustment. Precast concrete grade rings shall be constructed by manufacturer in standard 2", 3", 6", 8" and 12" lengths.
 - All manhole inverts shall be full depth of sewer pipes. All inverts shall extend throughout manhole bottom and provide smooth flow transitions.
 - Manholes in undeveloped areas shall be installed with 5'x5'x5" thick concrete pads with manhole cover in center of pad. Pads shall be reinforced with four No. 4 rebars. Install fiberglass MH marker by pad.
 - All benches shall be slightly higher than top of pipes and slope gently down to inverts.
 - 4' Manhole shall be installed between grease trap and public main to serve as a sampling port.



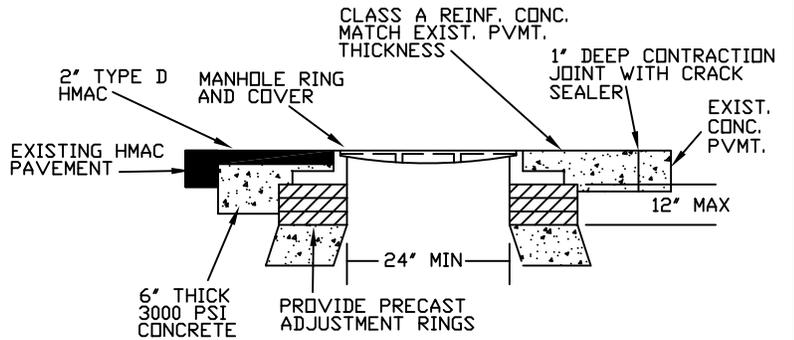
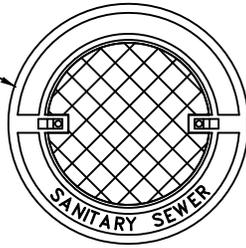
MANHOLE PAD (5" thick) FOR NON-TRAFFIC AREAS

Use 6" min. layer of washed rock beneath manhole where ground water is encountered. Bottom to be poured in dry.



S-13 PRECAST 4' MANHOLE/SAMPLING PORT		
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

30" Cast Iron Manhole Frame (to be furnished and installed by contractor) Bass and Hayes VRM-30 with pick bars or equal marked "sanitary sewer"



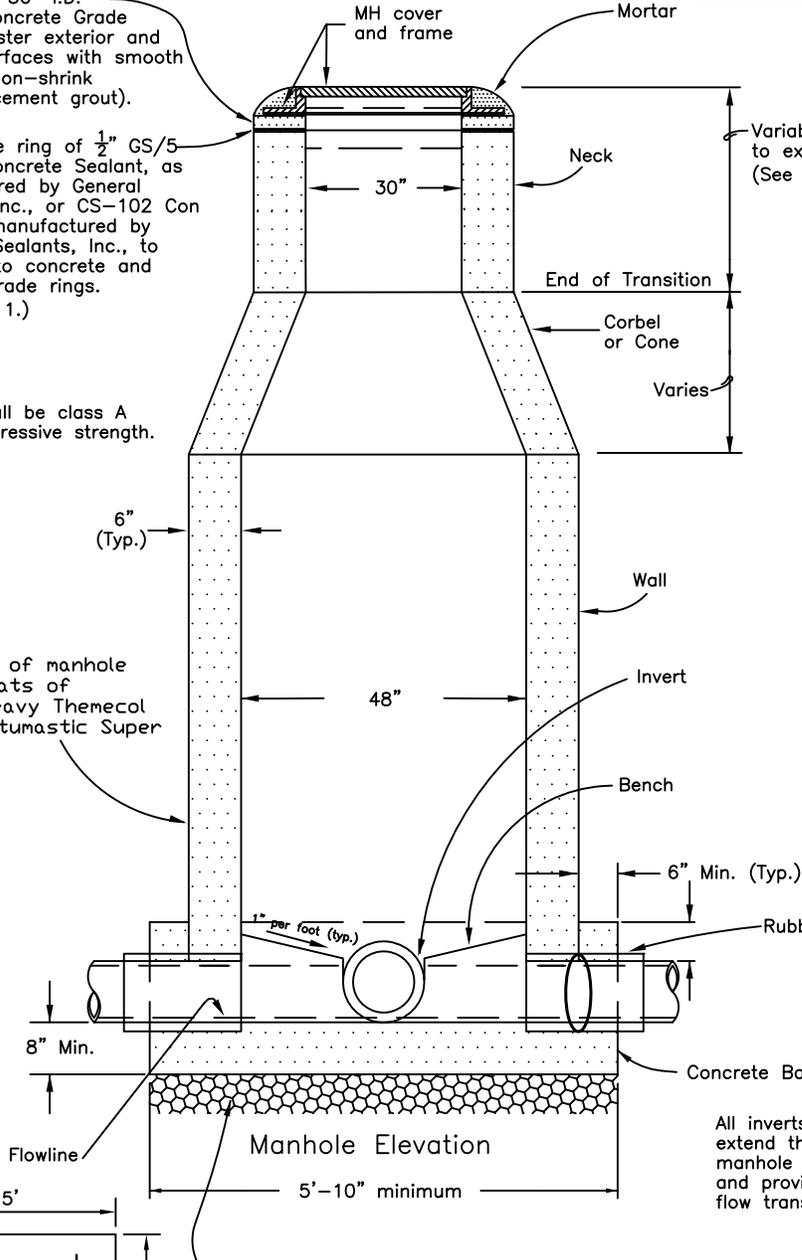
MANHOLE TOP FOR STREET INSTALLATION

34" O.D x 30" I.D. Precast Concrete Grade Rings (Plaster exterior and interior surfaces with smooth coats of non-shrink hydraulic cement grout).

Use double ring of 1/2" GS/5 Precast Concrete Sealant, as manufactured by General Sealants, Inc., or CS-102 Con Seal, as manufactured by Concrete Sealants, Inc., to seal ring to concrete and between grade rings. (See Note 1.)

All concrete shall be class A 3,000 psi compressive strength.

Coat Exterior of manhole with 2 mop coats of Themec 450 Heavy Themecol or Koppers Bitumastic Super Service, Black.



Variable, but not to exceed 2' - 6". (See Note 1.)

Notes:

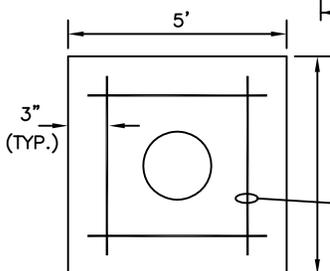
1. Grade rings may be used to adjust neck 12" or less. When adjustment is greater than 12", contractor shall use sono tube and place concrete for neck adjustment. Precast concrete grade rings shall be constructed by manufacturer in standard 2", 3", 6", 8" and 12" heights.
2. Contractor shall not remove any forms until 24 hours after concrete is placed. No backfill shall begin until 96 hours after concrete is placed.
3. All manhole inverts shall be full depth of sewer pipes. All inverts shall be formed to center of manhole and shall provide smooth flow transitions.
4. Manholes in undeveloped areas shall be installed with 5'x5'x5" thick concrete pads with cover in center of pad. Pads shall be reinforced with four No. 4 rebars. Install fiberglass MH marker by pad.
5. Contractor shall rub all interior surfaces to a smooth finish.
6. Manhole to be adjusted to final grade prior to paving operation on new concrete streets.
7. Manholes constructed within 100-year flood plain shall have watertight ring and lid.
8. 4' Manhole shall be installed between grease trap and public main to serve as a sampling port.

All inverts shall extend throughout manhole bottom and provide smooth flow transitions

All benches shall be slightly higher than top of pipes and slope gently to inverts.

S-14	CAST IN PLACE	
4'	MANHOLE/SAMPLING PORT	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

MANHOLE PAD FOR NON-TRAFFIC AREAS



EJIW EAST JORDAN
 IRON WORKS EST. 1883
 800-626-4653
 www.ejiw.com
 MADE IN USA

PRODUCT NUMBER
NCR08-2060A

CATALOG NUMBER
 VRM30 RING&COVER
 BURLESON LOGO

COVER

LOAD RATING
HEAVY DUTY

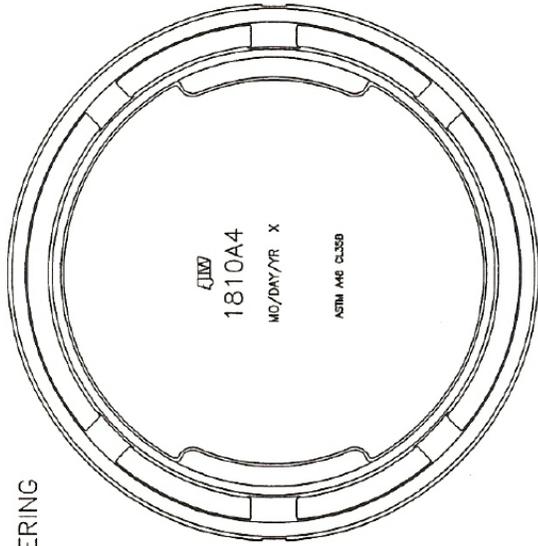
COATING
UNDIPPED

MATERIAL SPECIFICATION
 COVER - GRAY IRON
 ASTM A48 CL35B

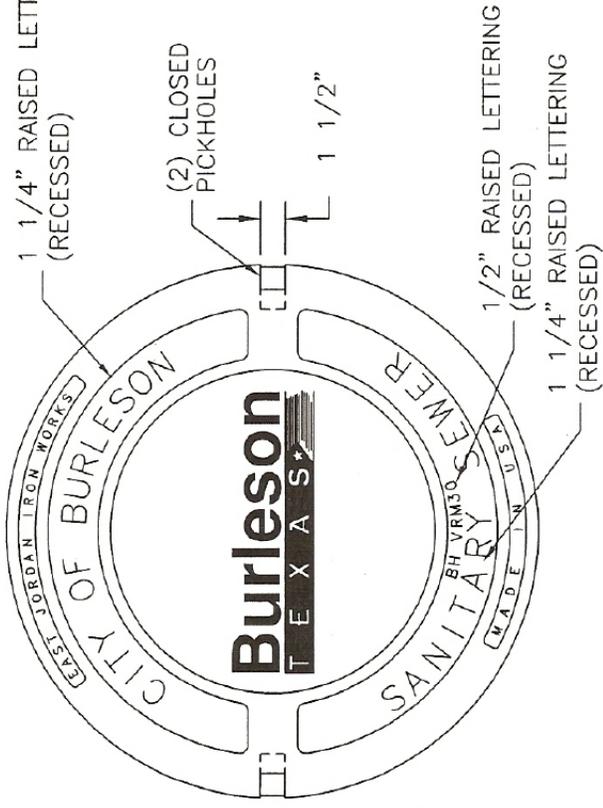
OPEN AREA
 N/A

DESIGNATES MACHINE SURFACE
 DRAWN DATE
 GAD 09/17/08

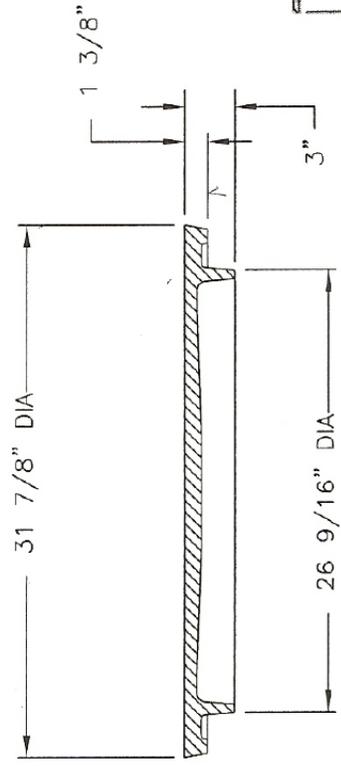
LAST REVISED DATE
 REFERENCE INFORMATION



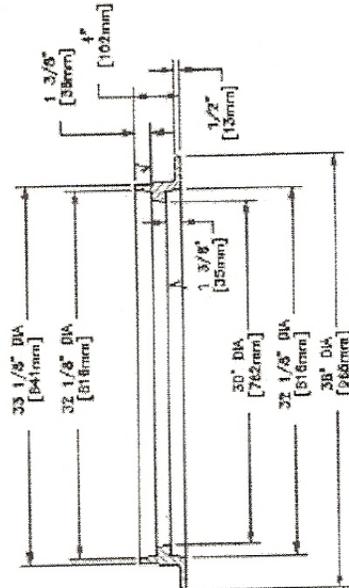
BOTTOM VIEW



COVER SECTION



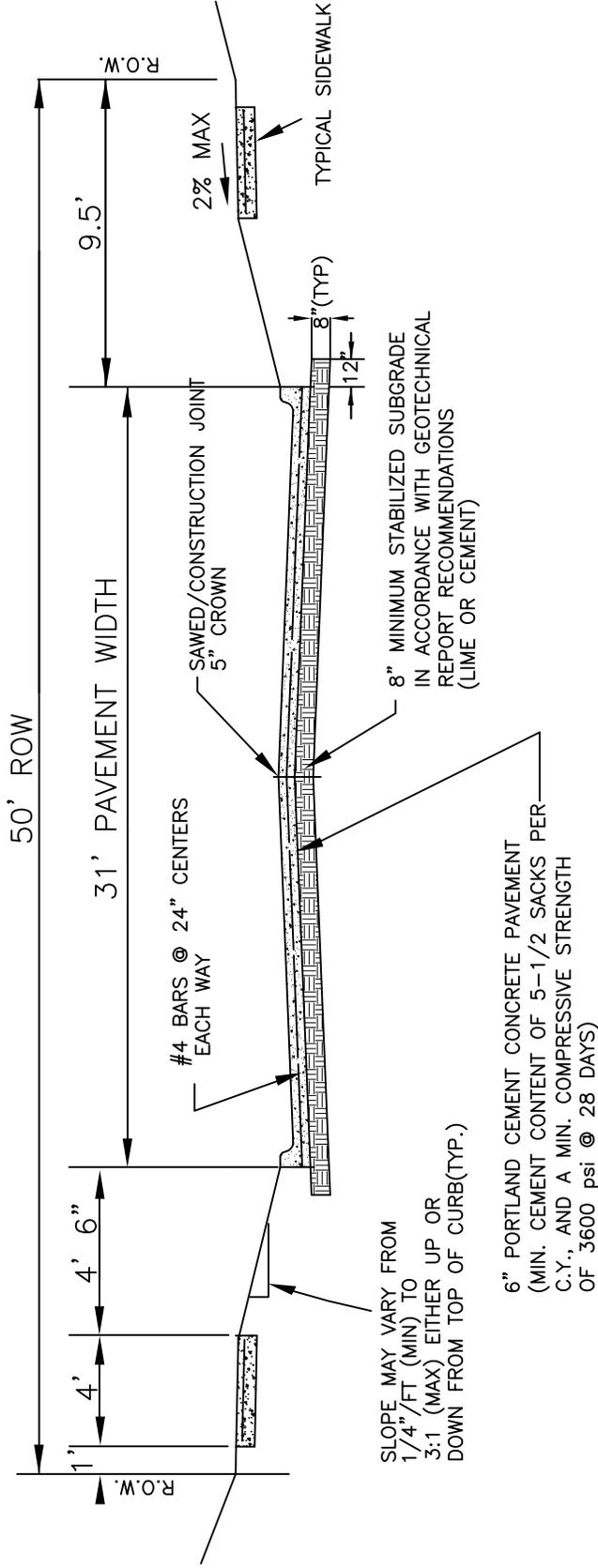
SECTION



CONFIDENTIAL: This drawing is the property of East Jordan Iron Works, Inc. and embodies confidential information, trade secret information, and/or know how that is the property of East Jordan Iron Works, Inc. © Copyright 2006 East Jordan Iron Works, Inc.

PAVING DETAILS

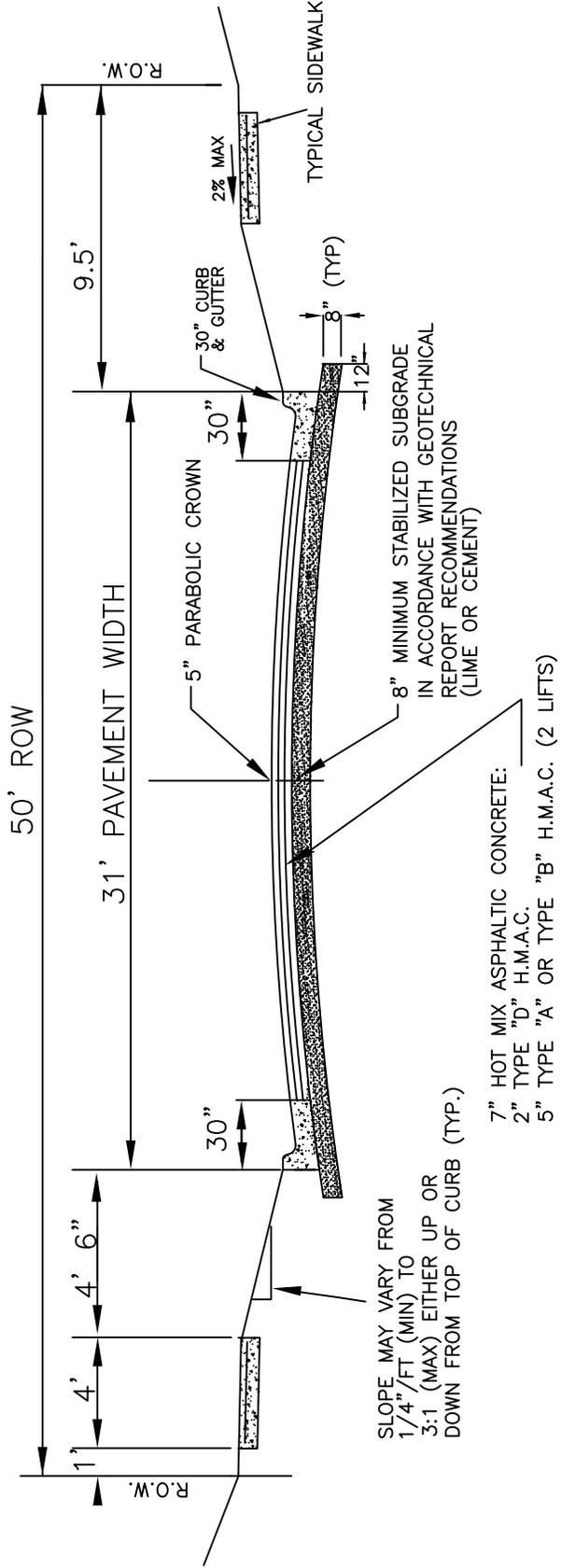
P-01	Residential Street (L2U) – Concrete
P-02	Residential Street (L2U) – HMAC
P-03	Rural Residential Street (L2U) – Concrete
P-04	Rural Residential Street (L2U) – HMAC
P-05	Minor Collector (C3U) – Concrete
P-06	Minor Collector (C3U) – HMAC
P-07	Major Collector (C4U)
P-08	Minor Arterial – Two-Way Left Turn Lane (P5U)
P-09	Minor Arterial – Conventional (P4D)
P-10	Principal Arterial – Conventional (P6D)
P-11	Alley/Fire Lane Paving
P-12a	Concrete Pavement Details: Epoxy Tie Bar Pavement Reinforcing Construction Joint Transverse Expansion Joint Sawed Contraction Joint
P-12b	Concrete Pavement Details: Joint Sealant Details Manhole Boxout Pavement Header
P-13	Joint and Steel Layout
P-14	Curb and Gutter
P-15	Rollover Curb
P-16	Drive Approach Detail – Constructed with Street
P-17	Drive Approach Detail – Connection to Existing Streets
P-18	Drive Approach Detail with 6' sidewalk at Right-of-Way
P-19	4' Sidewalk
P-20	6' Sidewalk
P-21	Sidewalk with Wall
P-22A-D	Curb Ramp
P-23	Pipe Handrail
P-24	Dead End Barricade
P-25	Valley Gutter
P-26	Median/Island Paving
P-27a	Electrical Details – Streetlighting (1 of 3)
P27b	Electrical Details – Streetlighting (2 of 3)
P27c	Streetlighting – General Notes
Guardrail	Use the appropriate TXDOT detail (MBGF-03A, MBGF (TR)-05, MBGF (TL2)-05, MBGF (T101)-05)



NOTES:

1. TRANSVERSE SAWED CONTRACTION JOINTS AT 12' INTERVALS FOR CONCRETE PAVEMENT.
2. GEOTECHNICAL REPORT (LIME SERIES TEST) PREPARED BY LICENSED ENGINEER IS REQUIRED TO DETERMINE LIME OR CEMENT APPLICATION RATE.
3. MINIMUM LIME APPLICATION RATE SHALL BE 30 LBS./S.Y.
4. SUBGRADE COMPACTION SHALL BE 95% STANDARD PROCTOR DENSITY.

P-01	RESIDENTIAL STREET (L2U) CONCRETE
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	



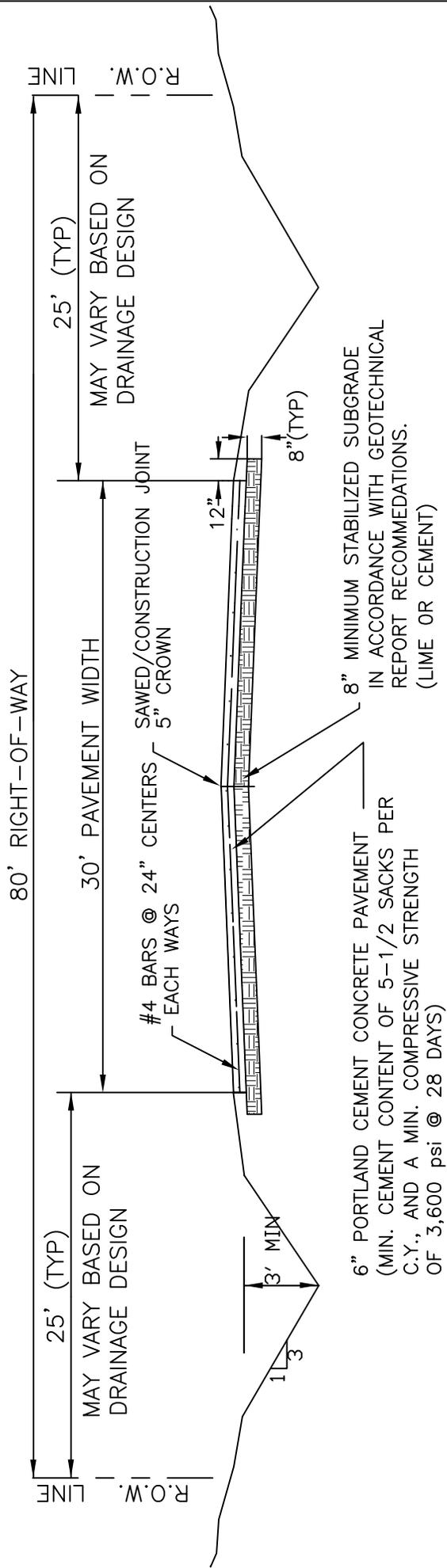
SLOPE MAY VARY FROM 1/4" / FT (MIN) TO 3:1 (MAX) EITHER UP OR DOWN FROM TOP OF CURB (TYP.)

7" HOT MIX ASPHALTIC CONCRETE:
 2" TYPE "D" H.M.A.C.
 5" TYPE "A" OR TYPE "B" H.M.A.C. (2 LIFTS)

NOTES:

1. GEOTECHNICAL REPORT (LIME SERIES TEST) PREPARED BY LICENSED ENGINEER IS REQUIRED TO DETERMINE LIME OR CEMENT APPLICATION RATE.
2. MINIMUM LIME APPLICATION RATE SHALL BE 30 LBS./S.Y.
3. SUBGRADE COMPACTION SHALL BE 95% STANDARD PROCTOR DENSITY.
4. BAR DITCH SIDE SLOPE VARIES DEPENDING UPON DESIGN. NO GREATER THAN 3:1 WITHOUT ARMORING.
5. FOR 30" GUTTER DETAIL, SEE CURB & GUTTER DETAILS.

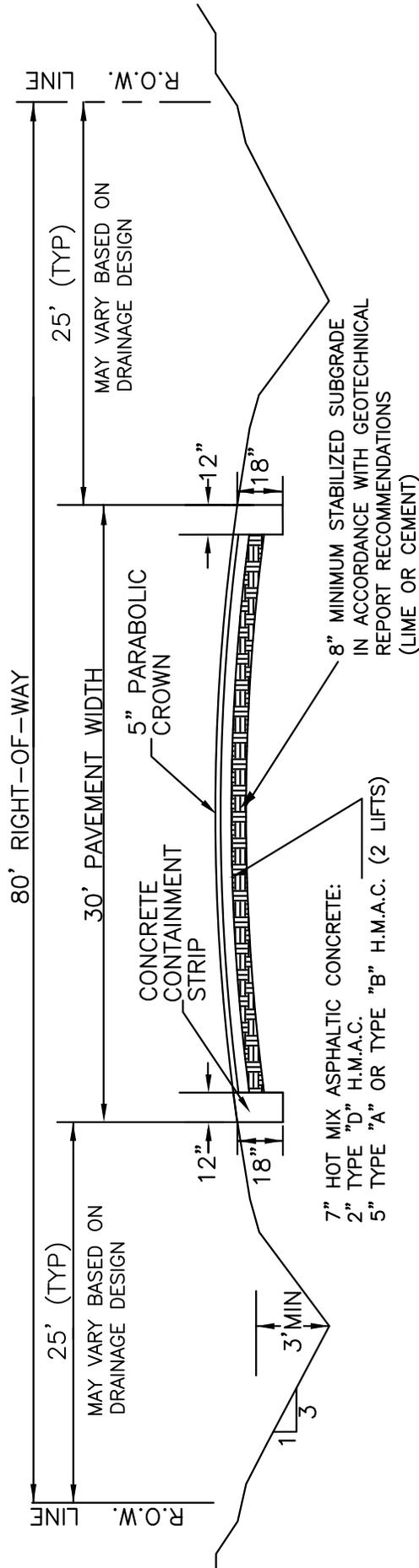
P-02	RESIDENTIAL STREET (L2U) HMAC
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	



NOTES:

1. TRANSVERSE SAWED CONTRACTION JOINT AT 12' INTERVALS FOR CONCRETE PAVEMENT.
2. BAR DITCH SIDE SLOPE VARIES DEPENDING UPON DESIGN. NO GREATER THAN 3:1 WITHOUT AMORING.
3. GEOTECHNICAL REPORT (LIME SERIES TEST) PREPARED BY A LICENSED ENGINEER IS REQUIRED TO DETERMINE LIME OR CEMENT APPLICATION RATE.
4. MINIMUM LIME APPLICATION RATE SHALL BE 30 LBS./S.Y.
5. SUBGRADE COMPACTION SHALL BE 95% STANDARD PROCTOR DENSITY.

P-03	RURAL RESIDENTIAL
STREET (L2U) CONCRETE	
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	



80' RIGHT-OF-WAY

25' (TYP)
MAY VARY BASED ON DRAINAGE DESIGN

30' PAVEMENT WIDTH

5" PARABOLIC CROWN

12"

18"

8" MINIMUM STABILIZED SUBGRADE IN ACCORDANCE WITH GEOTECHNICAL REPORT RECOMMENDATIONS (LIME OR CEMENT)

7" HOT MIX ASPHALTIC CONCRETE: 2" TYPE "D" H.M.A.C. 5" TYPE "A" OR TYPE "B" H.M.A.C. (2 LIFTS)

CONCRETE CONTAINMENT STRIP

3' MIN

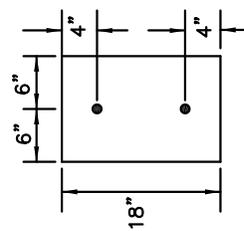
1 3

R.O.W. LINE

R.O.W. LINE

NOTES:

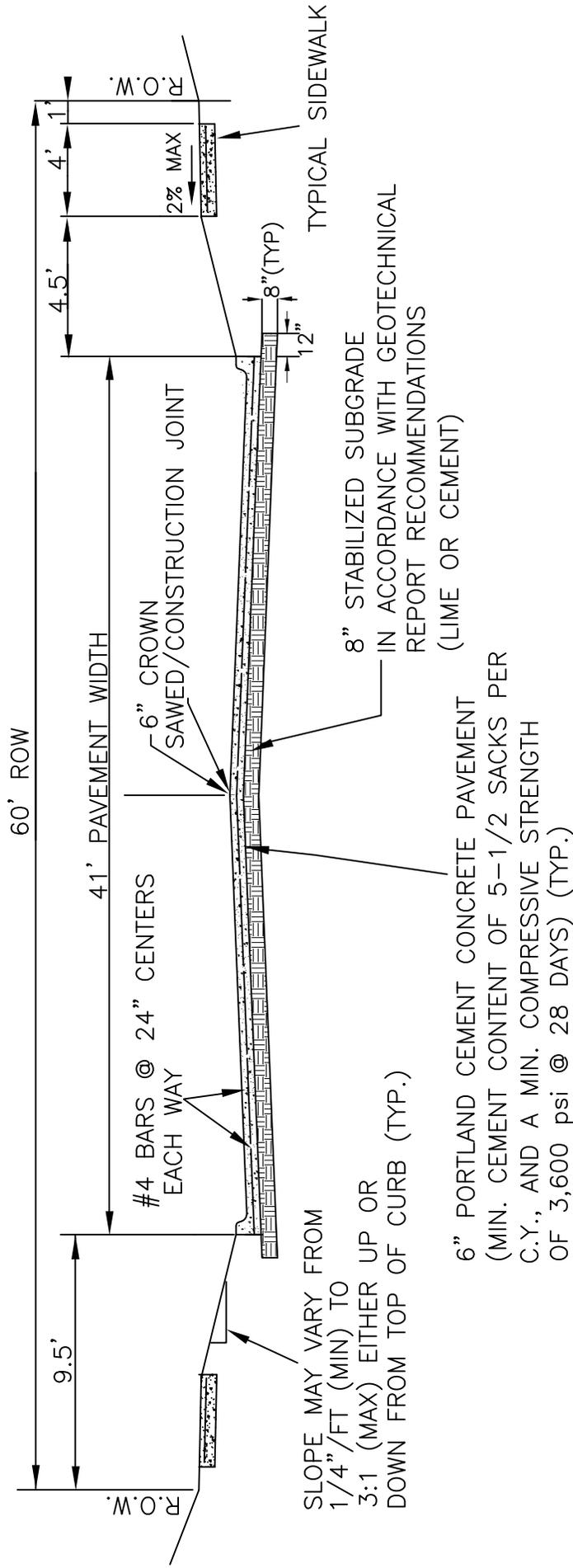
1. BAR DITCH SIDE SLOPE VARIES DEPENDING UPON DESIGN. NO GREATER THAN 3:1 WITHOUT AMORING.
2. GEOTECHNICAL REPORT (LIME SERIES TEST) PREPARED BY A LICENSED ENGINEER IS REQUIRED TO DETERMINE LIME OR CEMENT APPLICATION RATE.
3. MINIMUM LIME APPLICATION RATE SHALL BE 30 LBS./S.Y.
4. SUBGRADE COMPACTION SHALL BE 95% STANDARD PROCTOR DENSITY.



CONCRETE CONTAINMENT STRIP DETAIL

REINFORCING SHALL BE #4 BARS PLACED AS SHOWN.

P-04	RURAL RESIDENTIAL STREET (L2U) HMACH
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	

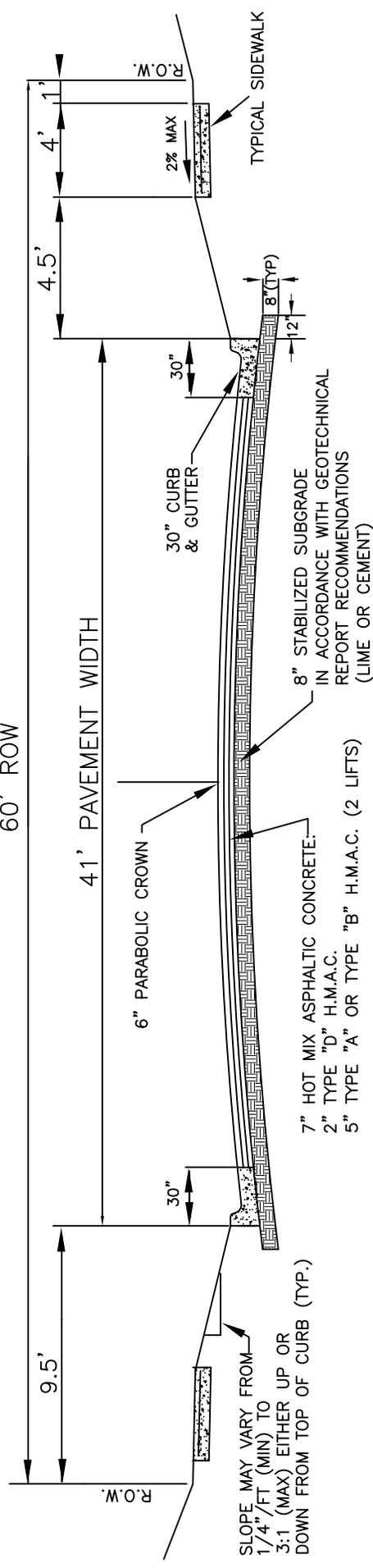


NOTES:

1. TRANSVERSE SAWED CONTRACTION JOINTS AT 12' INTERVALS FOR CONCRETE PAVEMENT. LONGITUDINAL SAWED CONTRACTION JOINTS AT 11' INTERVALS.
2. GEOTECHNICAL REPORT (LIME SERIES TEST) PREPARED BY LICENSED ENGINEER IS REQUIRED TO DETERMINE LIME OR CEMENT APPLICATION RATE.
3. MINIMUM LIME APPLICATION RATE SHALL BE 30 LBS./S.Y.
4. SUBGRADE COMPACTION SHALL BE 95% STANDARD PROCTOR DENSITY.

P-05	MINOR COLLECTOR (C3U) CONCRETE
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	

60' ROW



SLOPE MAY VARY FROM 1/4"/FT (MIN) TO 3:1 (MAX) EITHER UP OR DOWN FROM TOP OF CURB (TYP.)

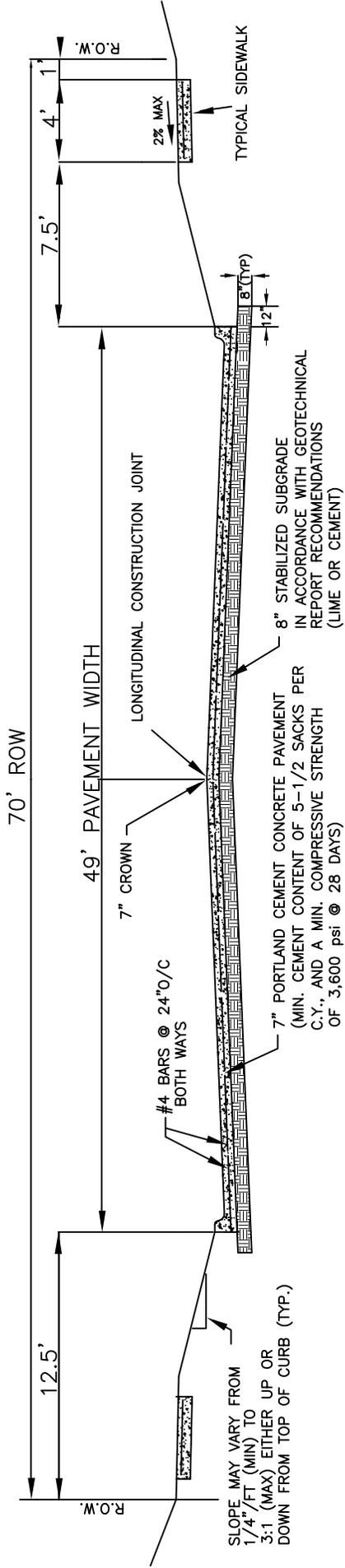
7" HOT MIX ASPHALTIC CONCRETE:
 2" TYPE "D" H.M.A.C.
 5" TYPE "A" OR TYPE "B" H.M.A.C. (2 LIFTS)

8" STABILIZED SUBGRADE
 IN ACCORDANCE WITH GEOTECHNICAL
 REPORT RECOMMENDATIONS
 (LIME OR CEMENT)

NOTES:

1. GEOTECHNICAL REPORT (LIME SERIES TEST) PREPARED BY LICENSED ENGINEER IS REQUIRED TO DETERMINE LIME OR CEMENT APPLICATION RATE.
2. MINIMUM LIME APPLICATION RATE SHALL BE 30 LBS./S.Y.
3. SUBGRADE COMPACTION SHALL BE 95% STANDARD PROCTOR DENSITY.

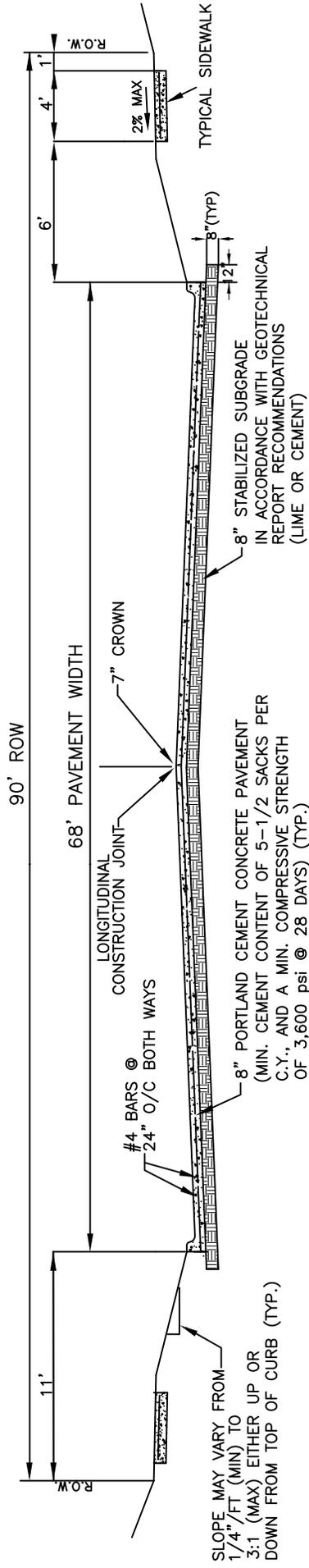
P-06	MINOR COLLECTOR (C3U) HMAC
CITY OF BURLERSON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	



NOTES:

1. TRANSVERSE SAWED CONTRACTION JOINTS AT 15' INTERVALS & LONGITUDINAL SAWED CONTRACTION JOINTS AT 11' INTERVALS FOR CONCRETE PAVEMENT.
2. GEOTECHNICAL REPORT (LIME SERIES TEST) PREPARED BY LICENSED ENGINEER IS REQUIRED TO DETERMINE LIME OR CEMENT APPLICATION RATE.
3. MINIMUM LIME APPLICATION RATE SHALL BE 30 LBS./S.Y.
4. SUBGRADE COMPACTION SHALL BE 95% STANDARD PROCTOR DENSITY.

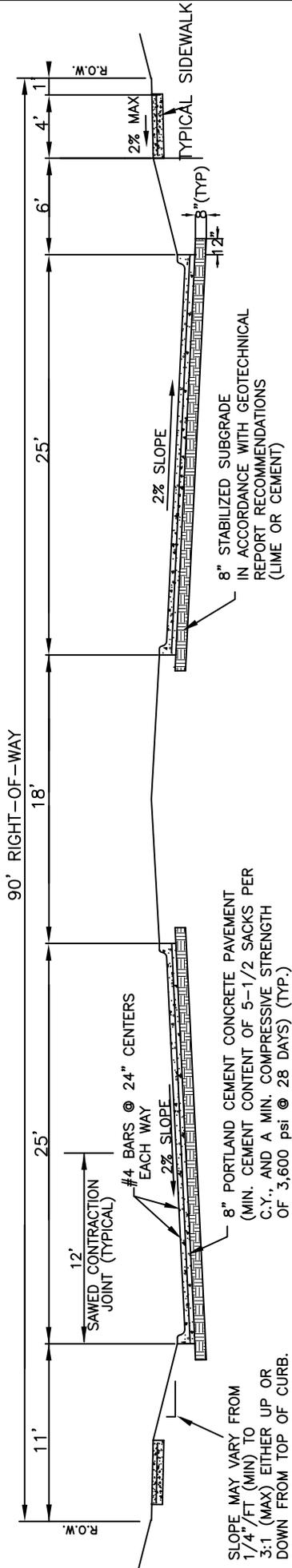
P-07	MAJOR COLLECTOR (C4U)
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	



NOTES:

1. TRANSVERSE SAWED CONTRACTION JOINTS AT 15' INTERVALS & LONGITUDINAL SAWED CONTRACTION JOINTS AT 11' INTERVALS FOR CONCRETE PAVEMENT.
2. GEOTECHNICAL REPORT (LIME SERIES TEST) PREPARED BY LICENSED ENGINEER IS REQUIRED TO DETERMINE LIME OR CEMENT APPLICATION RATE.
3. MINIMUM LIME APPLICATION RATE SHALL BE 30 LBS./S.Y.
4. SUBGRADE COMPACTION SHALL BE 95% STANDARD PROCTOR DENSITY.

P-08	MINOR ARTERIAL - TWLTL (P5U)
CITY OF BURLESON	
ORIGINAL	10/6/06 SWC
REVISION	
REVISION	
REVISION	

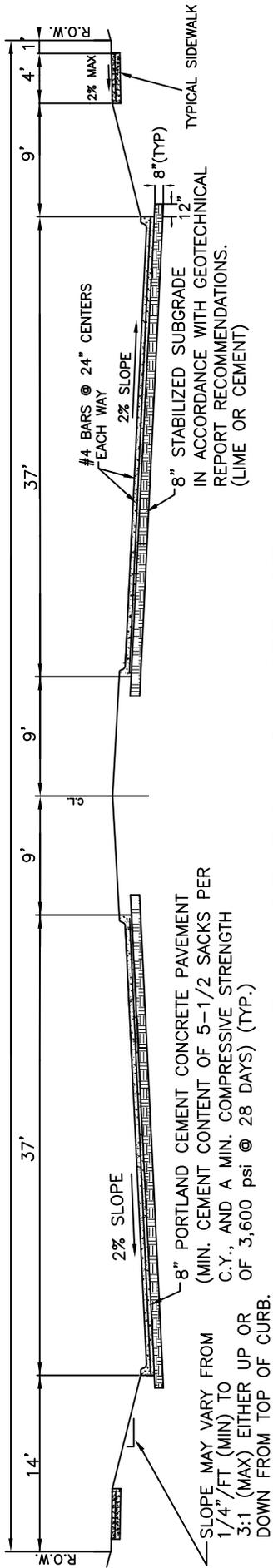


NOTES:

1. TRANSVERSE SAWED CONTRACTION JOINTS AT 15' INTERVALS AND LONGITUDINAL SAWED CONTRACTION JOINTS 12' FROM OUTSIDE BACK OF CURBS.
2. GEOTECHNICAL REPORT (LIME SERIES TEST) PREPARED BY LICENSED ENGINEER IS REQUIRED TO DETERMINE LIME OR CEMENT APPLICATION RATE.
3. MINIMUM LIME APPLICATION RATE SHALL BE 30 LBS./S.Y.
4. SUBGRADE COMPACTION SHALL BE 95% STANDARD PROCTOR DENSITY.

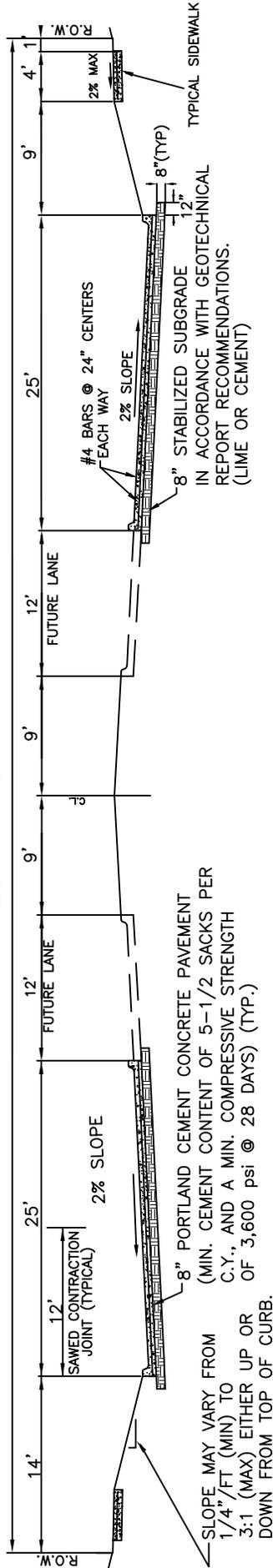
P-09	MINOR ARTERIAL CONVENTIONAL (P4D)
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	

120' RIGHT-OF-WAY



FULL SECTION CONSTRUCTION

120' RIGHT-OF-WAY

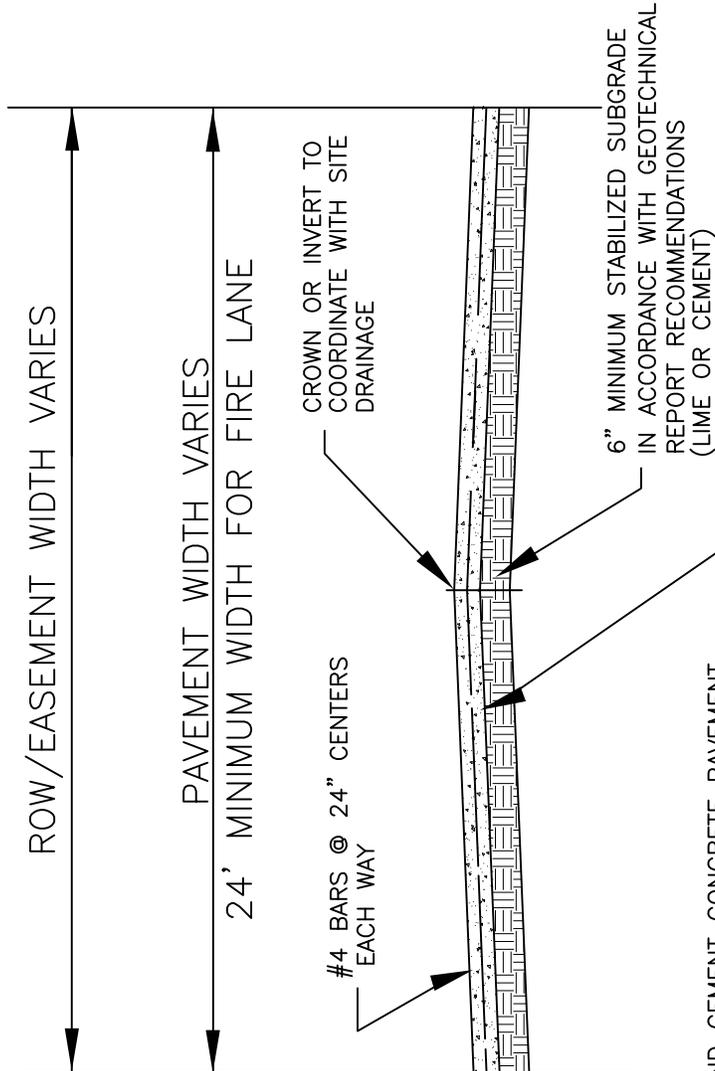


PROPOSED FUTURE WIDENING TO THE INSIDE

NOTES:

1. TRANSVERSE SAWED CONTRACTION JOINTS AT 15' INTERVALS & LONGITUDINAL SAWED CONTRACTION JOINTS AT 12' FROM OUTSIDE BACK OF CURBS.
2. GEOTECHNICAL REPORT (LIME SERIES TEST) PREPARED BY LICENSED ENGINEER IS REQUIRED TO DETERMINE LIME OR CEMENT APPLICATION RATE.
3. MINIMUM LIME APPLICATION RATE SHALL BE 30 LBS./S.Y.
4. SUBGRADE COMPACTION SHALL BE 95% STANDARD PROCTOR DENSITY.

P-10	PRINCIPAL ARTERIAL CONVENTIONAL (P6D)
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	

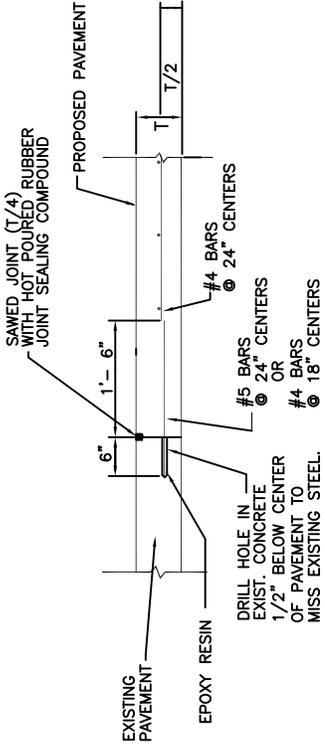


6" PORTLAND CEMENT CONCRETE PAVEMENT (MIN. CEMENT CONTENT OF 5-1/2 SACKS PER C.Y., AND A MIN. COMPRESSIVE STRENGTH OF 3600 psi @ 28 DAYS)

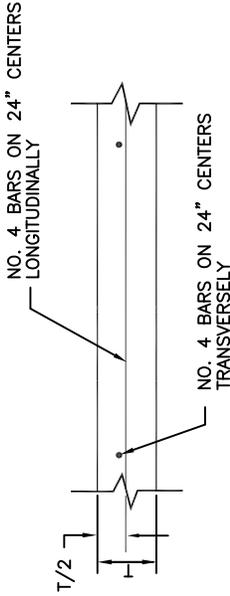
NOTES:

1. TRANSVERSE SAWED CONTRACTION JOINTS AT 12' INTERVALS.
2. GEOTECHNICAL REPORT (LIME SERIES TEST) PREPARED BY LICENSED ENGINEER IS REQUIRED TO DETERMINE LIME OR CEMENT APPLICATION RATE.
3. MINIMUM LIME APPLICATION RATE SHALL BE 30 LBS./S.Y.
4. SUBGRADE COMPACTION SHALL BE 95% STANDARD PROCTOR DENSITY.

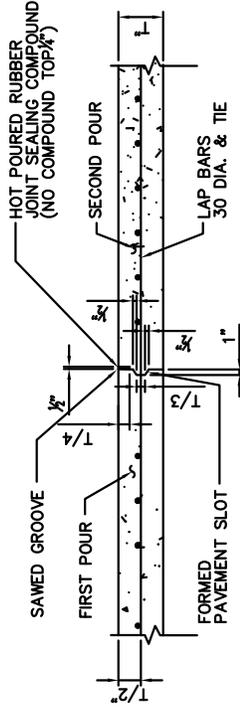
P-11	ALLEY/FIRE LANE PAVING
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	
REVISION	
REVISION	



EPOXY TIE BAR



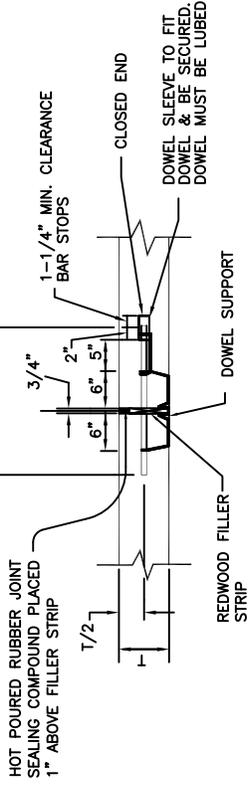
PAVEMENT REINFORCING



T = PAVEMENT THICKNESS
KEYWAY REQUIRED FOR T = 8" AND GREATER.

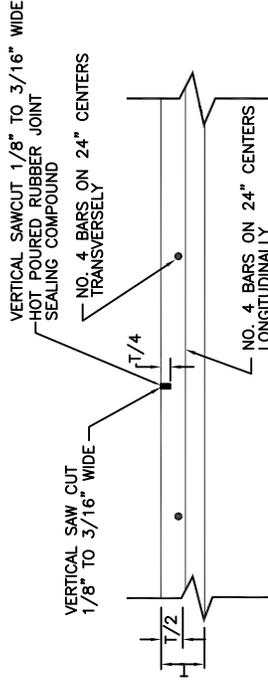
CONSTRUCTION JOINT

T	DOWEL SIZE	SPACING
< 7"	# 6	12"
≥ 7"	# 8	12"



- NOTES: 1. PAVEMENT STEEL IS NOT SHOWN FOR CLARITY AND SHALL STOP 3 INCHES FROM JOINT.
2. EXPANSION JOINTS SHALL BE PLACED AT ALL POINTS OF CURVATURE. POINTS OF TANGENCY AND ALL INTERSECTION CURB RETURN POINTS. MAXIMUM SPACING SHALL BE 600 FEET.

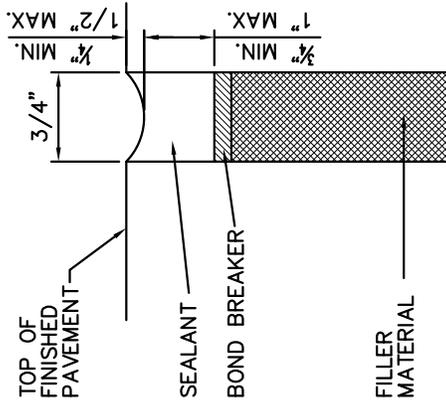
TRANSVERSE EXPANSION JOINT



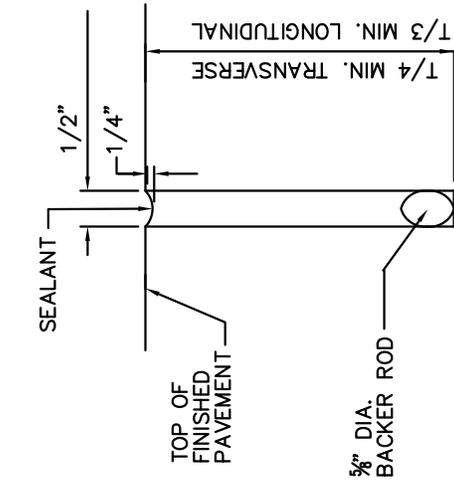
NOTE: TRANSVERSE JOINTS SHALL BE PLACED AT THE FOLLOWING INTERVALS:
6" THICKNESS = 12'
7" & 8" THICKNESS = 15'

SAWED CONTRACTION JOINT

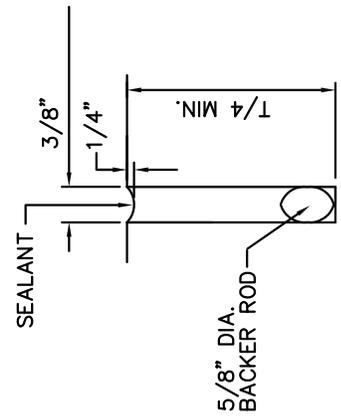
P-12d	CONCRETE PAVEMENT DETAILS (SHEET 1 OF 2)
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	



EXPANSION JOINT

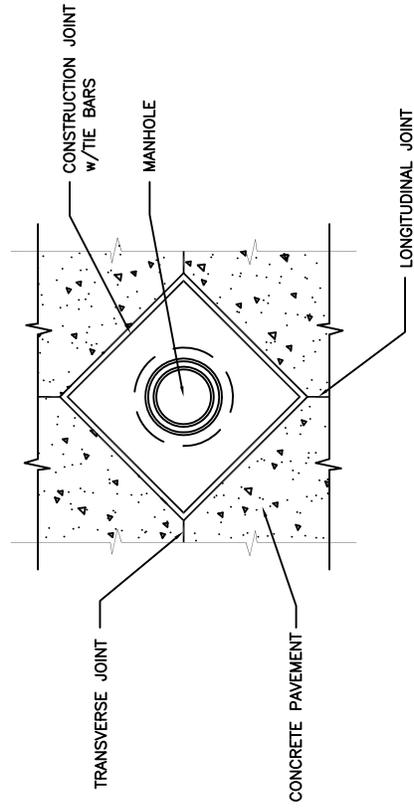


CONSTRUCTION JOINT



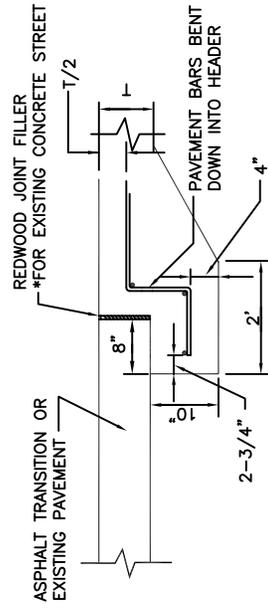
SAWED JOINT (DUMMY)

JOINT SEALANT DETAILS



ONLY PERMISSIBLE FOR HAND POURS

MANHOLE BOXOUT



NOTE: PAVEMENT & HEADER TO BE POURED MONOLITHICALLY

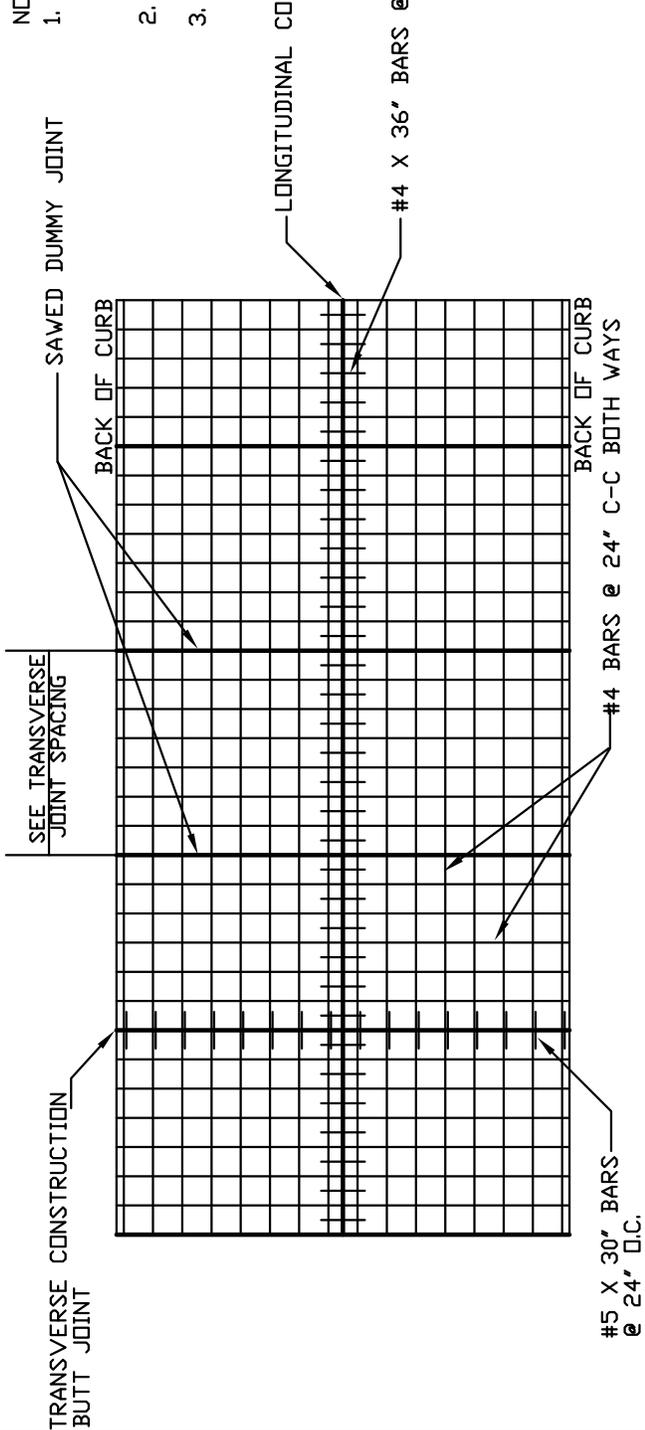
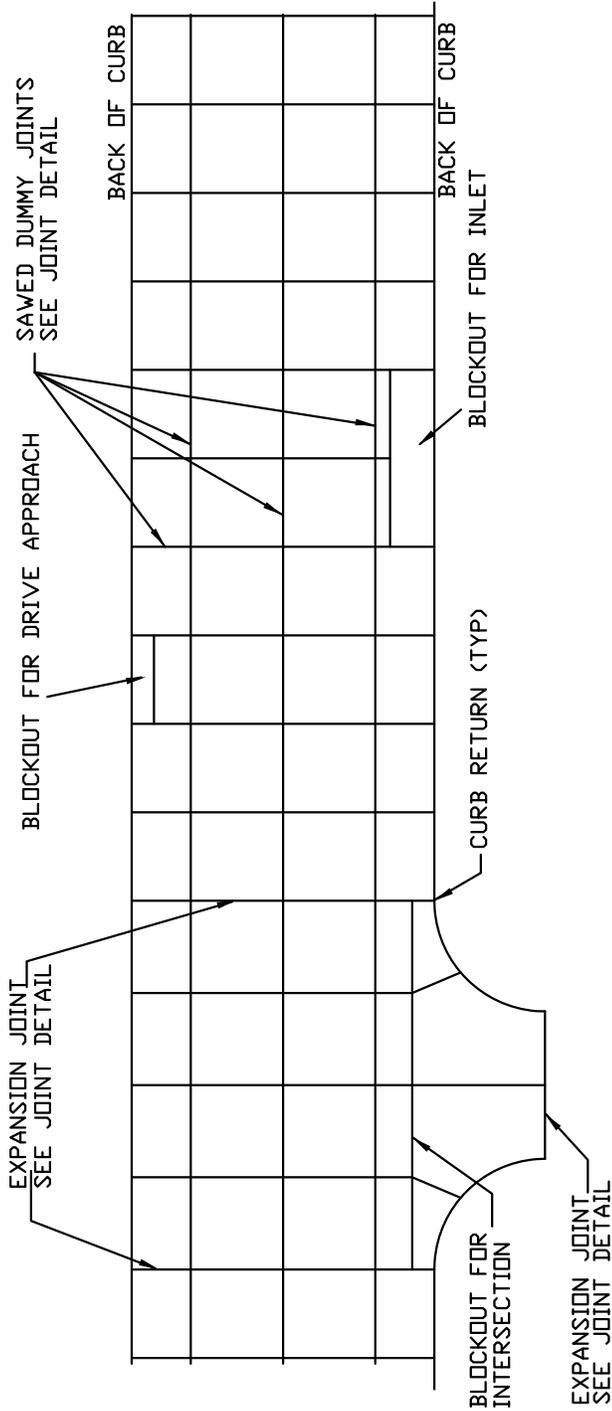
PAVEMENT HEADER

P-12b	CONCRETE PAVEMENT DETAILS (SHEET 2 OF 2)
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	

TRANSVERSE JOINT SPACING	
PAVEMENT THICKNESS	SPACING
6'	10'
7'	15'
8'	15'

LONGITUDINAL JOINT SPACING	
STREET WIDTH	SPACING
31'	ON CL
41'	ON CL AND 8' FROM B/C
45'	ON CL AND 9' OFF CL
67'	7' AND 21' OFF CL

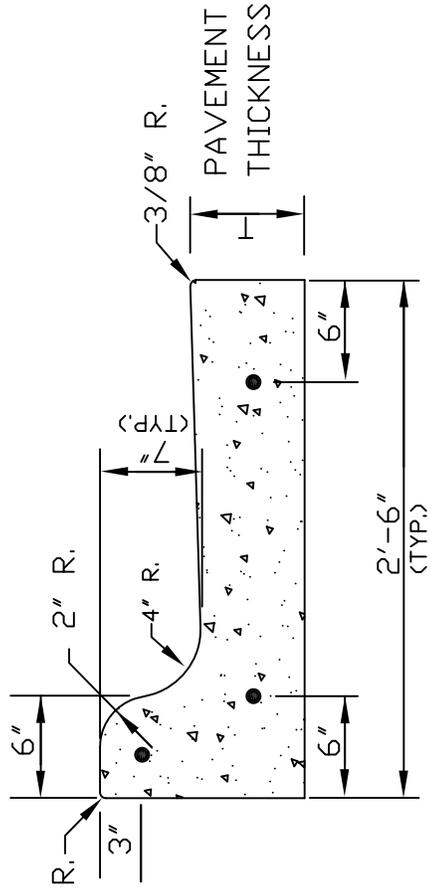
JOINT DEPTH	
PAVEMENT THICKNESS	JOINT DEPTH
6'	1 1/2'
7'	1 3/4'
8'	2'



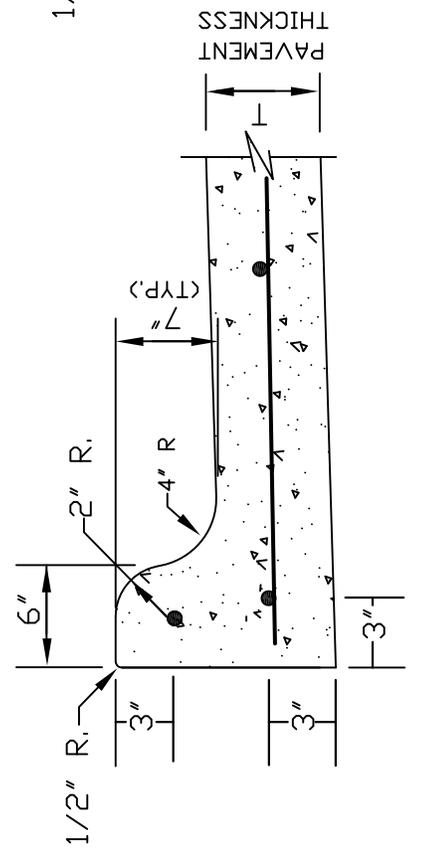
NOTES:

1. THE REINFORCING STEEL WILL EXTEND THROUGH LONGITUDINAL CONSTRUCTION BUTT, SAWED DUMMY AND TRANSVERSE CONSTRUCTION BUTT JOINTS.
2. EXPANSION JOINT SPACING IS 600' AND AT RADIUS RETURNS
3. FINISH IS BAKER BROOM FINISH

P-13	JOINT AND STEEL LAYOUT
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	
REVISION	
REVISION	



SEPARATE CURB & GUTTER

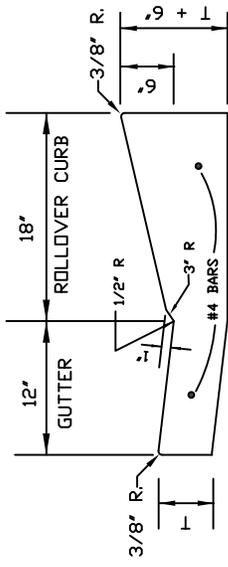


INTEGRAL CONCRETE CURB & GUTTER

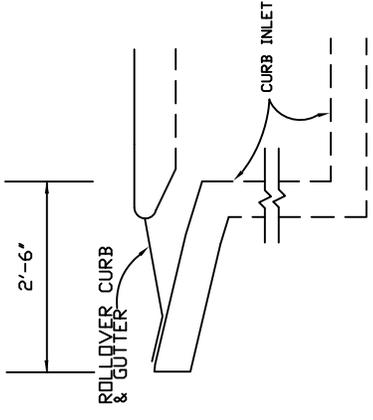
NOTES:

1. REINFORCEMENT SHALL BE NO. 4 BARS.
2. CONCRETE SHALL BE 5 1/2 SACK - 3600 PSI.

P-14	CURB AND GUTTER
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	

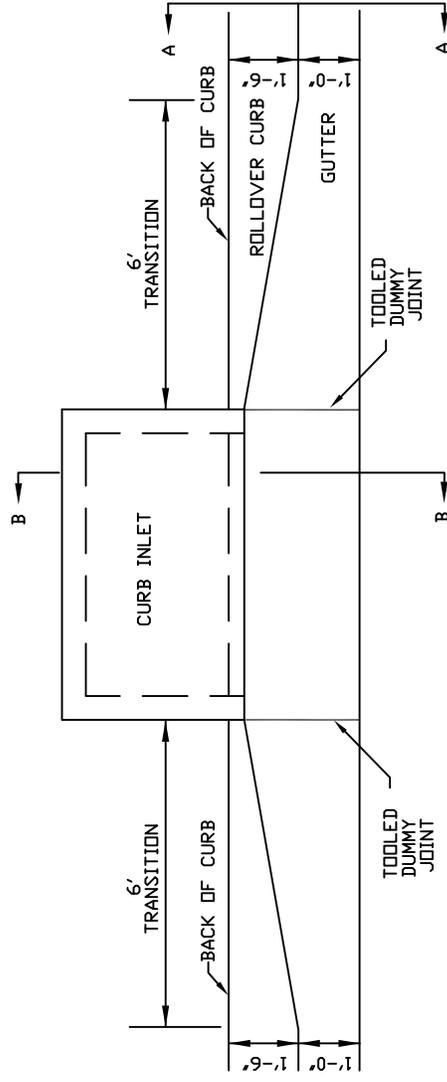


SECTION A-A



SECTION B-B

NOTE: SEE CURB INLET DETAILS

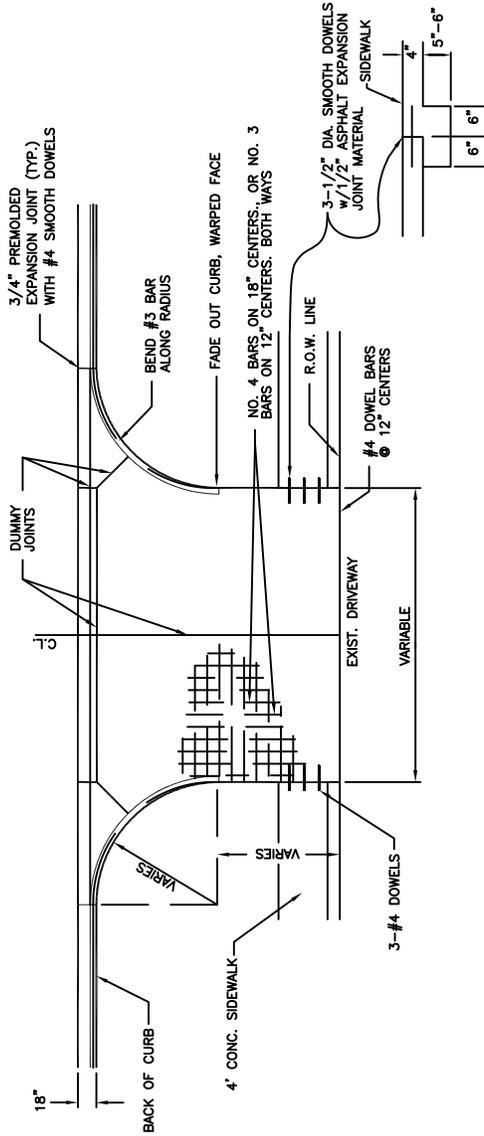


NOTE: IN THE TRANSITION AREA THE 18\"/>

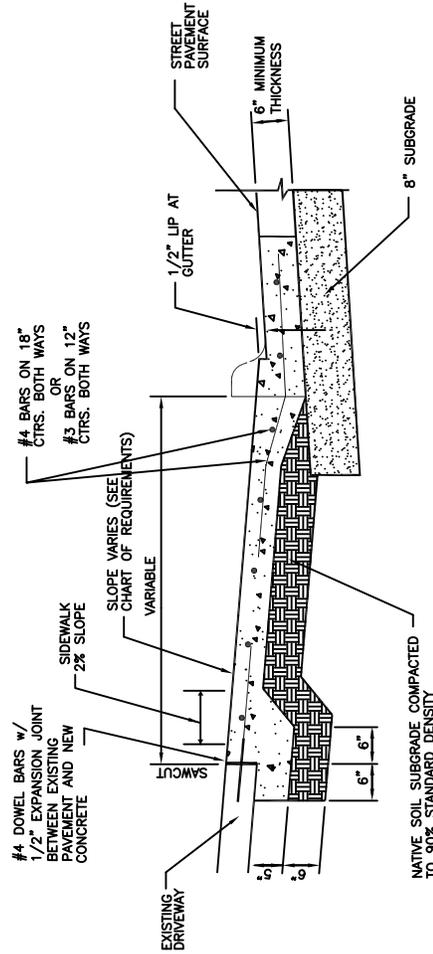
P-15	ROLLOVER CURB AND GUTTER
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	
REVISION	
REVISION	

NOTES:

- (1) FOR ANY APPROACH CONNECTING TO AN EXISTING STREET IT IS PREFERRED TO HORIZONTALLY SAW CUT THE CURB, THEN THE DRIVE MAY BE DOWELED INTO THE BACK OF THE GUTTER/SLAB. OTHERWISE, THE METHODS SHOWN IN THE ABOVE DETAILS SHALL BE USED.
- (2) THE SLOPE OF THE DRIVE WHERE (SIDEWALKS CROSS SHALL BE A BE A MAXIMUM 2% . SIDEWALK SHALL BE CONNECTED TO DRIVE WITH #4 BARS ON 18" CENTERS.
- (3) REMOVE ANY EXISTING SIDEWALK AT (NEAREST JOINT AND CONNECT REPLACED SECTION TO DRIVE WITH 3-#4 SMOOTH DOWELS WITH 1/2" PREMOLED EXPANSION MATERIAL.
- (4) ALL CONNECTIONS TO STATE RIGHT-OF-WAY SHALL USE TXDOT DETAILS.



TYPICAL SIDEWALK CONNECTION TO A DRIVE APPROACH

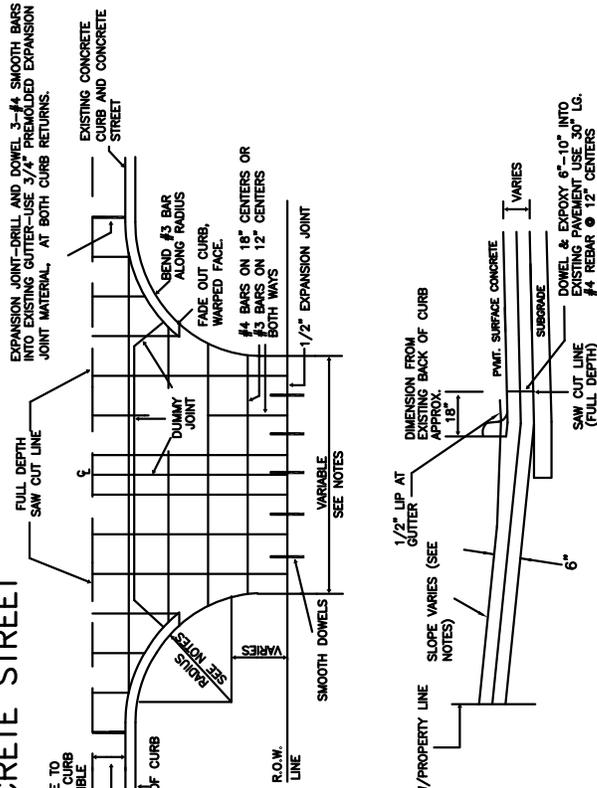


REQUIREMENTS	STREET CLASS	RESIDENTIAL DRIVEWAY	COMMERCIAL DRIVEWAY
DRIVEWAY THROAT WIDTH	LOCAL	10' - 28'	24' - 36'
	MINOR COLL.	10' - 28'	24' - 36'
	MAJOR COLL.	12' - 28'	24' - 36'
DRIVEWAY CURB RADIUS	ARTERIAL	12' - 28'	30' - 36'
	LOCAL	2.5' - 10'	10' - 20'
	MINOR COLL.	2.5' - 10'	15' - 20'
MAXIMUM APPROACH GRADE	MAJOR COLL.	10' - 20'	15' - 30'
	ARTERIAL	15' - 30'	20' - 30'
	LOCAL AND MINOR COLL.	9%	6%
MINIMUM APPROACH LENGTH	ALL OTHERS	6%	3%
	LOCAL AND MINOR COLL.	6'	9'
	ALL OTHERS	9'	20'

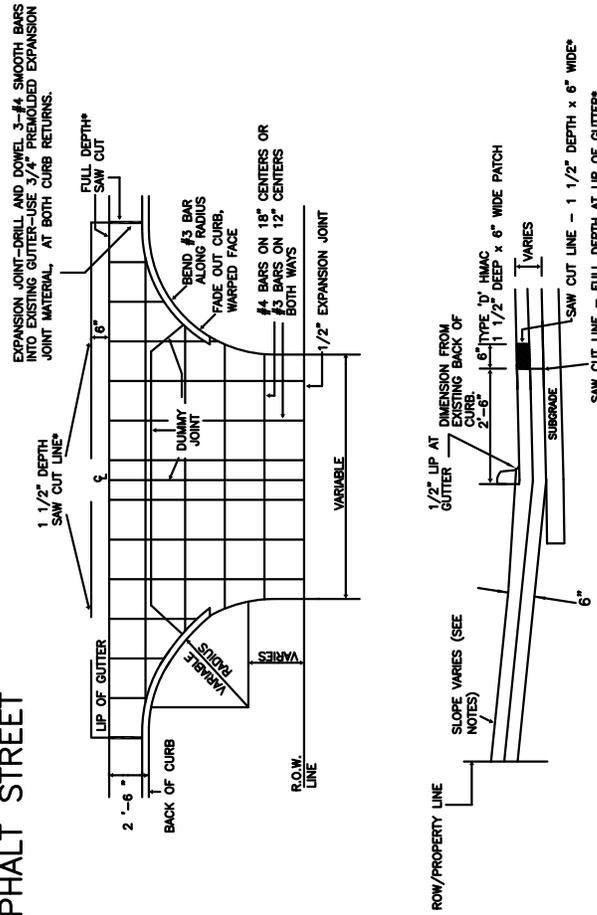
SEE DESIGN STANDARDS MANUAL FOR INDUSTRIAL DRIVEWAY REQUIREMENTS.

P-16	DRIVE APPROACH CONNECTION CONSTRUCTED WITH STREET
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	

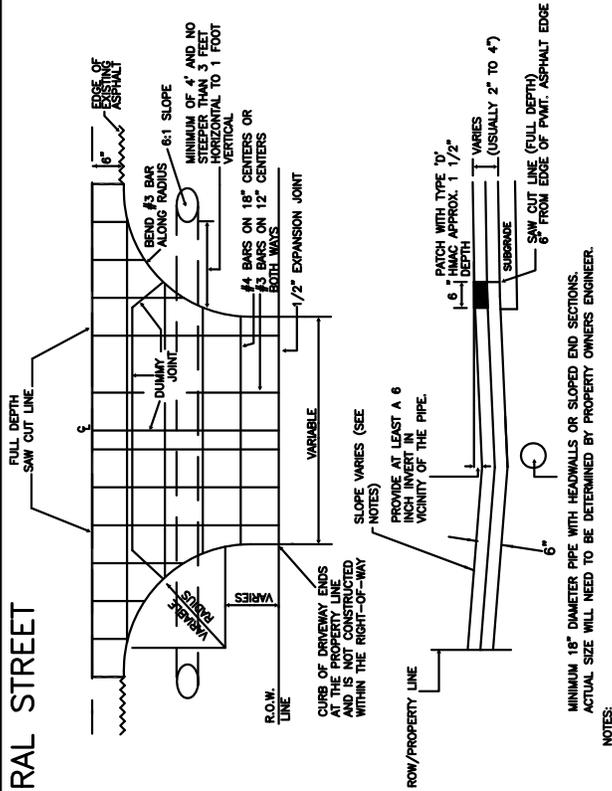
CONCRETE STREET



ASPHALT STREET



RURAL STREET



IN SOME CASES A SWALE MAY BE PROVIDED IN LIEU OF THE PIPE. THE PROPERTY OWNER AND OWNER'S ENGINEER WILL NEED TO DETERMINE IF A SWALE CAN BE USED IN LIEU OF A PIPE.

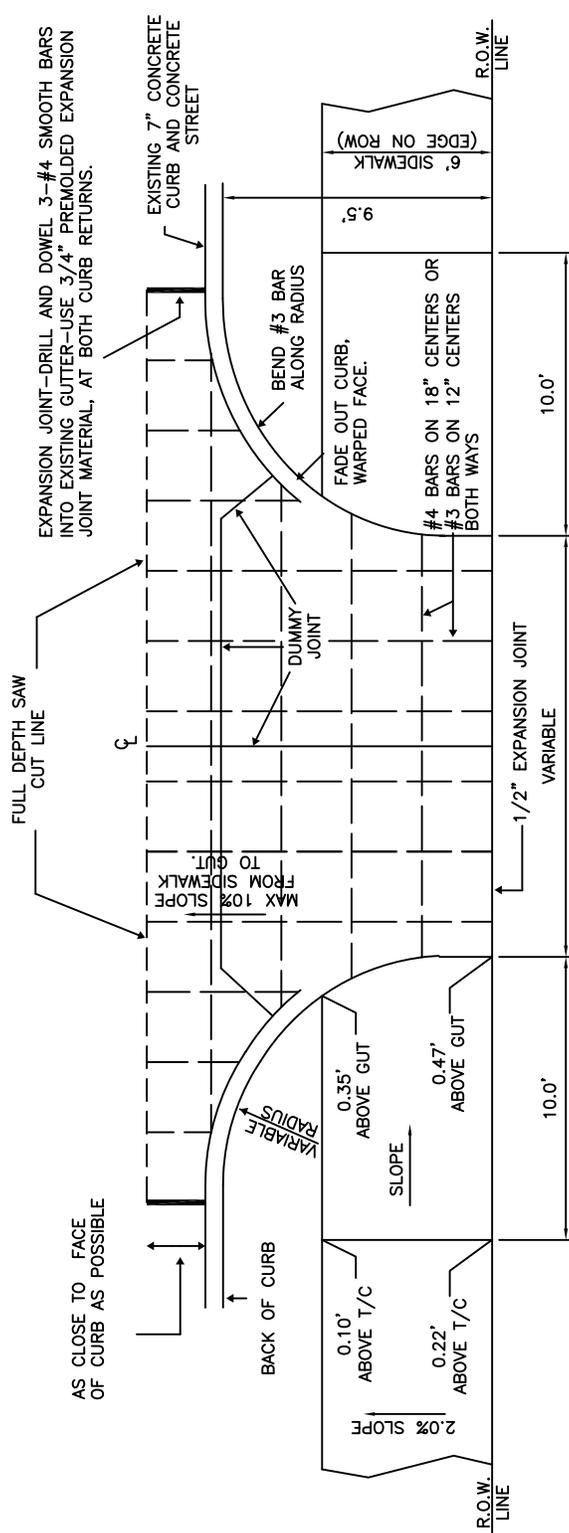
NOTES:

- (1) FOR ANY APPROACH CONNECTING TO AN EXISTING STREET IT IS PREFERRED TO HORIZONTALLY SAW CUT THE CURB. THEN THE DRIVE SHALL BE DOWELED INTO THE BACK OF THE GUTTER/SLAB. OTHERWISE, THE METHODS SHOWN IN THE ABOVE DETAILS SHALL BE USED.
- (2) THE SLOPE OF THE DRIVE WHERE (SIDEWALKS CROSS SHALL BE A BE A MAXIMUM 2% . SIDEWALK SHALL BE CONNECTED TO DRIVE WITH #4 BARS ON 18" CENTERS.
- (3) REMOVE ANY EXISTING SIDEWALK AT (NEAREST JOINT AND CONNECT REPLACED SECTION TO DRIVE WITH 3-#4 SMOOTH DOWELS WITH 1/2" PREMOULDED EXPANSION MATERIAL.
- (4) ALL CONNECTIONS TO STATE RIGHT-OF-WAY SHALL USE TxDOT DETAILS.
- (5) CONCRETE SHALL BE POURED WITHIN 72 HOURS OF CURB CUT.

REQUIREMENTS	STREET CLASS	RESIDENTIAL DRIVEWAY	COMMERCIAL DRIVEWAY
DRIVEWAY THROAT WIDTH	LOCAL	10' - 28'	24' - 36'
	MINOR COLL.	10' - 28'	24' - 36'
	MAJOR COLL.	12' - 28'	24' - 36'
	ARTERIAL	12' - 28'	30' - 36'
DRIVEWAY CURB RADIUS	LOCAL	2.5' - 10'	10' - 20'
	MINOR COLL.	2.5' - 10'	15' - 20'
	MAJOR COLL.	10' - 20'	15' - 30'
	ARTERIAL	15' - 30'	20' - 30'
MAXIMUM APPROACH GRADE	LOCAL AND MINOR COLL.	9%	6%
	ALL OTHERS	6%	3%
MINIMUM APPROACH LENGTH	LOCAL AND MINOR COLL.	6'	9'
	ALL OTHERS	9'	20'

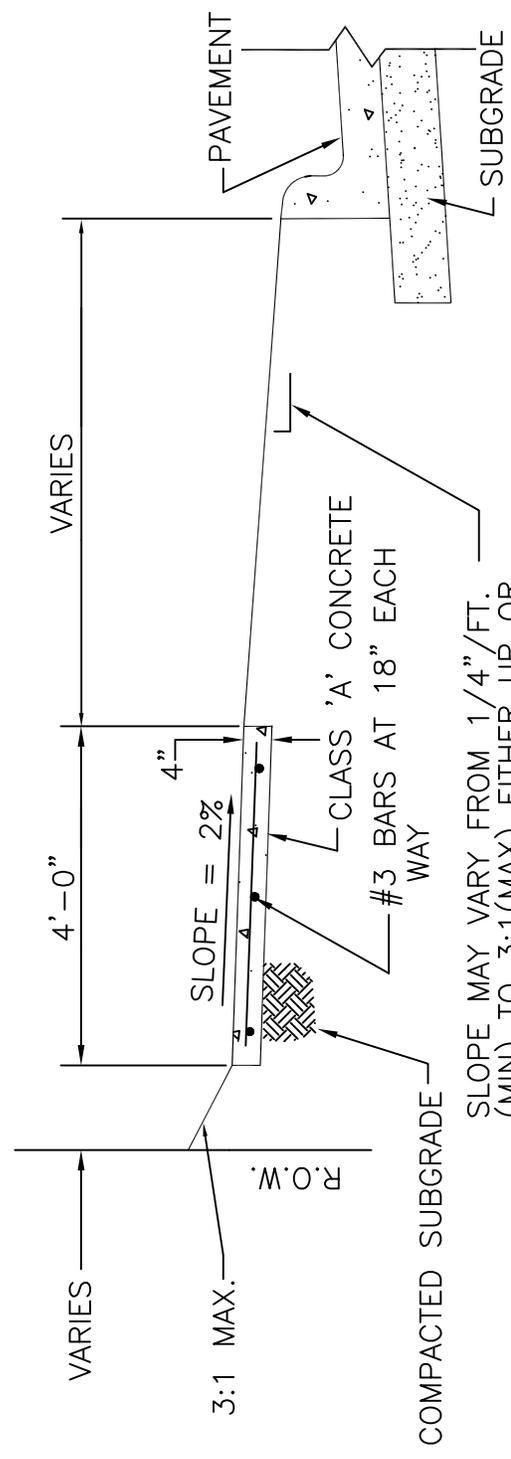
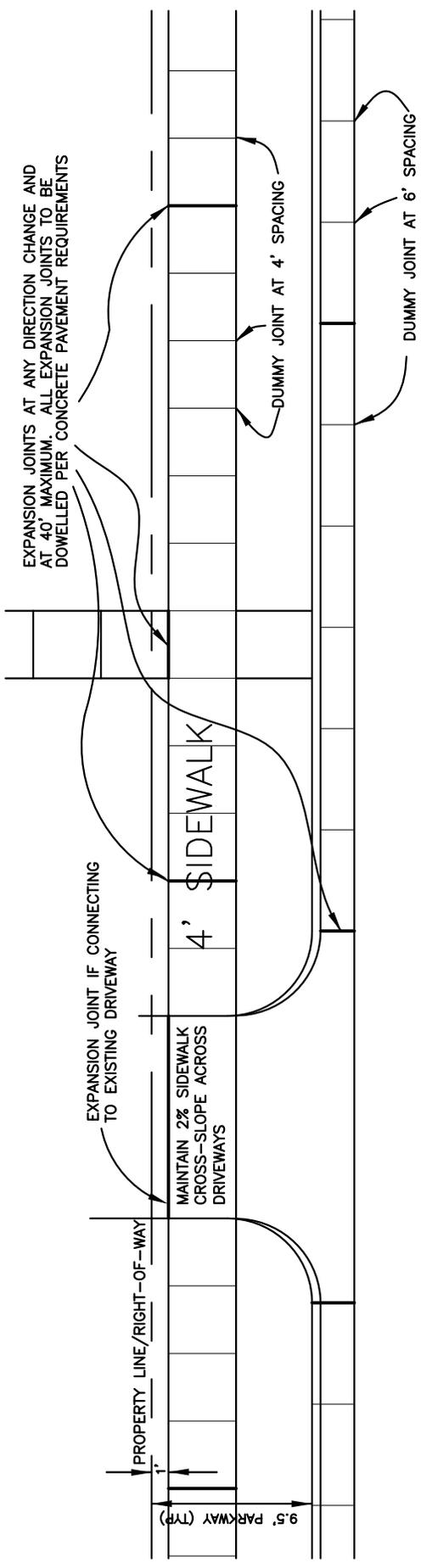
SEE DESIGN STANDARDS MANUAL FOR INDUSTRIAL DRIVEWAY REQUIREMENTS.

P-17	DRIVE APPROACH CONNECTION EXISTING STREET
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	



P-18	DRIVE APPROACH WITH 6' SIDEWALK AT RIGHT-OF-WAY
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	
REVISION	
REVISION	

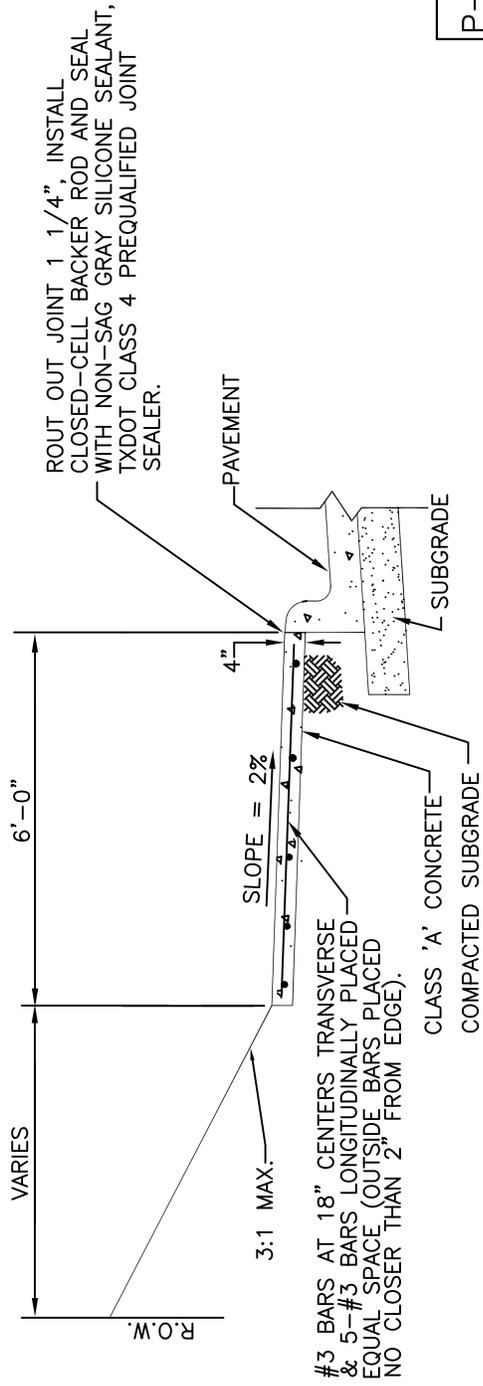
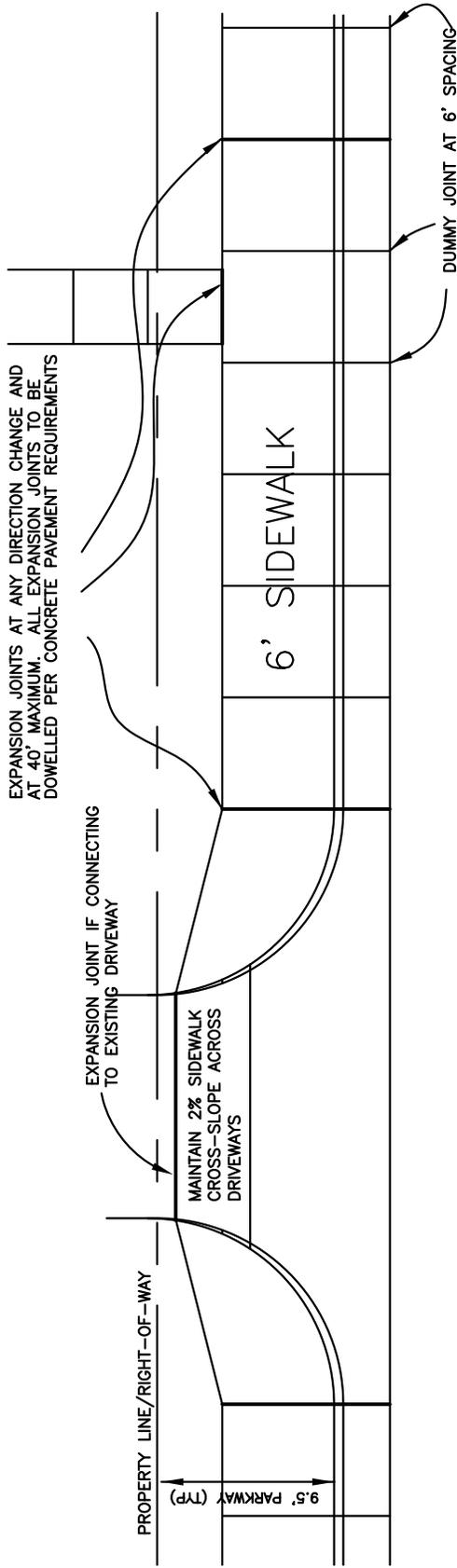
SWC



SLOPE MAY VARY FROM 1/4"/FT. (MIN) TO 3:1 (MAX) EITHER UP OR DOWN FROM THE TOP OF CURB (TYP).

NOTE: EXPANSION JOINT EVERY 40', DUMMY JOINT EVERY 4'. SEE TRANSVERSE EXPANSION JOINT DETAIL (EXCEPT USE #4 SMOOTH DOWELS).

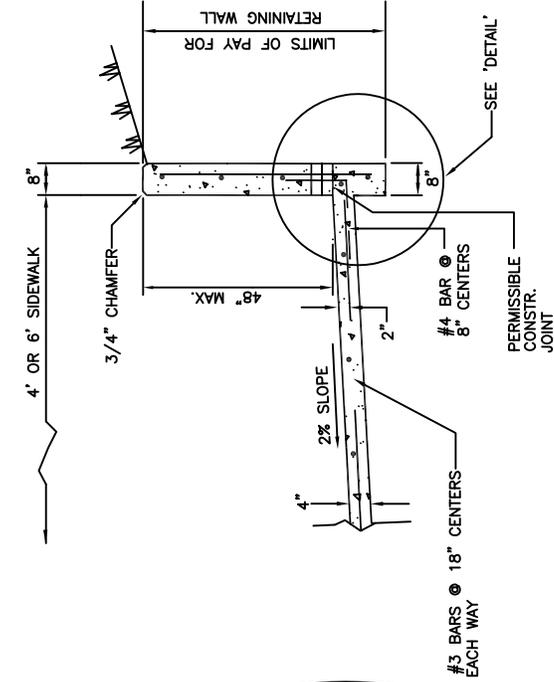
P-19	4' SIDEWALK
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	



NOTE: EXPANSION JOINT EVERY 42', DUMMY JOINT EVERY 6'. SEE TRANSVERSE EXPANSION JOINT DETAIL (EXCEPT USE #4 SMOOTH DOWELS).

P-20 6' SIDEWALK

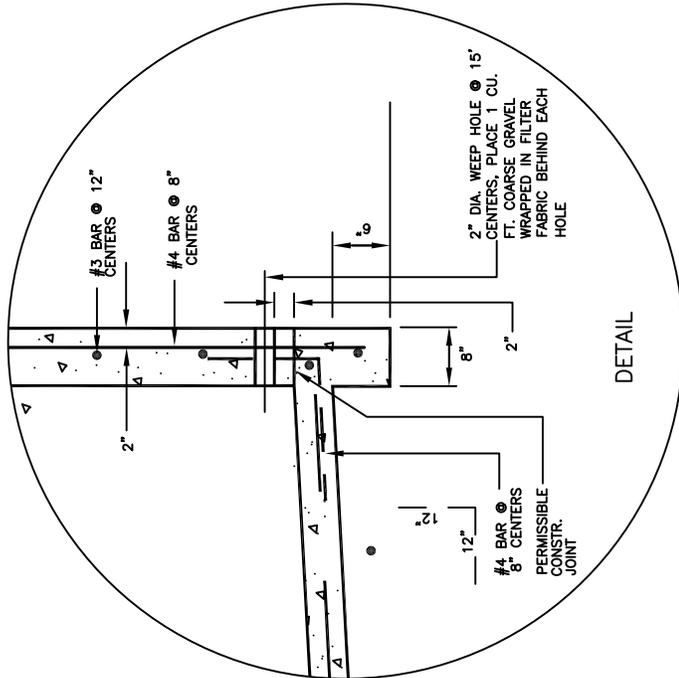
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	



NOTES:

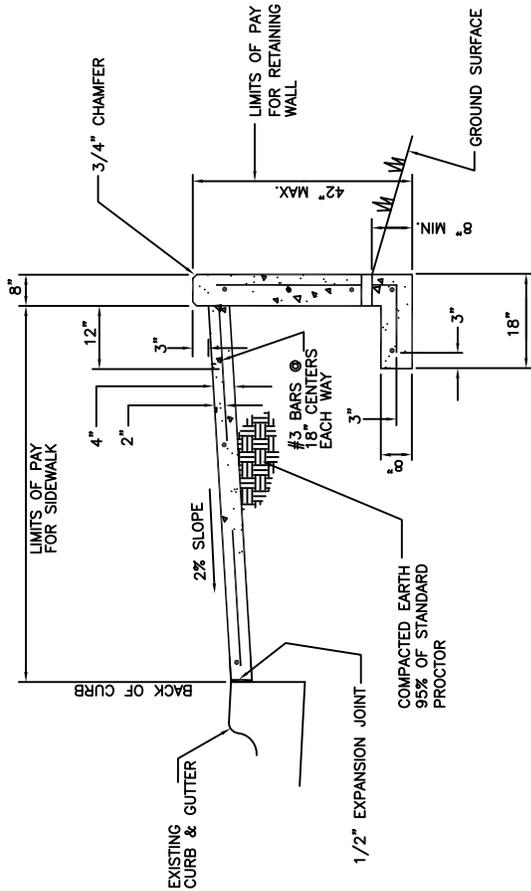
1. IN LOCATIONS WHERE WALL HEIGHT DOES NOT EXCEED 1', THE TOE WALL AND WEEP HOLES CAN BE OMITTED.
2. IN LOCATIONS WHERE WALL IS 36" TO 48" THE TOE WALL SHALL BE 1" DEPTH.
3. STEEL REINFORCING IN WALL SHALL BE #3 BARS @ 12" CENTERS HORIZONTALLY AND #4 BARS @ 8" CENTERS VERTICALLY.
4. REDWOOD JOINTS IN WALL SHALL MATCH REDWOOD JOINTS IN THE SIDEWALK. THE WALL SHALL BE DOUBLE CHAMFERED AT THE REDWOOD LOCATIONS.
5. ENDS OF WALL SHALL ALSO BE CHAMFERED.
6. CONCRETE TO HAVE COMPRESSIVE STRENGTH OF 3000 psi at 28 DAYS.
7. PRE-MOLDED MATERIAL WITH REMOVABLE CAP STRIP, SEAL WITH NON-SAG GRAY SILICONE SEALANT, TXDOT CLASS 4 PREQUALIFIED JOINT SEALER.

6' SIDEWALK WITH WALL



NOTES:

1. STEEL REINFORCING IN WALL SHALL BE #3 BARS @ 12" CENTERS HORIZONTALLY AND #4 BARS @ 8" CENTERS VERTICALLY.
2. REDWOOD JOINTS IN WALL SHALL MATCH REDWOOD JOINTS IN THE SIDEWALK. THE WALL SHALL BE DOUBLE CHAMFERED AT THE REDWOOD LOCATIONS.
3. ENDS OF WALL SHALL ALSO BE CHAMFERED.
4. AT 28 DAYS.



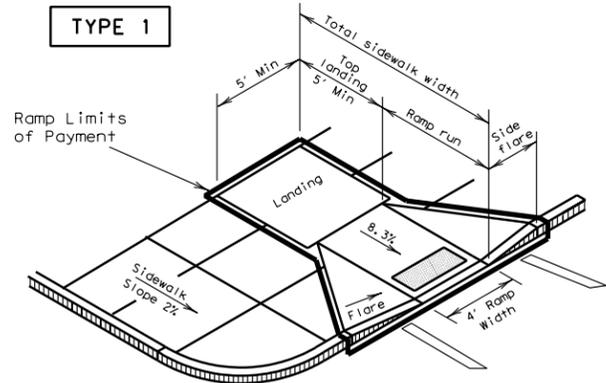
SIDEWALK WITH LOW WALL

P-21	SIDEWALK WITH WALL
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	
REVISION	
REVISION	

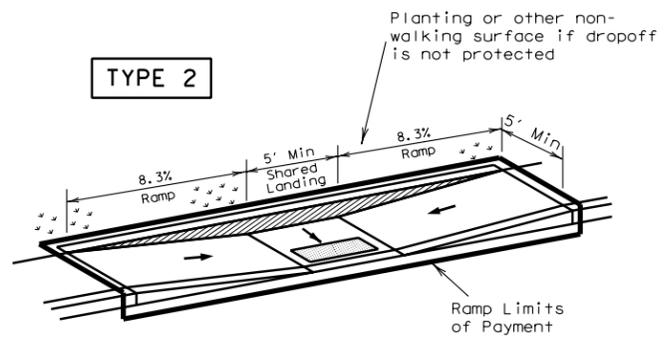
SWC

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

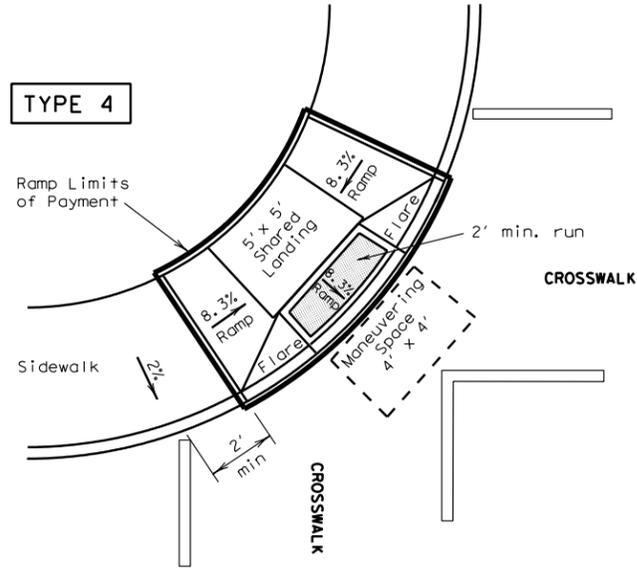
LEVELS DISPLAYED	
1	



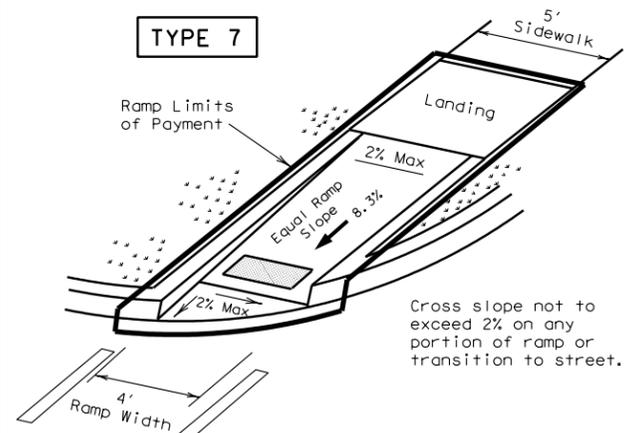
PERPENDICULAR CURB RAMP



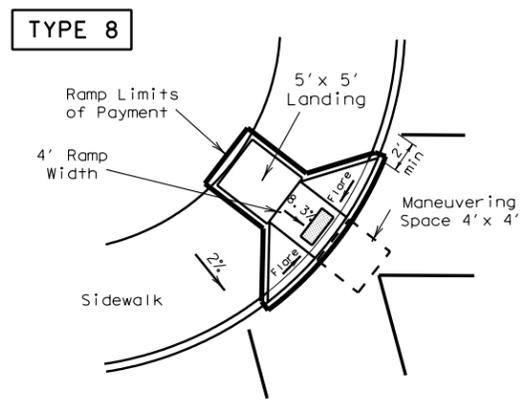
PARALLEL CURB RAMP
(Use only where water will not pond in the landing.)



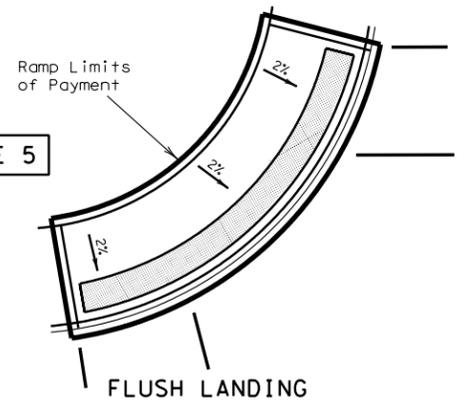
DIAGONAL COMBINATION CURB RAMP
Perpendicular to the Tangent of the Curb Radius and Contained in Crosswalk



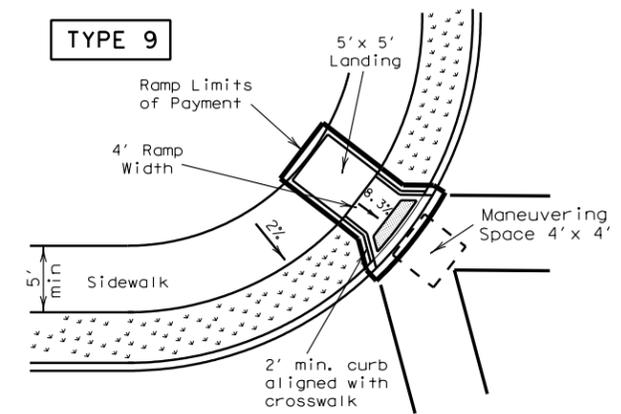
DIRECTIONAL RAMP WITHIN RADIUS
(Sidewalk set back from curb)



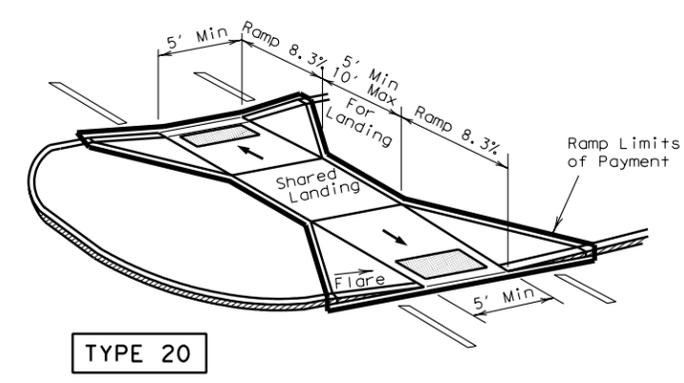
DIAGONAL CURB RAMP (FLARED SIDES)



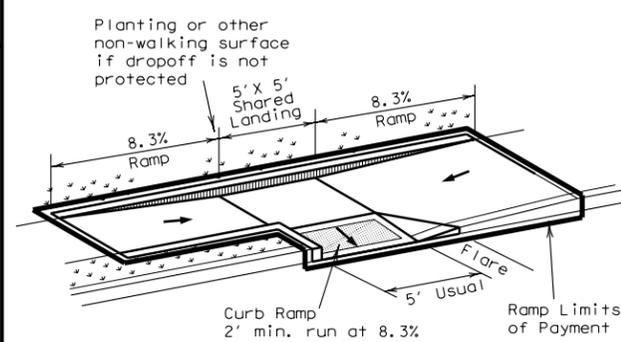
FLUSH LANDING



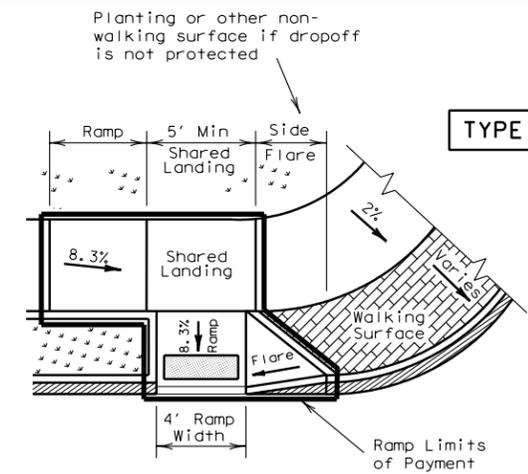
DIAGONAL CURB RAMP (RETURNED CURB)



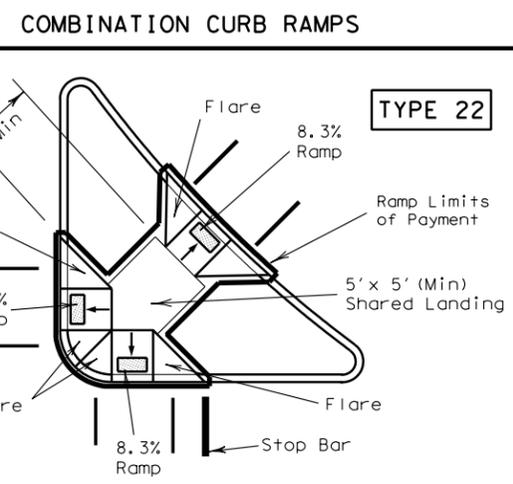
TYPE 20



TYPE 3

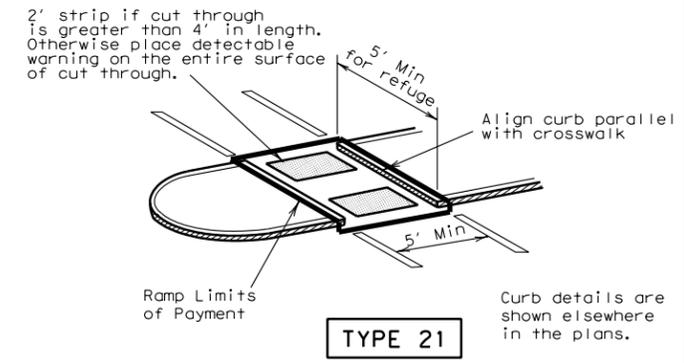


TYPE 6



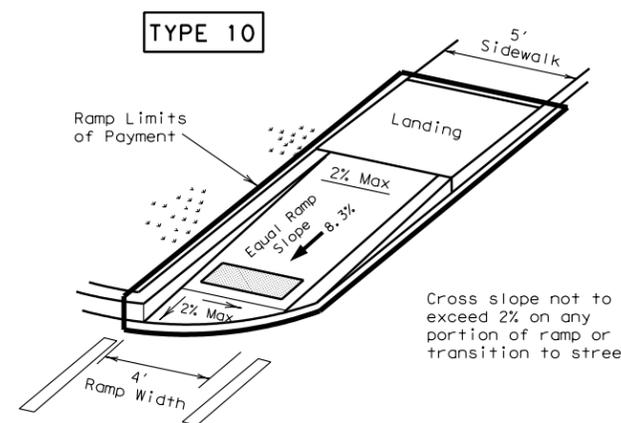
TYPE 22

COMBINATION ISLAND RAMPS

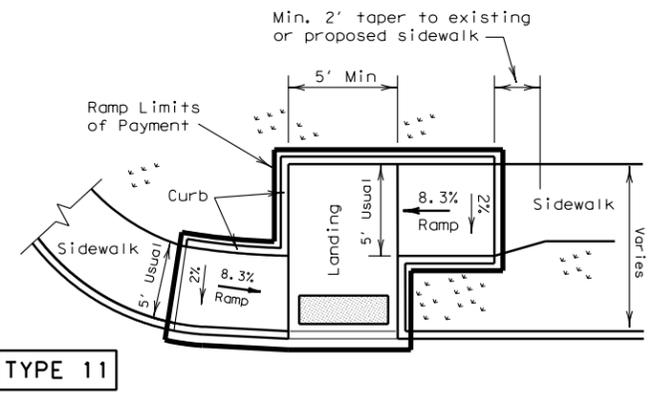


TYPE 21

CURB RAMPS AT MEDIAN ISLANDS



DIRECTIONAL RAMP WITHIN RADIUS
(Sidewalk adjacent to curb)



TYPE 11

OFFSET PARALLEL CURB RAMP

NOTES:
See General Notes on sheet 2 of 4 for more information.
Denotes planting or non-walking surface.

Texas Department of Transportation
Design Division (Roadway)

**PEDESTRIAN FACILITIES
CURB RAMPS**

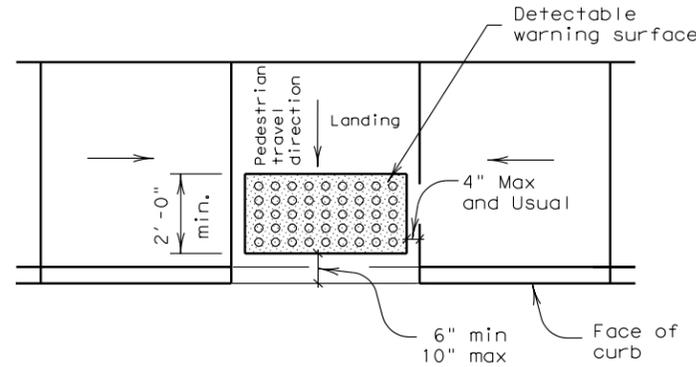
PED-05 SHEET 1 OF 4

FILE: ped05.dgn	DN: EH	CK:	DW: BGD	CK:
© TxDOT March 2002	DIST	FEDERAL AID PROJECT		SHEET
REVISIONS	COUNTY	CONTROL	SECT	JOB
				HIGHWAY

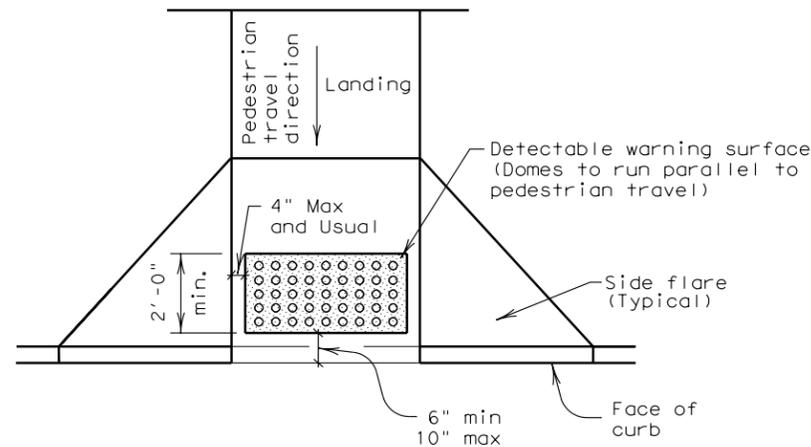
DETECTABLE WARNINGS

General Notes for Detectable Warnings

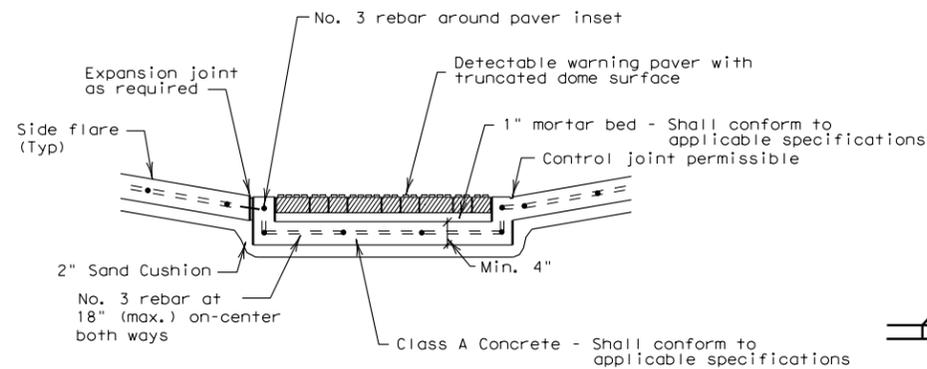
1. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with Section 4.29 of the Texas Accessibility Standards (TAS). The surface must contrast visually with adjoining surfaces, including side flares. Furnish dark brown or dark red detectable warning surface adjacent to uncolored concrete, unless specified elsewhere in the plans.
2. Detectable warning surfaces must be slip resistant and not allow water to accumulate.
3. Align truncated domes in the direction of pedestrian travel when entering the street.
4. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.
5. Detectable warning surfaces shall be a minimum of 24" in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
6. Detectable warning surfaces shall be located so that the edge nearest the curb line is a minimum of 6" and a maximum of 10" from the extension of the face of curb. Detectable warning surfaces may be curved along the corner radius.
7. TxDOT maintains a list of Qualified Detectable Warning Materials. Details are provided herein for the placement of landscape pavers. For other materials, refer to the manufacturer's product manual for proper installation.



Typical placement of detectable warning surface on landing at street edge.



Typical placement of detectable warning surface on sloping ramp run.

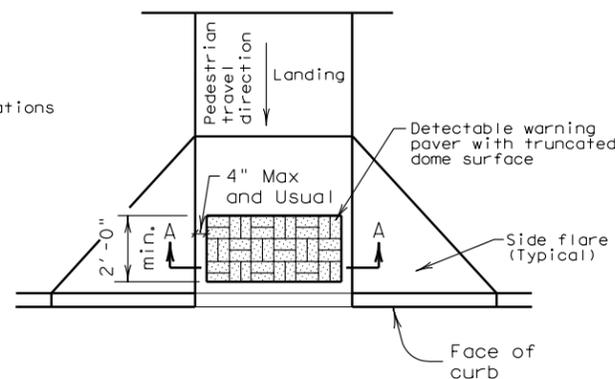


Section A-A

General Notes (Pavers)

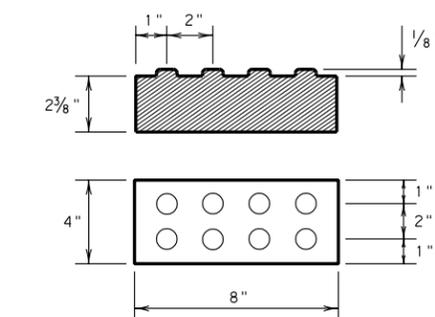
Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.

Lay full-size units first followed by closure units consisting of at least 25 percent of a full unit. Cut detectable warning paver units using a power saw.



Truncated Dome Pattern Curb Ramp

DETECTABLE WARNING PAVER (OPTION)



Detectable Warning Paver

Pedestrian Facilities General Notes

1. All slopes are maximum allowable. The least possible slope that will still drain properly should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
2. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is encouraged. Where a 5' sidewalk can not be provided due to site constraints, a minimum 3' sidewalk with 5' x 5' passing areas at intervals not to exceed 200' is required.
3. Landings shall be 5' x 5' minimum with a maximum 2% slope in any direction.
4. Maneuvering space at the bottom of curb ramps shall be a minimum of 4' x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
5. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
6. Curb ramps with returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planting or other non-walking surface or because the side approach is substantially obstructed. Otherwise, provide flared sides.
7. Additional information on curb ramp location, design, light reflective value and texture may be found in the current edition of the Texas Accessibility Standards (TAS) and 16 TAC §68.102.
8. To serve as a pedestrian refuge area, the median should be a minimum of 5' wide. Medians should be designed to provide accessible passage over or through them.
9. Small channelization islands, which do not provide a minimum 5' x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
10. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall be aligned with theoretical crosswalks, or as directed by the Engineer.
11. Existing features that comply with TAS may remain in place unless otherwise shown on the plans.
12. Handrails are not required on curb ramps. Provide curb ramps wherever an accessible route crosses (penetrates) a curb.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Separate curb ramp and landings from adjacent sidewalk and any other elements with pre-mold or board joint of 3/4" unless otherwise directed by the Engineer.
15. Provide a smooth transition where the curb ramps connect to the street.
16. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
17. Flare slope shall not exceed 10% measured along curb line.

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

LEVELS DISPLAYED	
1	

Texas Department of Transportation
Design Division (Roadway)

PEDESTRIAN FACILITIES

GENERAL NOTES AND DETECTABLE WARNINGS

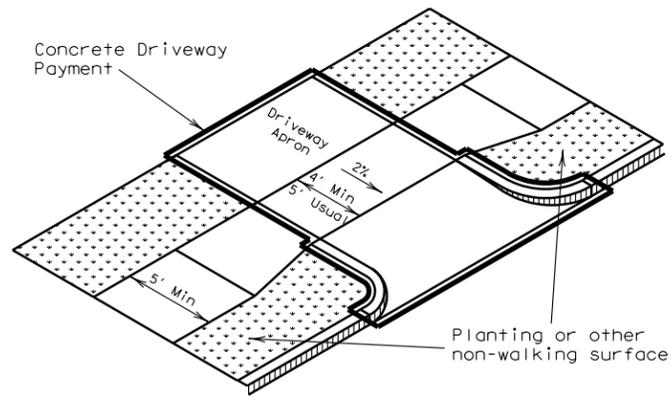
PED-05

SHEET 2 OF 4

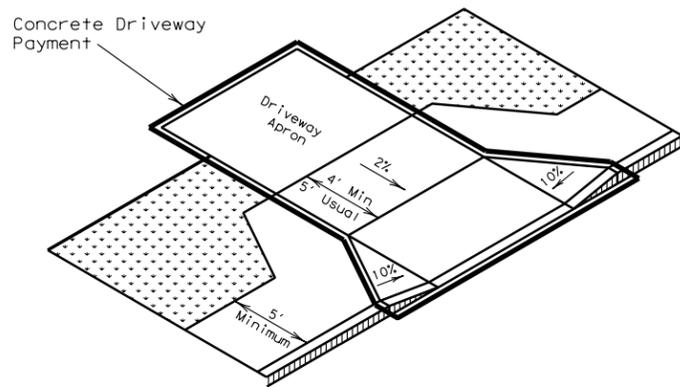
FILE: ped05.dgn	DN: EH	CK:	DW: BGD	CK:
© TxDOT March 2002		DIST: FEDERAL AID PROJECT		SHEET
REVISIONS				
COUNTY	CONTROL	SECT	JOB	HIGHWAY

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

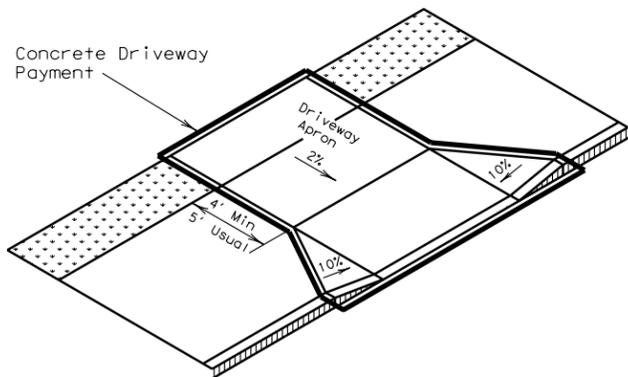
LEVELS DISPLAYED	
1	



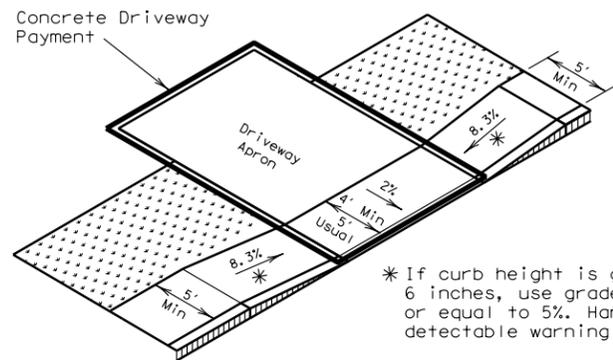
Setback sidewalk



Apron offset sidewalk



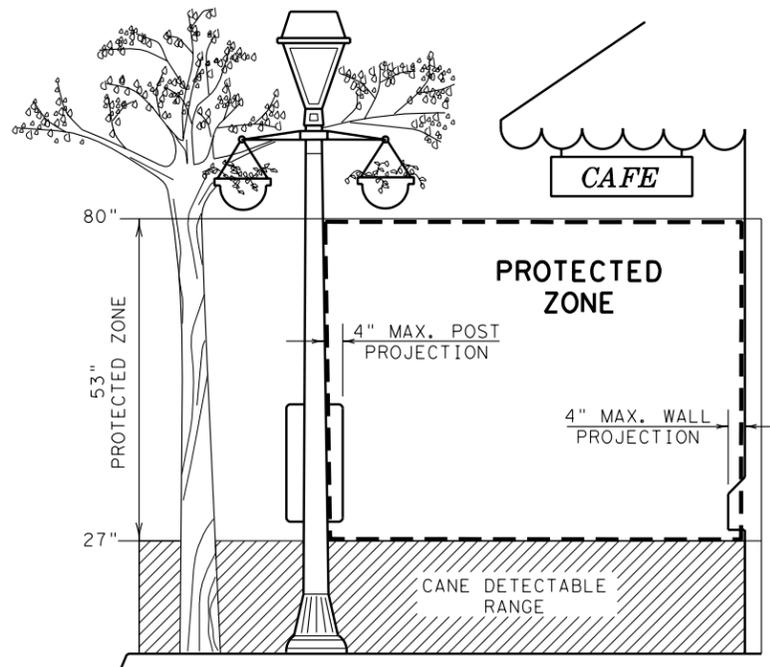
Wide sidewalk



Ramp sidewalk

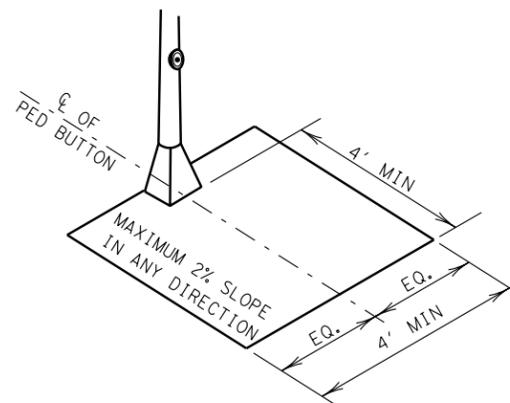
SIDEWALK TREATMENT AT DRIVEWAYS

* If curb height is greater than 6 inches, use grade less than or equal to 5%. Handrail and detectable warning not required.

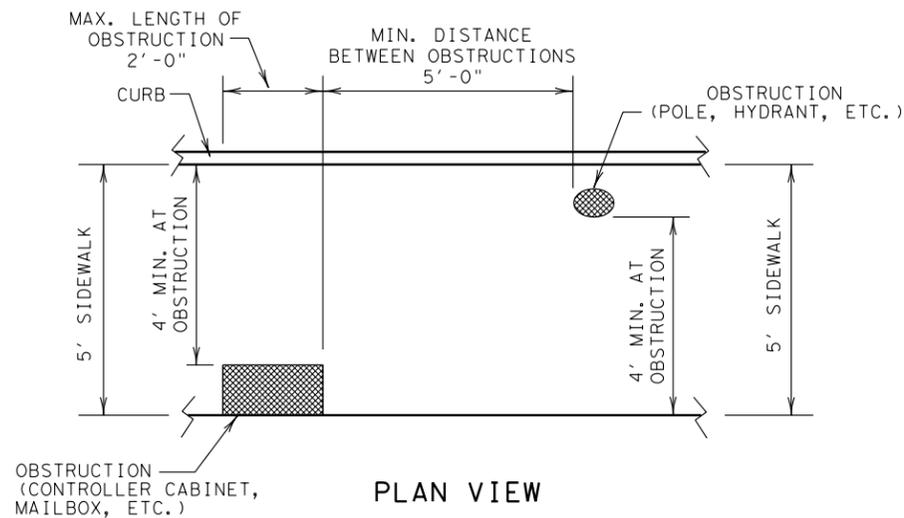


PROTECTED ZONE

In pedestrian circulation area, maximum 4" projection for post or wall mounted objects between 27" and 80" above the surface.



CLEAR GROUND SPACE CENTERED AT PEDESTRIAN PUSH BUTTON

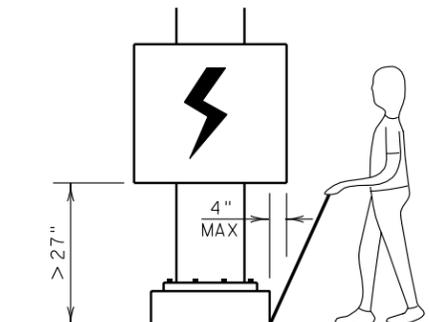


PLAN VIEW
PLACEMENT OF STREET FIXTURES

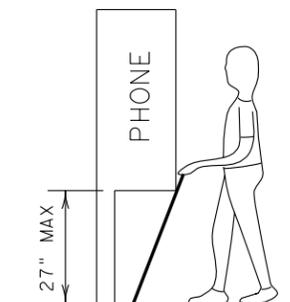
(ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' x 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.)

General Notes

1. All slopes are maximum allowable. The least possible slope that will still drain properly should be used.
2. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the accessible route or clear ground space.
3. Usual sidewalk cross slope equals 1.5%. The maximum allowable sidewalk cross slope equals 2%.
4. Street grades and cross slopes shall be as shown elsewhere in the plans.
5. Existing features that comply with TAS may remain in place unless otherwise shown on the plans.
6. Changes in level greater than 1/4 inch are not permitted.
7. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks, within the public right of way, may follow the grade of the parallel roadway. Where a continuous grade greater than 5% must be provided, handrails may be desirable on one or both sides of the sidewalk to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails must comply with TAS 4.8.5.
8. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
9. Driveways and turnouts shall be constructed and paid for in accordance with Item, "Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
10. Sidewalk details are shown elsewhere in the plans.



When an obstruction of a height greater than 27" from the surface would create a protrusion of more than 4" into the pedestrian circulation area, construct additional curb or foundation at the bottom to provide a maximum 4" overhang.



Protruding objects of a height $\leq 27"$ are detectable by cane and do not require additional treatment.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation
Design Division (Roadway)

PEDESTRIAN FACILITIES
SIDEWALKS

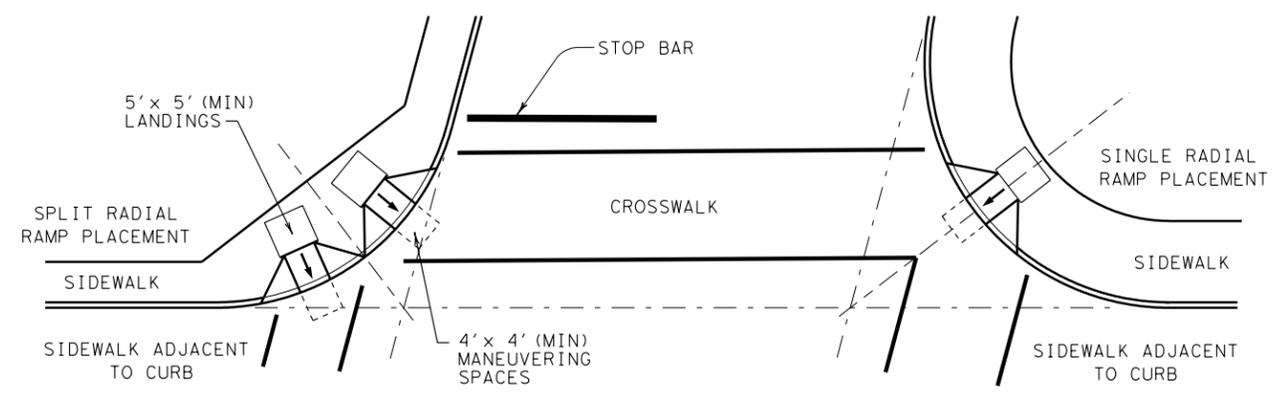
PED-05

SHEET 3 OF 4

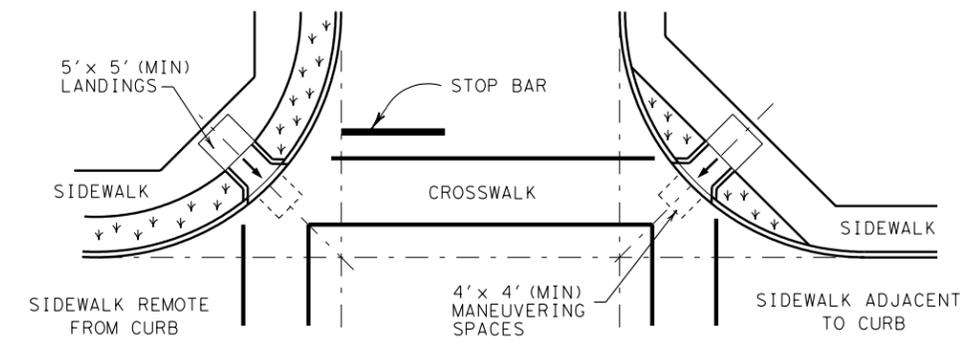
FILE: ped05.dgn	DN: EH	CK:	DW: BGD	CK:
© TxDOT March 2002	DIST	FEDERAL AID PROJECT		SHEET
REVISIONS				
	COUNTY	CONTROL	SECT	JOB
				HIGHWAY

General Notes

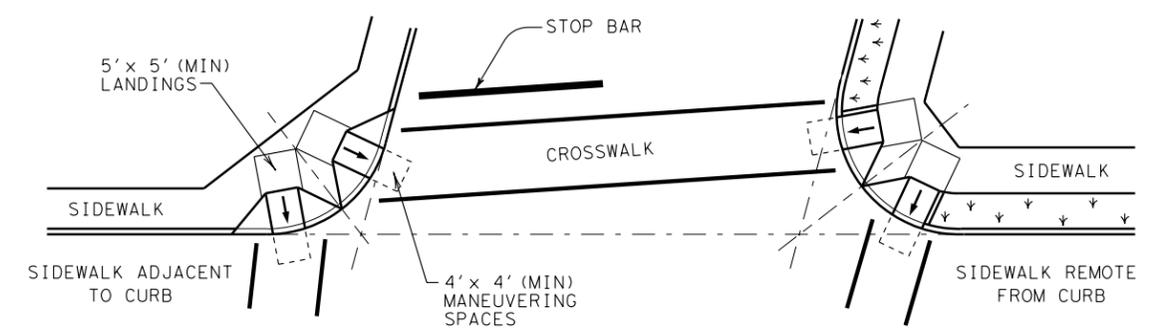
1. Street grades and cross slopes shall be as shown elsewhere in the plans.
2. Ramps are shown here without detectable warnings for simplicity. Detectable warnings are required at the locations shown on the PED Standard (Sheets 1 and 2 of 4) and in accordance with the details shown below.
3. Small channelization islands, which can not provide a minimum 5' x 5' landing at the top of ramps, shall be cut through level with the surface of the street.



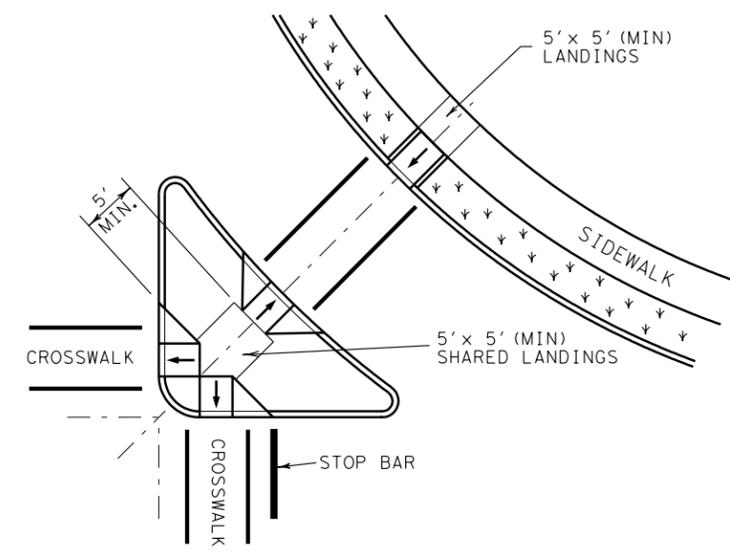
SKewed INTERSECTION WITH "LARGE" RADIUS



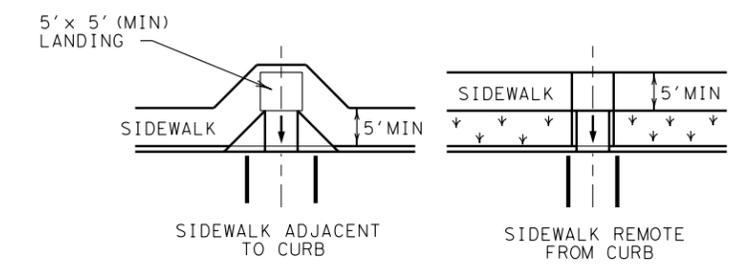
NORMAL INTERSECTION WITH "LARGE" RADIUS



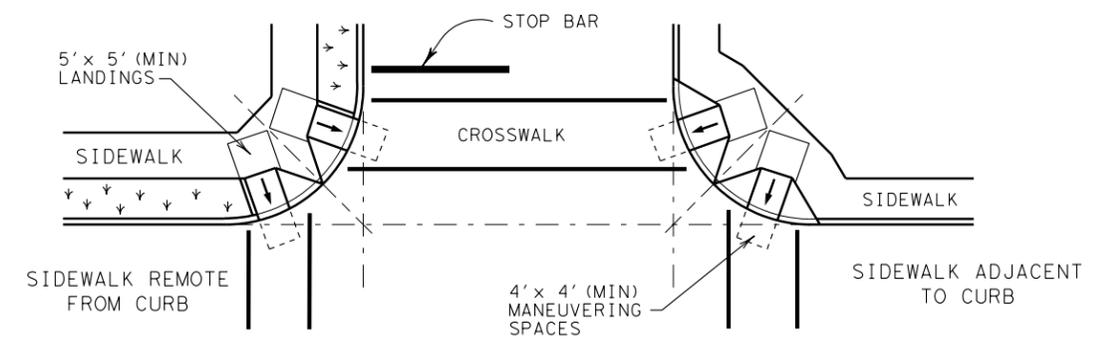
SKewed INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION W/FREE RIGHT TURN & ISLAND



MID-BLOCK PLACEMENT PERPENDICULAR RAMPS



NORMAL INTERSECTION WITH "SMALL" RADIUS

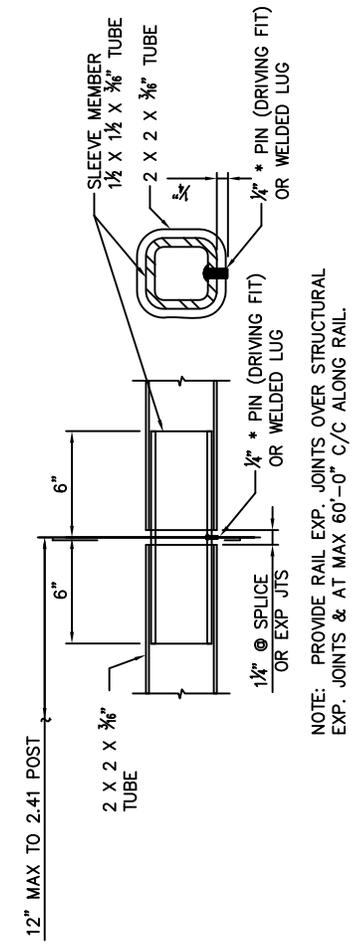
TYPICAL CROSSING LAYOUTS
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

LEVELS DISPLAYED	
1	

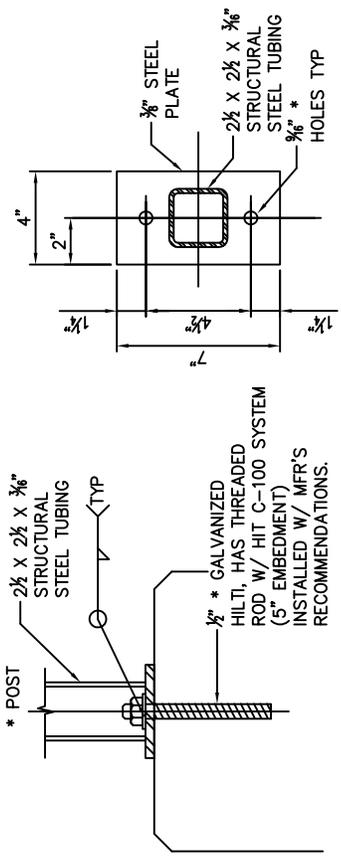

PEDESTRIAN FACILITIES
 INTERSECTION LAYOUTS
PED-05
 SHEET 4 OF 4

FILE: ped05.dgn	DN: EH	CK:	DW: BGD	CK:
© TxDOT March 2002	DIST	FEDERAL AID PROJECT		SHEET
REVISIONS				
	COUNTY	CONTROL	SECT	JOB HIGHWAY

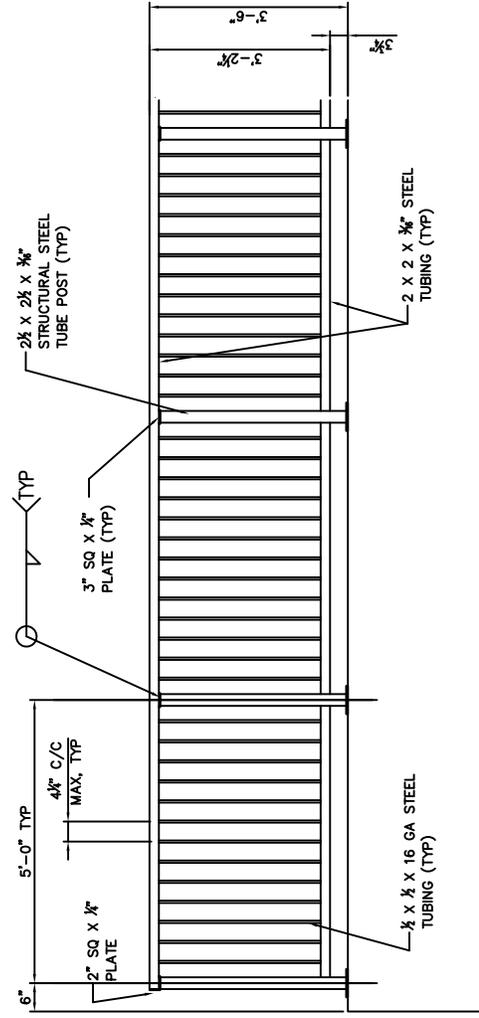


NOTE: PROVIDE RAIL EXP. JOINTS OVER STRUCTURAL EXP. JOINTS & AT MAX 60"-0" C/C ALONG RAIL.

HANDRAIL SPLICE DETAIL



HANDRAIL BASE PLATE DETAILS

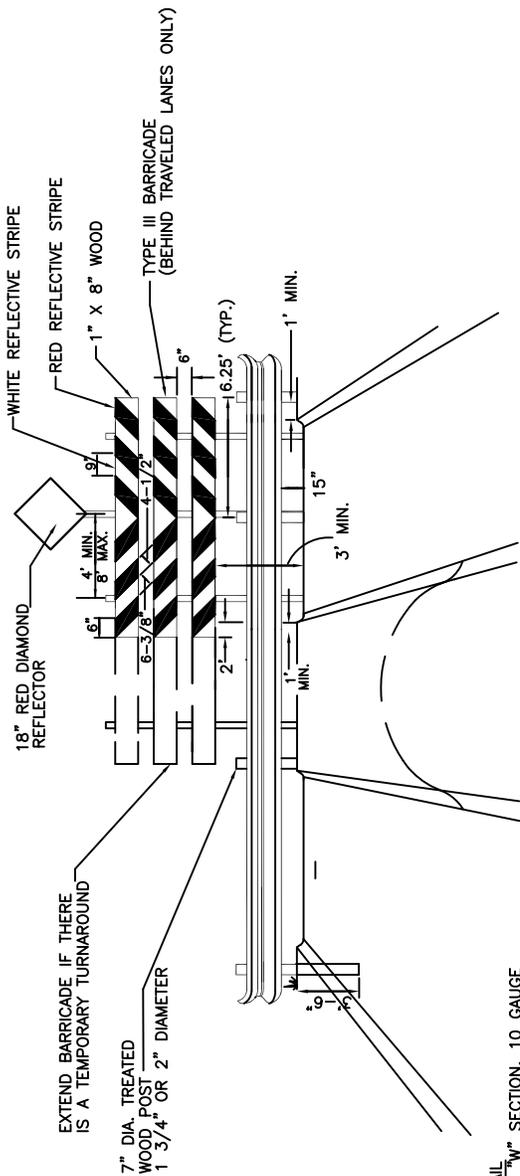


ELEVATION - HAND RAIL

NOTES:

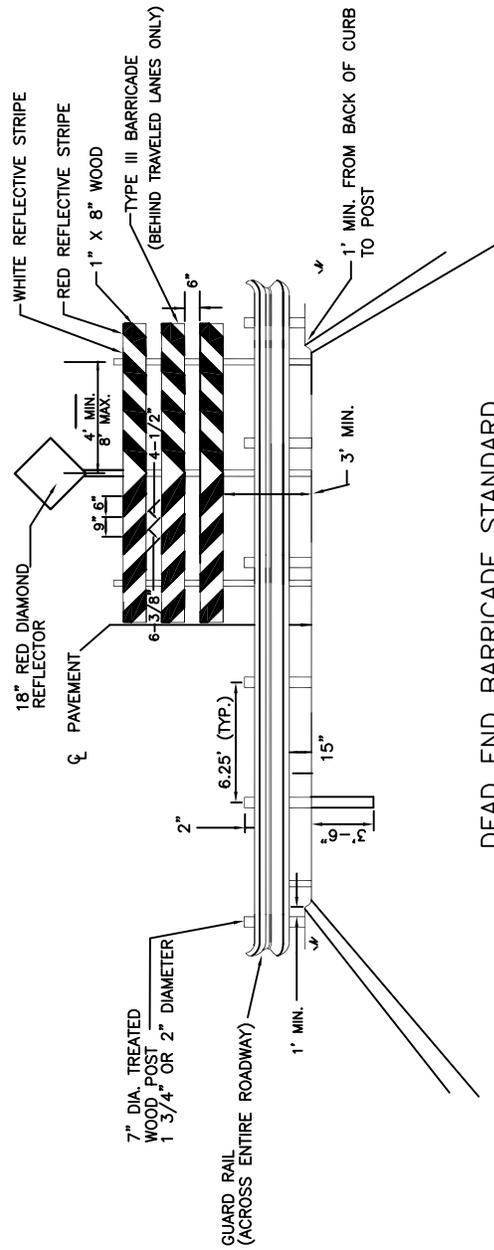
1. ALL STEEL COMPONENTS SHALL BE COATED IN TAN OR BLACK COLOR.
2. EXPOSED EDGES OF HANDRAIL AND HANDRAIL POSTS SHALL BE ROUNDED OR CHAMFERED TO APPROXIMATELY 1/16" BY GRINDING.
3. HANDRAIL POSTS SHALL BE PERPENDICULAR TO TOP OF CONCRETE. GROUT MAY BE USED UNDER BASE PLATES IF NECESSARY.

P-23	PIPE HANDRAIL
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	



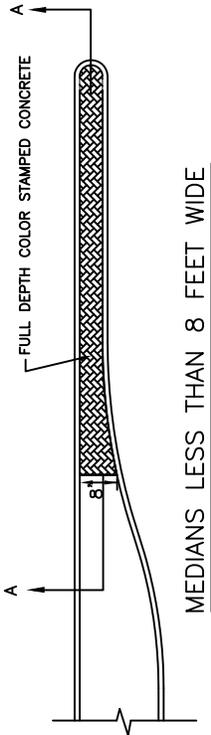
NOTES:
 GUARD RAIL
 STEEL "W" SECTION, 10 GAUGE
 CONNECTIONS
 5/8" DIA. BOLTS, APPROX. 9" LONG

DEAD END BARRICADE STANDARD
 DIVIDED ROADWAY

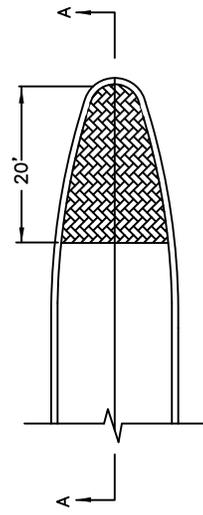


DEAD END BARRICADE STANDARD
 UNDIVIDED ROADWAY

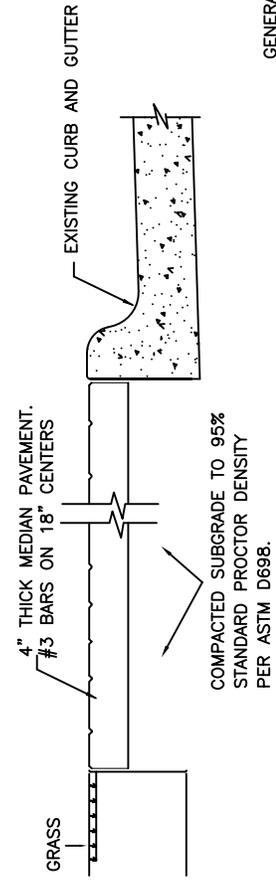
P-24	DEADEND BARRICADE
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	SWC
REVISION	
REVISION	



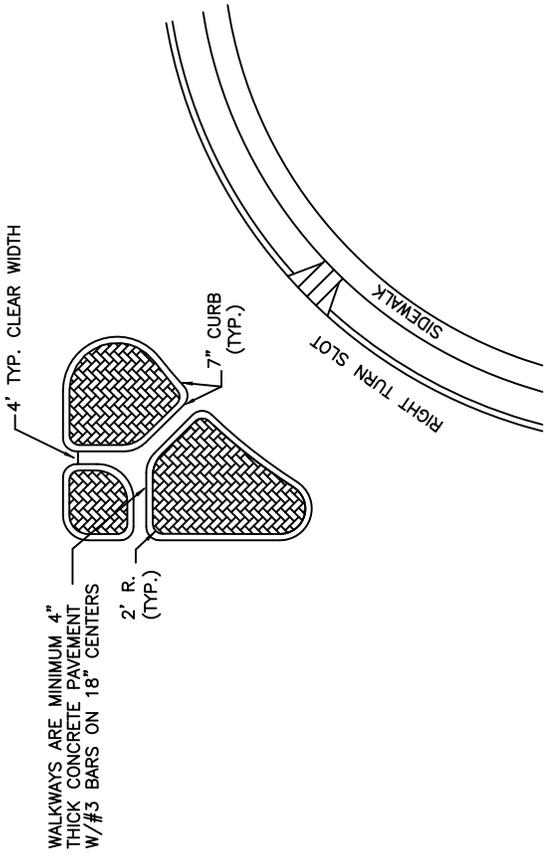
MEDIANS LESS THAN 8 FEET WIDE



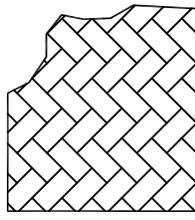
MEDIAN GREATER THAN 8 FEET WIDE



SECTION A-A



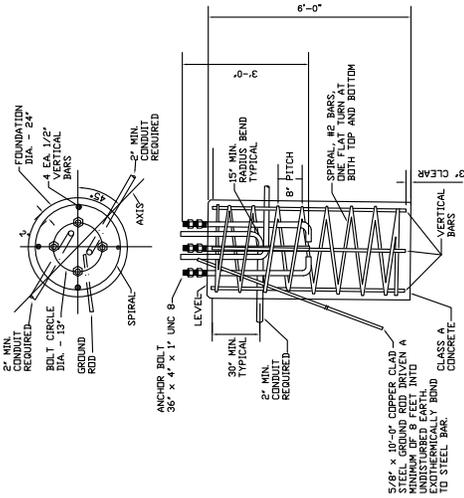
TYPICAL ISLAND AT INTERSECTION



CONCRETE PAVER PATTERN
HERRINGBONE BRICK (NEW BRICK FINISH)
OR APPROVED EQUAL

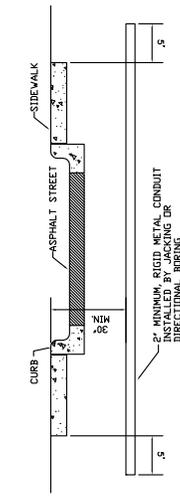
- GENERAL NOTES:
1. CONCRETE SHALL CONFORM TO THE CITY OF BURLESON STANDARD SPECIFICATIONS.
 2. MEDIAN PAVING SHALL BE FULL DEPTH COLOR STAMPED CONCRETE. COLOR SHALL BE RED CLAY (4D) OR APPROVED EQUAL.
 3. MEDIAN PAVING SHALL BE 4" THICK CONCRETE, REINFORCED WITH #3 BARS ON 18" CENTERS ON A COMPACTED SUBGRADE.
 4. 1/2" PREMOULDED ASPHALTIC FIBER EXPANSION JOINT MATERIAL ANY PLACE WHERE CONCRETE ABUTS CONCRETE.

P-26	MEDIAN/ISLAND PAVING
CITY OF BURLESON	
ORIGINAL	10/6/06
REVISION	
REVISION	
REVISION	

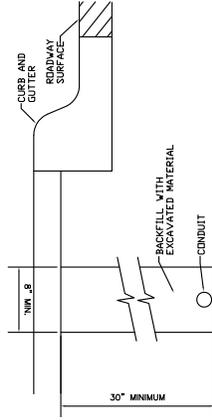


1 Davit Pole Base Detail
N.T.S.

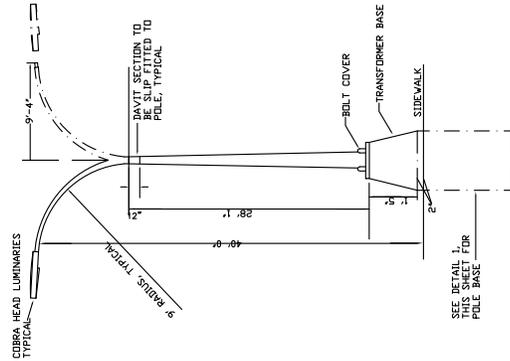
- DAVIT POLE BASE NOTES:**
1. ELEVATION OF TOP SHALL BE THE SAME AS THE ELEVATION OF THE CURB OR SIDEWALK OR THE SAME AS THE ELEVATION OF THE CROWN OF THE ROADWAY UNDER THE DAVIT ARM, WHICHEVER IS HIGHER. THE CONTRACTOR SHALL FIELD VERIFY THE ELEVATIONS.
 2. EACH FOUNDATION SHALL HAVE AT LEAST 3" O.D. P.C. STUBBED UP INTO THE BASE AND ORIENTED AS REQUIRED TO SERVE THE ENTERING CABLES.
 3. FOUNDATION SHALL MEET ALL CITY AND STATE REQUIREMENTS AND BOLT HOLE PATTERN WITH THE CITY REQUIREMENTS.
 4. UNLESS OTHERWISE NOTED, THE DESIGN OF THE POLES, DAVIT ARMS AND LUMINAIRES SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, STRUCTURES AND TRAFFIC SIGNALS. ALL DESIGN SHALL WITHSTAND ICE AND 80 MPH WINDS WITH 104 MPH GUSTS.



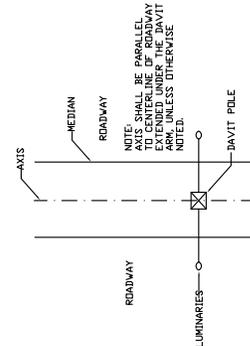
3 Street Crossing Detail
N.T.S.



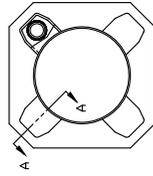
4 Conduit Under Median
N.T.S.



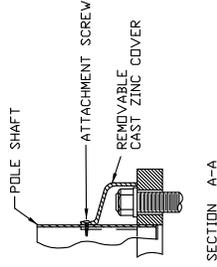
5 Davit Pole Detail
N.T.S.



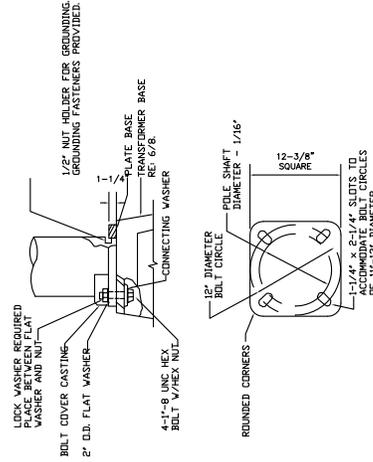
2 Foundation Orientation
N.T.S.



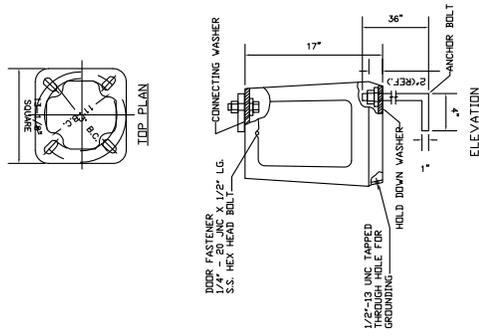
6 Bolt Cover Detail
N.T.S.



7 Base Plate Detail
N.T.S.



8 Transformer Base Detail
N.T.S.



TRANSFORMER BASE NOTES:

1. DORR OPENING APPROXIMATELY 8-3/4\"/>

P-27b	ELECTRICAL DETAILS STREETLIGHTING
CITY OF BURLESON	
ORIGINAL	6/6/08
REVISION	SWC
REVISION	
REVISION	

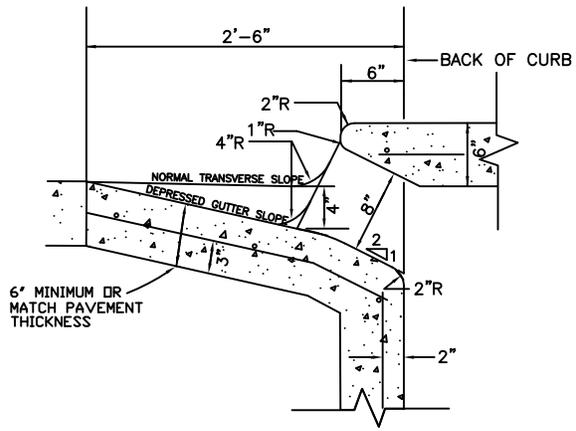
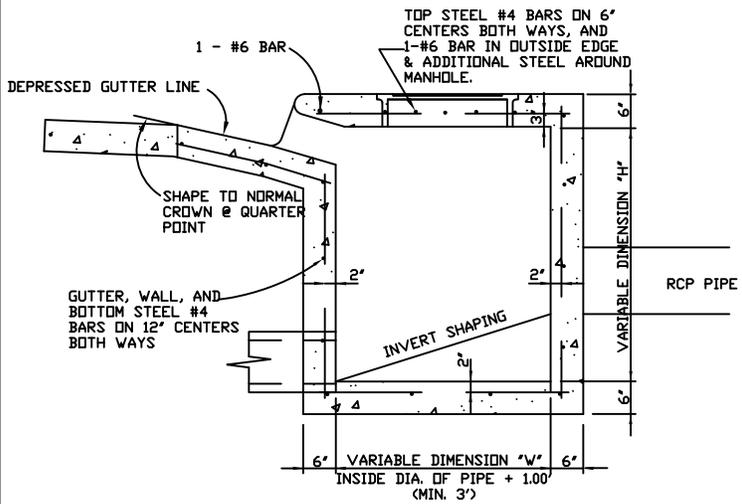
1. ALL STREET LIGHT CONSTRUCTION SHALL BE IN CONFORMANCE WITH THE STANDARD SPECIFICATIONS FOR STREET LIGHTING CITY OF BURLESON, TEXAS, DEPARTMENT OF PUBLIC WORKS.
2. PROPOSED LIGHTING POLE LOCATIONS AND CONDUIT ALIGNMENT SHALL BE STAKED BY THE CONTRACTOR. CONTRACTOR SHALL KEEP A RECORD SET OF PLANS AND MARK ANY DIFFERENCES BETWEEN THE LOCATIONS SHOWN IN THE PLANS AND THE BUILT LOCATIONS. THIS RECORD SET SHALL BE PROVIDED TO THE CITY AT THE TIME OF ACCEPTANCE OF THE WORK.
3. T.X.U. ELECTRIC WILL INSTALL TRANSFORMERS. ALL WORK AT SERVICE INCLUDING SERVICE CONNECTION SHALL BE BY CONTRACTOR.
4. UNDERGROUND LIGHTING CIRCUIT CONDUCTORS SHALL BE TWO XHHN 600 VOLT INSULATED COPPER CONDUCTORS OF THE SIZES INDICATED WITH A BARE COPPER GROUNDING CONDUCTOR OF THE SIZE INDICATED.
5. CONTRACTOR SHALL HAVE ALL EXISTING UTILITIES THAT ARE POSSIBLY IN CONFLICT WITH CONSTRUCTION STAKED HORIZONTALLY AND / OR VERIFIED VERTICALLY PRIOR TO CONSTRUCTION.
6. SCHEDULE 40 PVC CONDUIT SHALL BE USED AND SHALL BE BURIED A MINIMUM OF 30".
7. POLES SHALL BE INSTALLED A MINIMUM OF FOUR FEET FROM FIRE HYDRANTS, TREES, DRAIN LINES, INLETS, DRIVEWAYS, ETC.
8. INSTALL IN LINE FUSES AT ALL SERVICE CONNECTIONS.

9. POLES SHALL BE STEEL, 40'-0" DAVIT DOUBLE ARM, BRONZE IN COLOR WITH 24' X 72" PIER
10. LUMINAIRES SHALL BE AMERICAN ELECTRIC SERIES 114, OR EQUAL, OUTDOOR LIGHTING, HORIZONTAL LUMINAIRES FOR 150 WATT HIGH PRESSURE SODIUM LAMP 120/240 VOLT MULTI-BALLAST. LUMINAIRES SHALL BE A COBRA-HEAD TYPE WITH A FLAT CLEAR LENS AND LIGHTING ASSESSOR. LUMINAIRES SHALL CONFORM TO ALL PROVISIONS OF THE CURRENT CITY OF BURLESON SPECIFICATIONS FOR STREET LIGHTING.
11. INSTALL PHOTO ELECTRIC CONTROLLED LIGHTING CONTROLLER ON POLES WHERE INDICATED. CONTROLLER SHALL BE RCOC REMOTE CONTROL OUTDOOR LIGHTING MODEL MR-UG DOUBLE POLE RELAY TYPE RATED 120/240 VOLTS. THE CABINET OF THE CONTROLLER SHALL BE MADE OF FINISHED CAST ALUMINUM. CONTROLLER SHALL BE FURNISHED COMPLETE WITH PHOTO ELECTRIC CONTROL AND DUAL ELEMENT LOAD OF THE SIZE INDICATED. CONTROLLER AMPERE RATING FUSE SIZE SHALL BE AS NOTED ON THE PLAN SHEETS AT THE POINT OF INSTALLATION. WHERE CONTROLLER IS LOCATED AT MIDPOINT OF THE CIRCUIT, CONNECT BOTH ENDS OF THE CIRCUIT CONNECTORS TO THE COMMON LOAD TERMINALS OF THE LIGHTING CONTROLLER.
12. ALL EXPOSED METAL PARTS ON LIGHTING LUMINARIES AND LIGHTING STANDARDS SHALL BE BONDED TO THE LIGHTING CIRCUIT GROUNDING CONDUCTOR.
13. THERE IS TO BE A MINIMUM CLEARANCE OF 10' BETWEEN THE STREET LIGHT POLES AND ANY OVERHEAD POWER LINES. THE CONTRACTOR SHALL VERIFY THAT NO CONFLICT EXISTS WITH ANY OVERHEAD POWER LINES THAT RUN PARALLEL WITH OR CROSS OVER ROADWAYS BEFORE DRILLING THE PIERS FOR THE POLES. ADJUST THE LOCATION OF THE STREET LIGHT POLES ACCORDINGLY TO INSURE THE 10' MINIMUM CLEARANCE. CONTACT CITY REPRESENTATIVE CONCERNING ALL CONFLICTS.

P-27c	STREETLIGHTING GENERAL NOTES
CITY OF BURLESON	
ORIGINAL	6/6/08 SWC
REVISION	
REVISION	
REVISION	

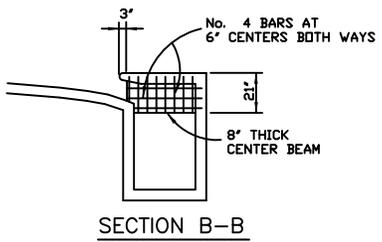
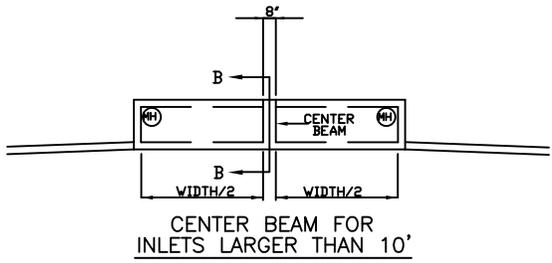
STORM DRAIN SYSTEM DETAILS

D-01	Standard Curb Inlet
D-02	Recessed Curb Inlet
D-03	Drop Inlet
D-04	Manhole Cover and Steps and General Inlet Notes
D-05A	Storm Drain Manhole (Sheet 1 of 2)
D-05B	Storm Drain Manhole (Sheet 2 of 2)
D-06	Storm Drain Embedment Detail
D-07	Storm Drain Connection to Existing Pipe
D-08	Pipe Collar
D-09	Flume
D-10	Channel
D-11	Existing Street Backfill and Repair
D-12	Street Backfill Prior to Street Construction

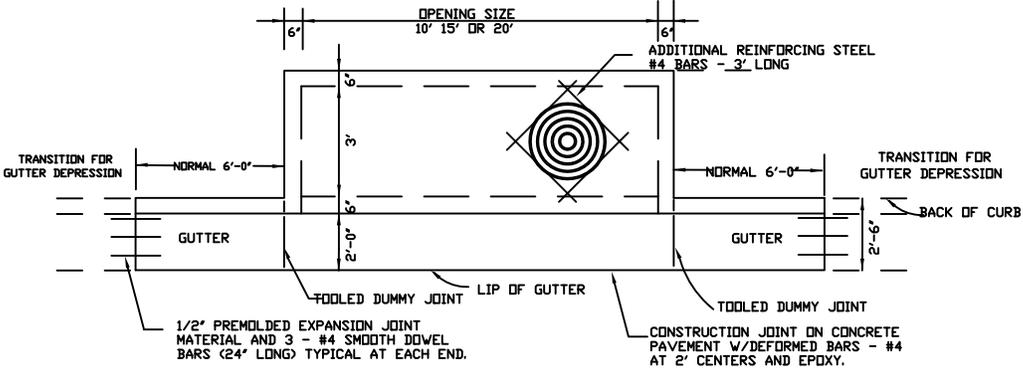


THROAT DETAIL FOR STANDARD INLETS ON CONCRETE STREETS

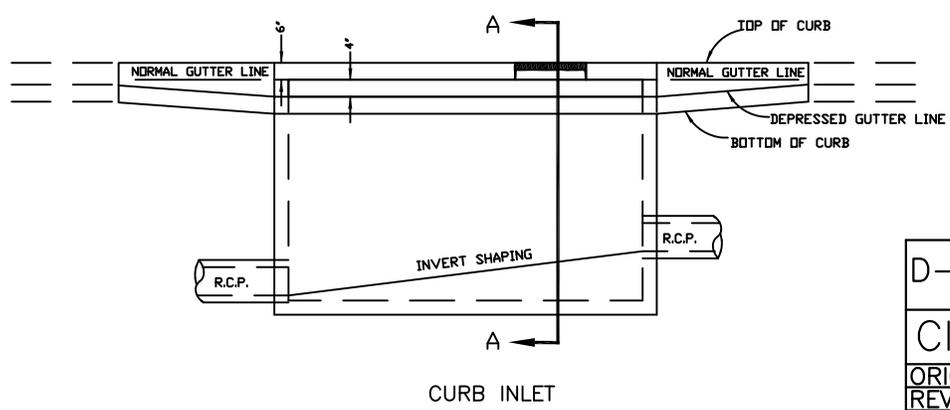
A-A
CURB INLET
CROSS SECTION



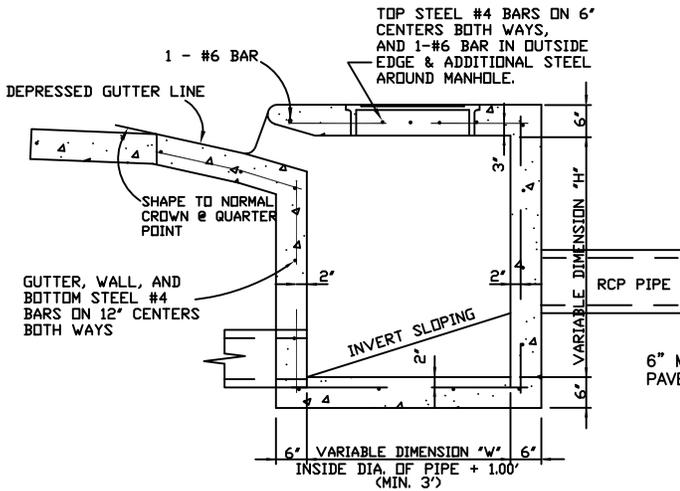
- NOTES:
1. ALL INLETS LARGER THAN 10' WILL REQUIRE A CENTER SUPPORT BEAM.
 2. ALL OPEN BACK INLETS WILL REQUIRE A CENTER BEAM, REGARDLESS OF INLET TYPE OR SIZE.



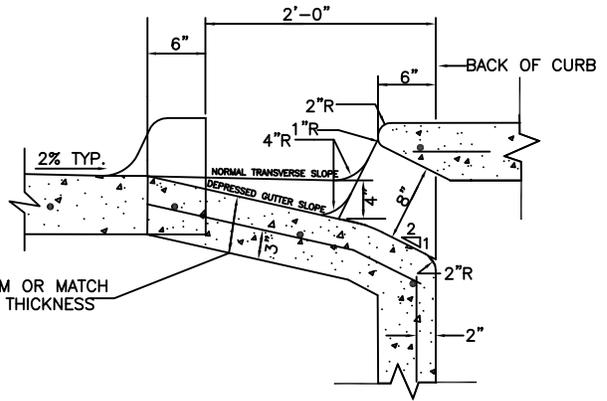
SEE DETAIL D-04 FOR MANHOLE AND STEP DETAILS AND GENERAL INLET NOTES.



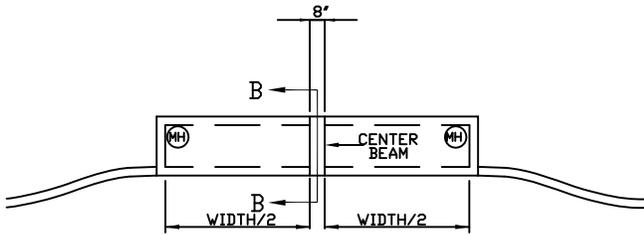
D-01	STANDARD CURB INLET	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



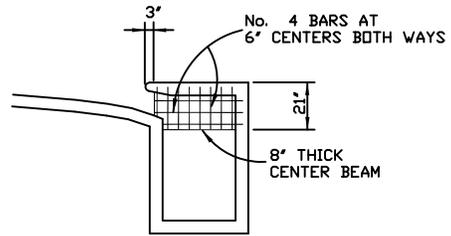
SECTION A-A
CURB INLET
CROSS SECTION



THROAT DETAIL FOR RECESSED INLETS
ON CONCRETE STREETS



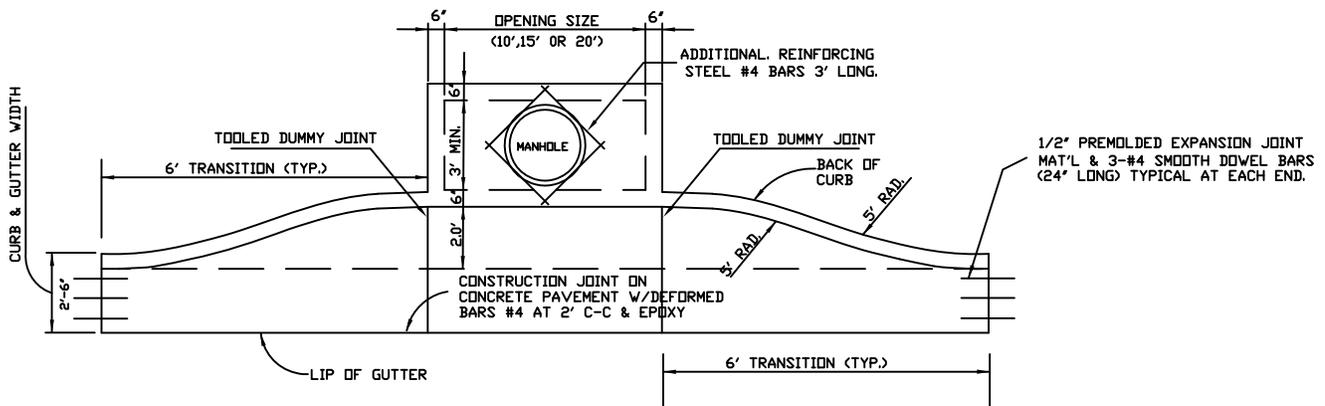
CENTER BEAM FOR
FOR INLETS LARGER THAN 10'



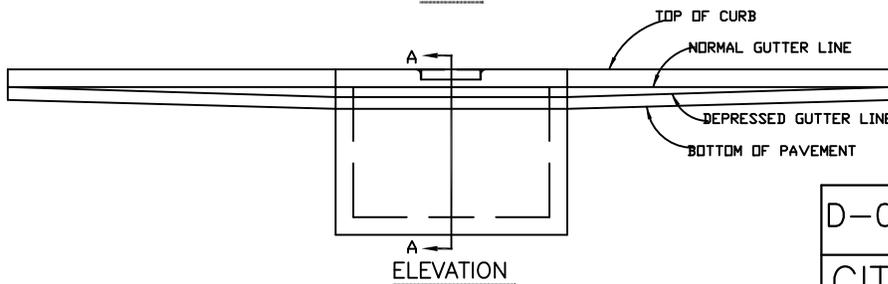
SECTION B-B

NOTES:

1. ALL INLETS LARGER THAN 10' WILL REQUIRE A CENTER SUPPORT BEAM.
2. ALL OPEN BACK INLETS WILL REQUIRE A CENTER BEAM, REGARDLESS OF INLET TYPE OR SIZE.



PLAN

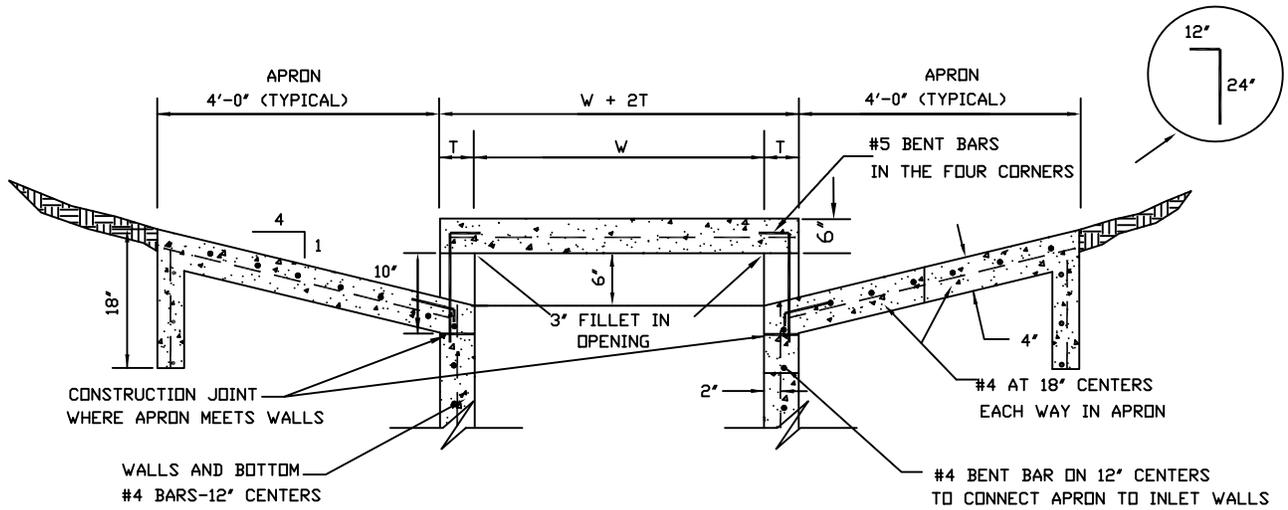


ELEVATION

SEE DETAIL D-04
FOR MANHOLE AND
STEP DETAILS AND
GENERAL INLET
NOTES.

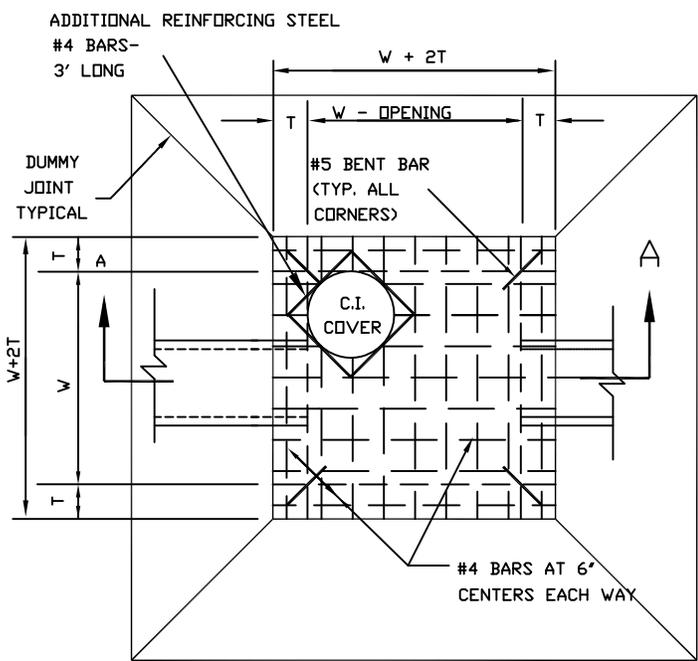
CURB INLET RECESSED
10', 15' OR 20' OPENING

D-02	RECESSED CURB INLET	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



SECTION "A"

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

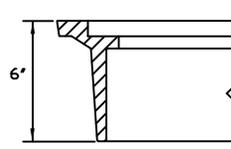
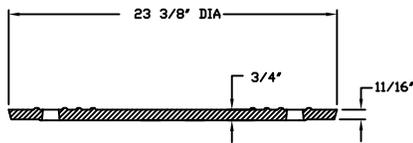
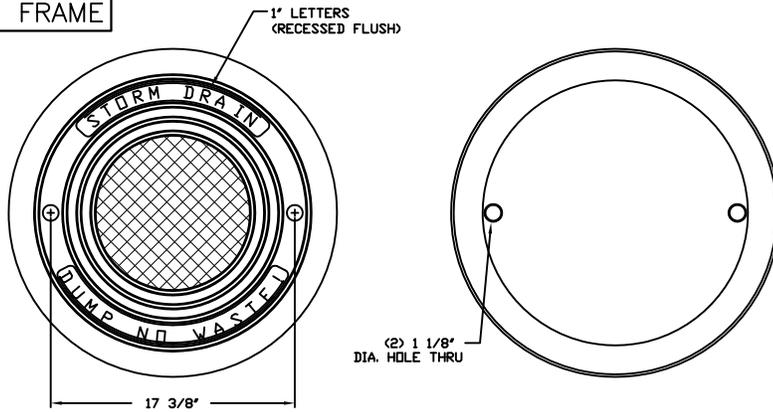


PLAN OF TOP SLAB

SEE DETAIL D-04 FOR MANHOLE COVER AND STEP DETAILS AND GENERAL NOTES.

D-03	DROP INLET	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

MANHOLE COVER & FRAME



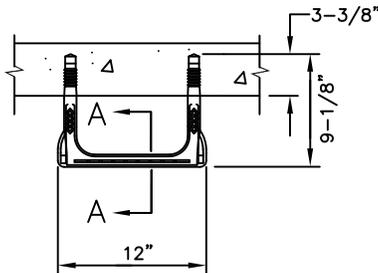
COVER SECTION

SECTION THROUGH RING

COVER WILL BE BASS AND HAYES NO. 103 (OR APPROVED EQUAL)

COVER WILL BE NON-LOCKING TYPE. SPOT WELD INLET COVER TO RING IN AT LEAST 4 LOCATIONS TO PREVENT THEFT.

NON-CORROSIVE STEPS



1/2" GRADE 60 STEEL REINFORCEMENT



SECTION A-A

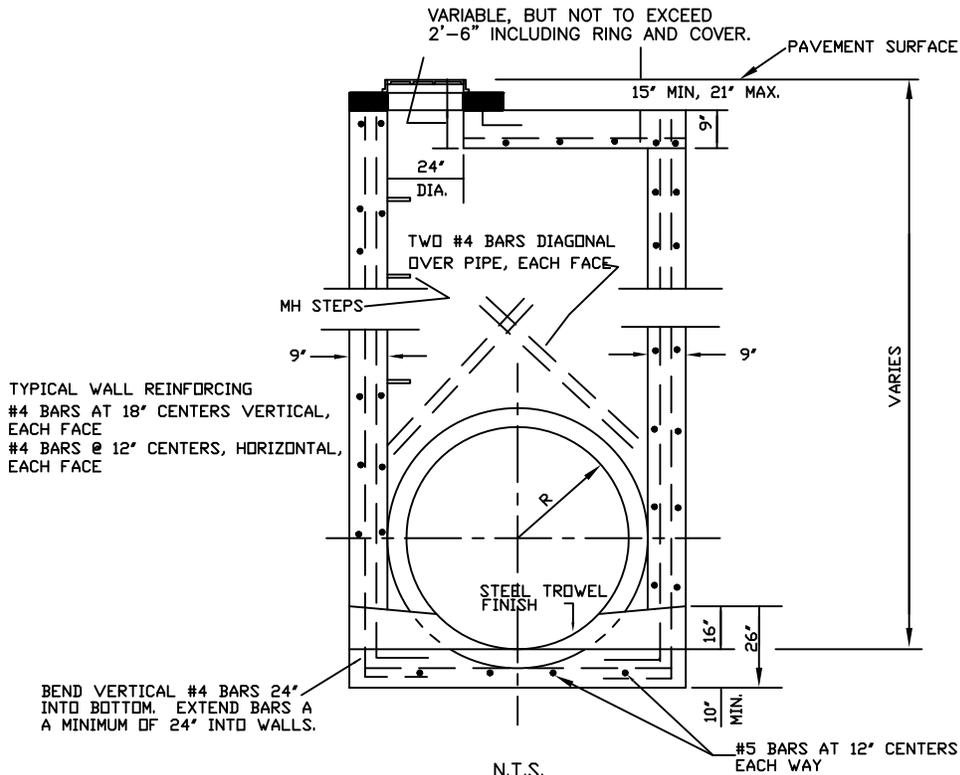
NOTES:

1. STEPS SHALL CONFORM TO ASTM C478-88a.
2. M.A. IND. INC. NUMBER 'PS1-PF' STEPS OR AMERICAN STEP CO., INC. NUMBER ML-10 OR APPROVED EQUAL TO BE INSTALLED PER MANUFACTURERS DIRECTION.
3. STEPS ARE REQUIRED FOR ALL INLETS 4' AND DEEPER.
4. STEPS SHALL BE PLACED 12" ON CENTERS VERTICALLY AND STAGGERED 12" ON CENTERS HORIZONTALLY.
5. THE TOP STEP SHALL BE NO GREATER THAN 1' BELOW THE INSIDE OF THE TOP OF THE INLET, AND THE BOTTOM STEP SHALL BE NO HIGHER THAN 2" FROM THE FLOOR.
6. STEPS SHALL BE PLACED ON A WALL WHICH WILL NOT CONFLICT WITH THE PIPE(S) AND SHALL BE EASILY ACCESSIBLE FROM THE MANHOLE OPENING.

GENERAL INLET NOTES

1. REINFORCING STEEL SHALL BE #4 BARS ON 12" CENTERS BOTH WAYS FOR GUTTER, BOTTOM SLAB, ENDS, FRONT AND BACK WALLS, AND #4 BARS ON 6" CENTERS BOTH WAYS FOR TOP SLAB. AN ADDITIONAL #6 BAR SHALL BE PLACED IN THE FRONT EDGE OF THE TOP SLAB IN THE CURB INLETS AND ADDITIONAL REINFORCING STEEL SHALL BE PLACED AROUND MANHOLES AS SHOWN.
2. ALL REINFORCING STEEL SHALL BE GRADE 60.
3. ALL CONCRETE SHALL BE CLASS 'A'.
4. ALL EXPOSED CORNERS SHALL BE CHAMFERED 3/4".
5. ALL REINFORCING STEEL SHALL HAVE A MINIMUM COVER OF 2".
6. ALL BACKFILLING SHALL BE PERFORMED BY MECHANICAL TAMPING TO 95% STANDARD PROCTOR DENSITY.
7. IF MODIFYING AN INLET, I.E. CREATING AN OPEN BACK INLET, THE TOP SHALL BE REMOVED AND RECONSTRUCTED.
8. LOCATION OF MANHOLE OPENING ON CURB INLETS TO BE AT OUTFALL END.
9. ALL 15' AND 20' INLETS WILL REQUIRE TWO MANHOLES ONLY IF THE INSIDE HEIGHT (UNDER THE CENTER BEAM) IS LESS THAN FOUR FEET.
10. LIGHT BROOM FINISH ON ALL SURFACES.
11. ALL DROP INLETS SHALL HAVE ONE OPENING ON EACH SIDE UNLESS OTHERWISE SHOWN ON PLANS.

MANHOLE COVER AND STEPS	
D-04	AND GENERAL INLET NOTES
(APPLICABLE TO ALL INLET DETAILS)	
CITY OF BURLESON	
ORIGINAL	SWC
REVISION	
REVISION	
REVISION	

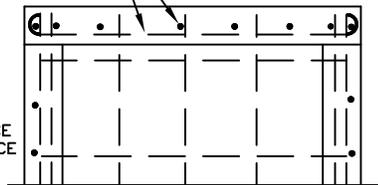


JUNCTION BOX MAY BE RECTANGULAR
BUT NOT LESS THAN 4 FEET IN SHORT DIRECTION.

STORMWATER JUNCTION BOX 4', 5' OR 6' WIDTHS

#5 BARS AT 6' CENTERS
EACH WAY, HOOKED EACH END.

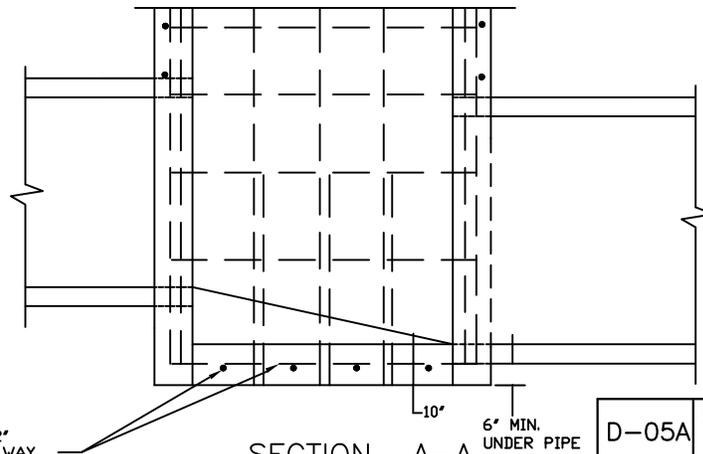
TYPICAL WALL REINFORCING
#4 BARS AT 18' CENTERS VERTICAL, EACH FACE
#4 BARS @ 12' CENTERS, HORIZONTAL EACH FACE



NOTES :

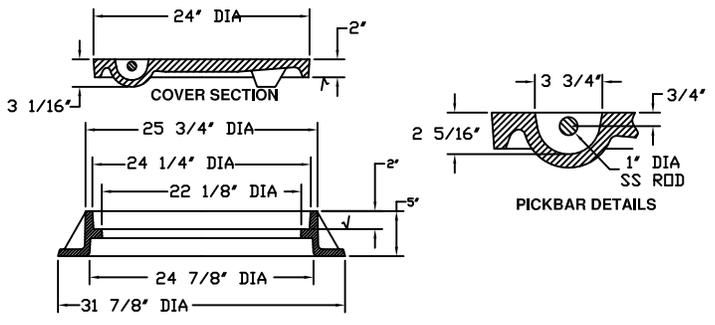
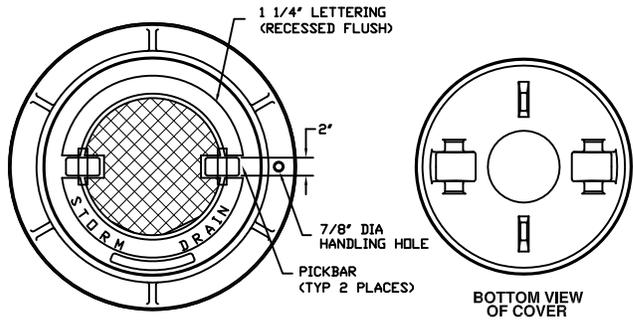
1. SLOPE INVERT OF JUNCTION BOX TO MATCH PIPE FLOWLINES.
2. LAYERS OF REINFORCING STEEL NEAREST THE INTERIOR AND EXTERIOR SURFACE SHALL HAVE A COVER OF 2" TO THE BARS, UNLESS OTHERWISE NOTED.
3. CONCRETE SHALL BE CLASS "A".
4. REINFORCING STEEL TO BE GRADE 60.

#5 BARS AT 12' CENTERS EACH WAY



SECTION A-A
N.T.S.

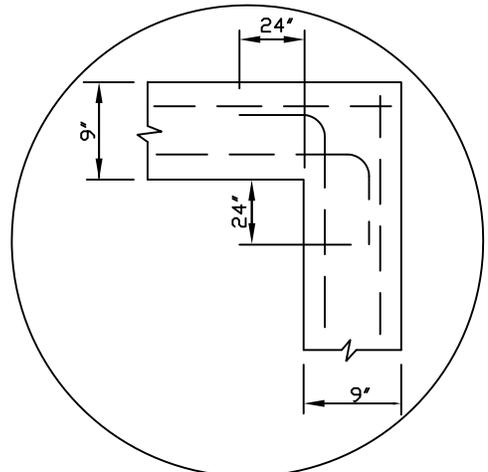
D-05A	STORM DRAIN MANHOLE (SHEET 1 OF 2)	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



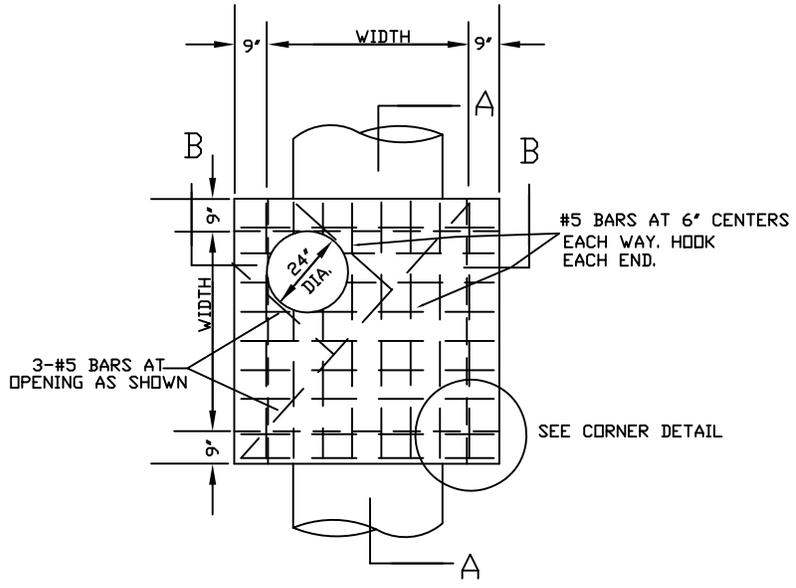
RING SECTION √ MACHINED SURFACE

MANUFACTURER	REFERENCE NUMBER	APPRX. WEIGHT
EAST JORDAN	1342	310 lb
BASS & HAYS	1342	310 lb
OR APPROVED EQUAL		

LOGO MANHOLE COVER & FRAME

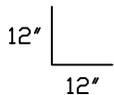


CORNER DETAIL
PLAN VIEW



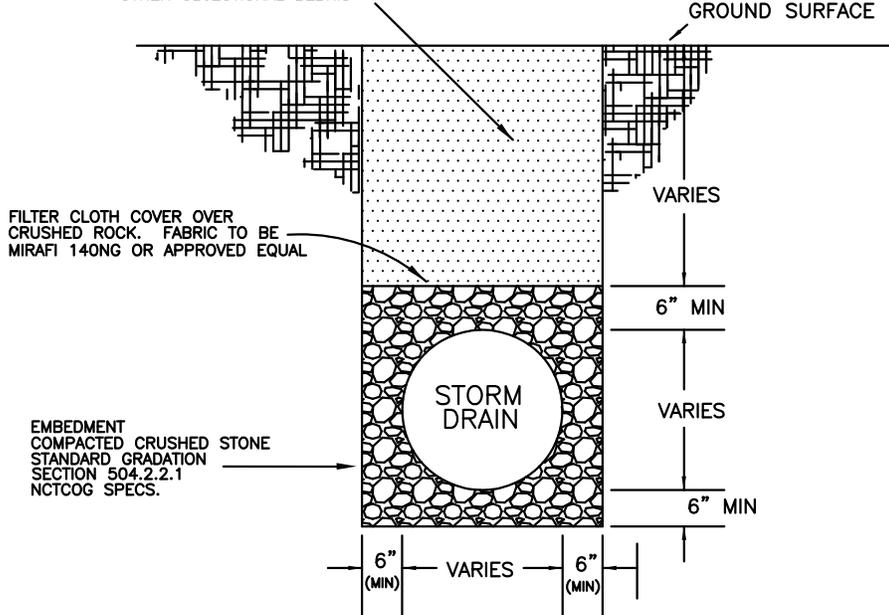
PLAN

SONOTUBE SHALL BE USED FOR FORMING NECK ADJUSTMENT, POUR CONCRETE AROUND TUBE 9" WIDE. CONNECT TO TOP SLAB WITH 12" x 12" #4 BARS AT 12" CENTERS AROUND OPENING. ONE #4 BAR AROUND OPENING.



D-05B	STORM DRAIN MANHOLE (SHEET 2 OF 2)	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

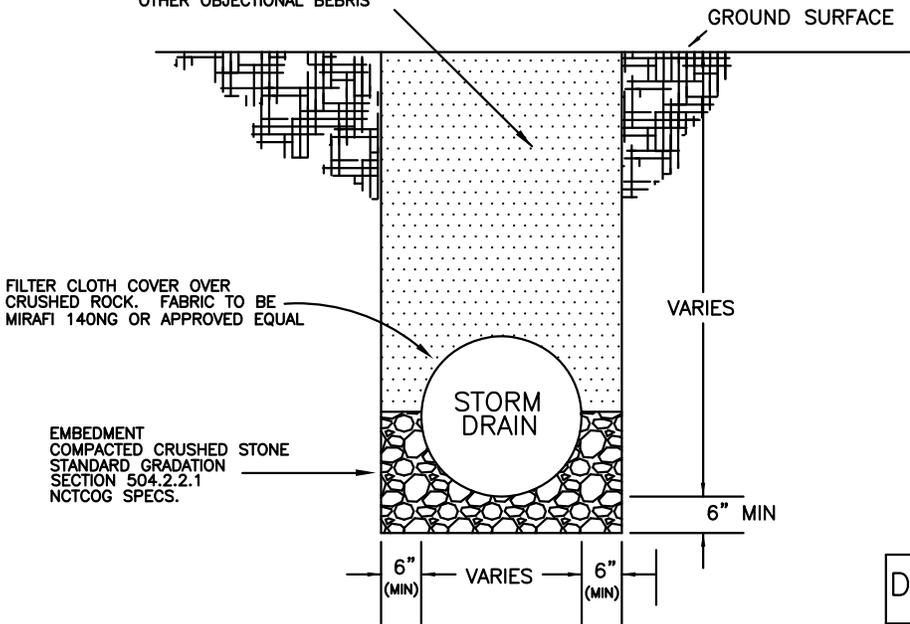
BACKFILL
 NATIVE MATERIAL
 COMPACTION BASED ON
 STANDARD PROCTOR
 90% COMPACTION IN PARKWAYS
 95% COMPACTION UNDER PAVEMENT
 TEST DENSITY EVERY 300'
 ON EVERY SECOND LIFT
 SECTION 504.2.3.3
 NCTCOG SPECS.
 NATIVE MATERIAL SHALL BE FREE
 OF STONES, RUBBISH, ROOTS AND
 OTHER OBJECTIONAL BEBRIS



STORM DRAIN EMBEDMENT DETAIL
 RCP UNDER PAVEMENT AND HDPE PIPE

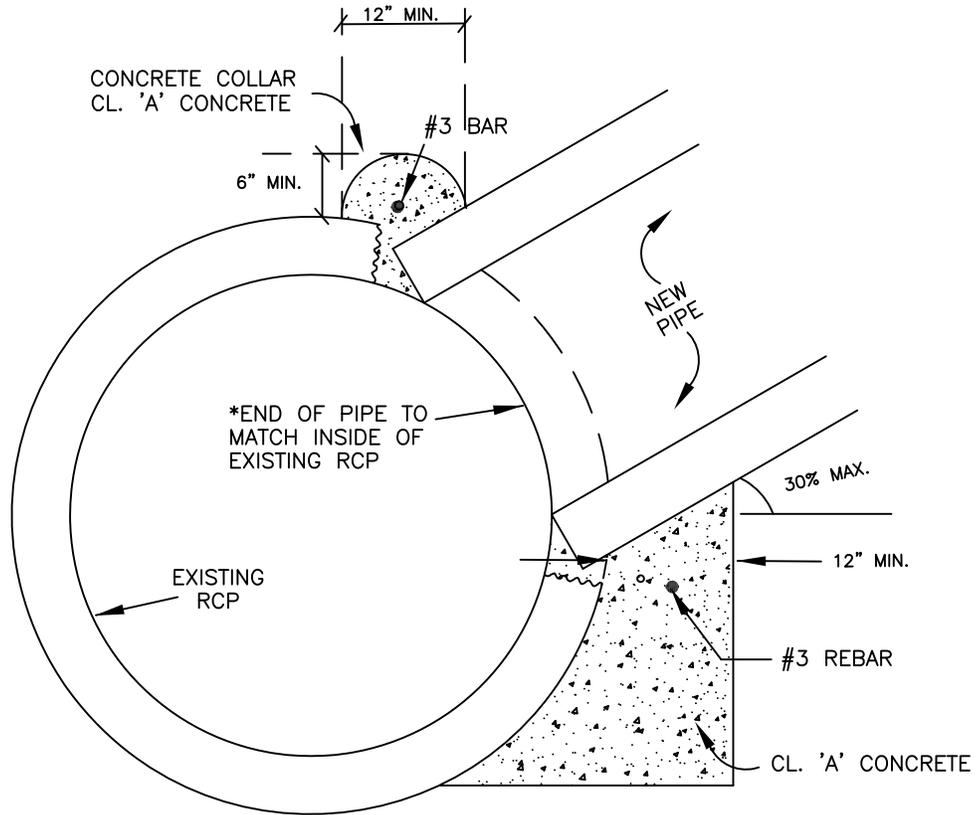
NOTE:
 HDPE PIPE IS NOT ALLOWED
 UNDER PUBLIC PAVEMENT.

BACKFILL
 NATIVE MATERIAL
 COMPACTION BASED ON
 STANDARD PROCTOR
 90% COMPACTION IN PARKWAYS
 95% COMPACTION UNDER PAVEMENT
 TEST DENSITY EVERY 300'
 ON EVERY SECOND LIFT
 SECTION 504.2.3.3
 NCTCOG SPECS.
 NATIVE MATERIAL SHALL BE FREE
 OF STONES, RUBBISH, ROOTS AND
 OTHER OBJECTIONAL BEBRIS

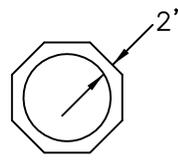
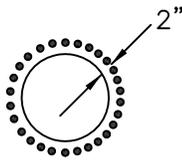


STORM DRAIN EMBEDMENT DETAIL
 RCP IN PARKWAY OR UNPAVED EASEMENT

D-06	STORM DRAIN EMBEDMENT	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



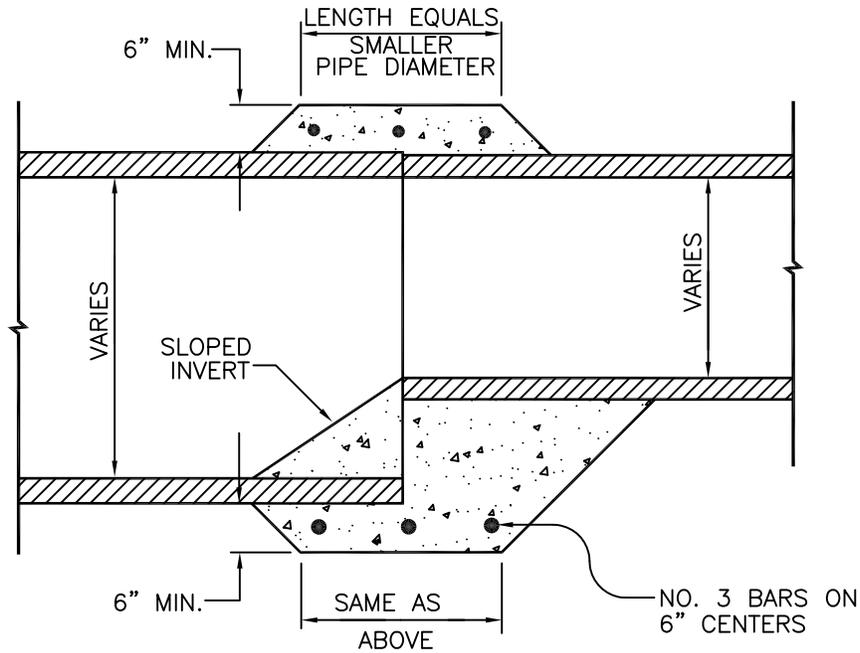
* REMOVAL OF PLUG FROM EXISTING RCP TO BE ACCOMPLISHED BY USING A MASONRY DRILL AT A SPACING EQUAL TO THE DRILL BIT DIAMETER IN A CIRCULAR PATTERN OR A MASONRY SAW IN AN OCTAGONAL PATTERN PER DETAIL.



STORM DRAIN CONNECTION
TO EXISTING RCP
NTS

THIS DETAIL APPLICABLE ONLY FOR APPLICATIONS WHERE NEW PIPE IS LESS THAN OR EQUAL TO ONE HALF THE DIAMETER OF THE EXISTING PIPE. FOR APPLICATIONS WHERE THE NEW PIPE IS GREATER THAN HALF THE SIZE OF THE EXISTING PIPE, A PREFABRICATED WYE SHALL BE USED.

D-07	STORM DRAIN CONNECTION TO EXISTING PIPE	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



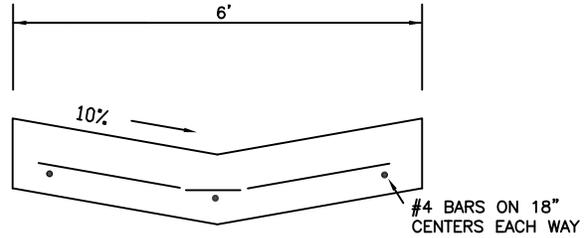
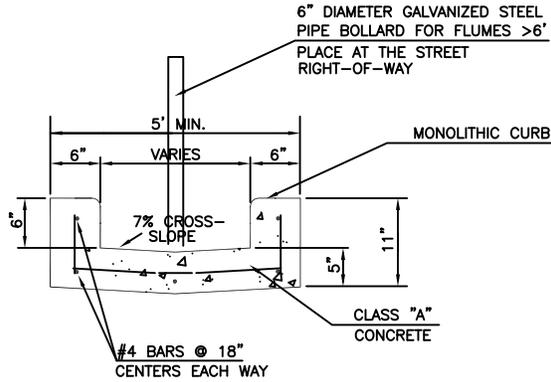
PIPE COLLAR DETAIL

NOTES

1. THIS PROCEDURE/DETAIL WILL ONLY BE USED WHEN A PREFAB REDUCTION IS NOT POSSIBLE.
2. CONCRETE FOR COLLAR WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS OTHER BIDS.
3. CONCRETE SHALL BE 5 SACK 3000 PSI.

D-08	PIPE COLLAR	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

FLUME SECTIONS



CURBS MAY BE OMITTED AND USE THE VALLEY SECTION WHEN OVERFLOW IS 10 CFS OR LESS OR WHEN FLOW CAN BE CONTAINED WITHIN THE CONCRETE SECTION.

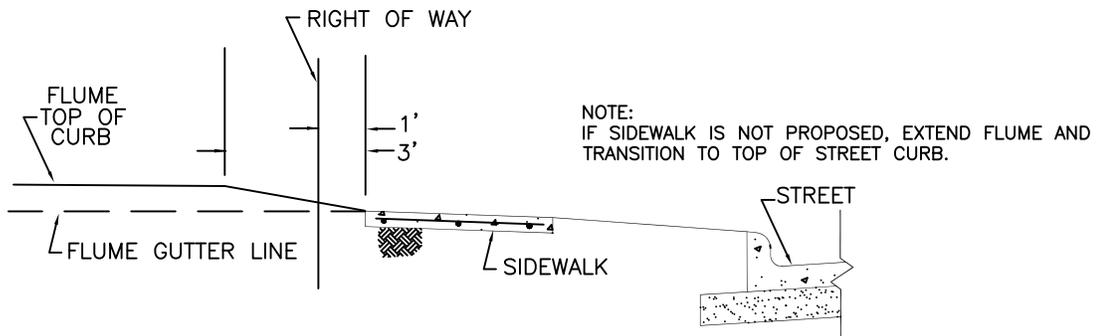
ALTERNATE

NOTE:

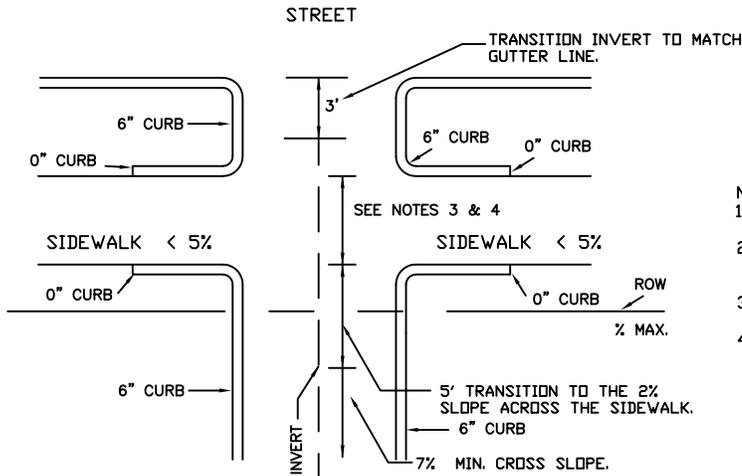
1. FLUME NEEDS TO BE FLARED AT ENTRANCE ONLY FOR HYDRAULIC PURPOSES.
2. BOLLARDS SHALL BE FILLED WITH CONCRETE AND SET IN 18" DIAMETER CONCRETE FOOTING A MINIMUM OF 3' BELOW THE FLUME FLOW LINE. BOLLARD SHALL BE 4' HIGH ABOVE THE FLUME FLOW LINE.

SIDEWALK CROSSING OPTIONS

APPROPRIATE OPTION TO BE DETERMINED BY DESIGN ENGINEER AND THE CITY



OVERFLOW FLUME PROFILE (TRANSITION TO SIDEWALK)
GENERALLY USED FOR OVERFLOW FLUMES.



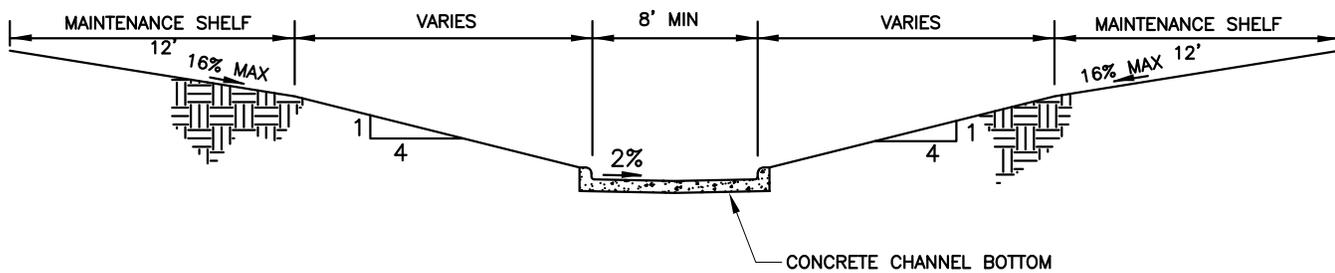
NOTE:

1. FLOW IS TOWARD STREET, OTHERWISE THE FLUME WILL HAVE TO BE FLARED AT THE STREET.
2. FOR FLUMES 5 FEET OR LESS IN WIDTH A METAL PLATE MAY BE CONSIDERED FOR UNIQUE SITUATIONS IF AUTHORIZED BY THE PUBLIC WORKS DEPARTMENT.
3. LONGITUDINAL FLUME SLOPE ACROSS SIDEWALK MUST BE NO GREATER THAN 2%.
4. THE TRANSVERSE SLOPE OF THE FLUME AT THE SIDEWALK MUST BE LESS THAN 5

FLUME WITH SIDEWALK CROSSING

GENERALLY USED WHEN FLUME IS PRIMARY DRAINAGE FEATURE.

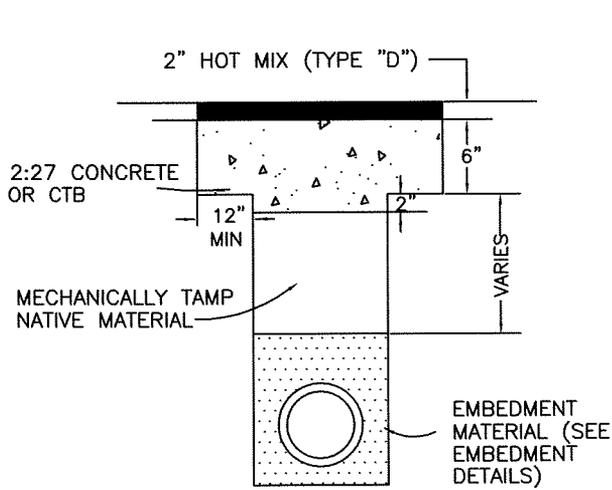
D-09	FLUME	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



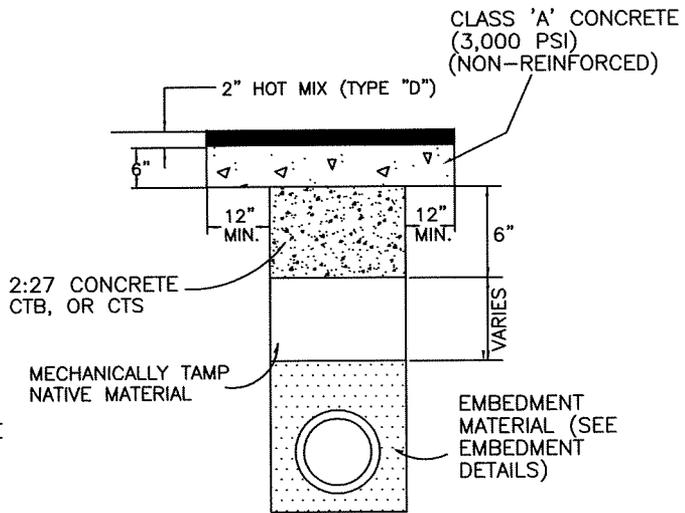
NOTES:

1. CONCRETE CHANNEL BOTTOM SHALL HAVE 6" CURBS.
2. CONCRETE SHALL BE 6" THICK WITH 3000 PSI COMPRESSIVE STRENGTH.
3. CONCRETE SHALL BE REINFORCED WITH #3 BARS ON 18" CENTERS.
4. 2" MINIMUM DIAMETER WEEPHOLES WITH MIRAFI 140NS FILTER MEDIA OR APPROVED EQUAL SHALL BE PLACED AT INTERVALS NO GREATER THAN 25'.
5. CONCRETE SHALL HAVE TRANSVERSE JOINTS AT WEEPHOLE LOCATIONS. REDWOOD EXPANSION JOINTS ARE REQUIRED A MAXIMUM OF EVERY 200 FEET. CONSTRUCTION JOINTS PLACED WHEN PAVING OPERATION HAS CEASED FOR MORE THAN 30 MINUTES.
6. SIDESLOPES AND MAINTENANCE SHELVES SHALL HAVE ADEQUATE STAND OF VEGETATION PRIOR TO ACCEPTANCE.

D-10	CHANNEL	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		

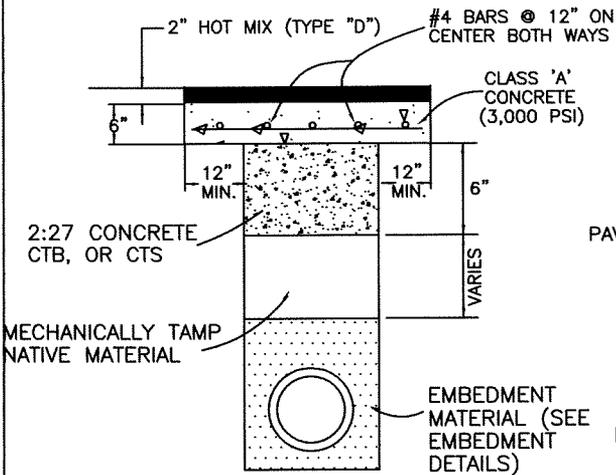


RESIDENTIAL/COUNTY ROAD

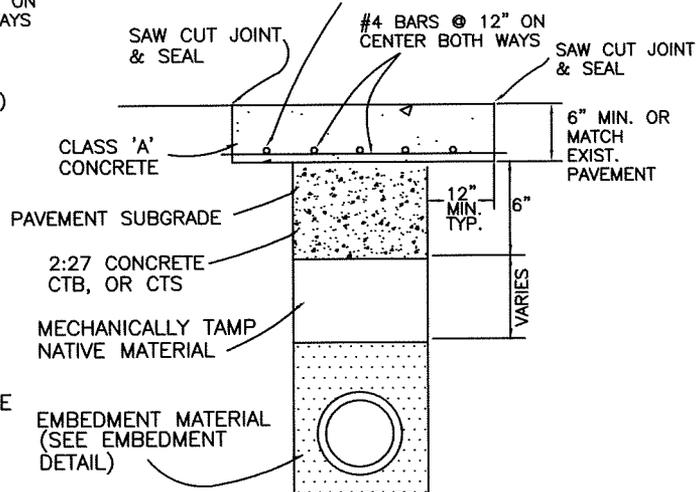


COLLECTOR STREET

SAW CUT FULL DEPTH PRIOR TO EXCAVATION
DOWEL #4 @ 12" CENTERS,
6" INTO EXISTING PAVEMENT
AND EPOXY IN PLACE
BOTH WAYS.



MAJOR ARTERIALS & THOROUGHFARES

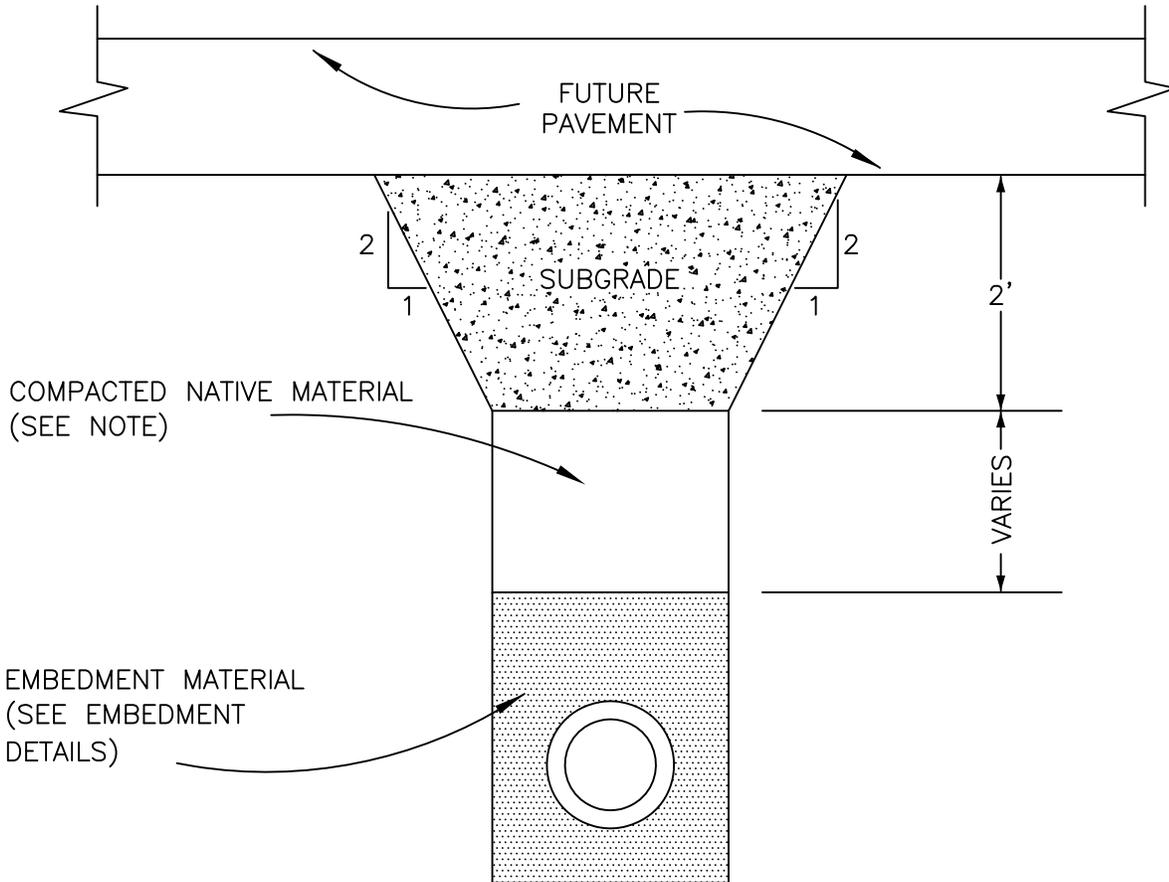


CONCRETE STREET

NOTES:

1. A SAW SHALL BE USED TO CUT ASPHALT OR CONCRETE FULL DEPTH PRIOR TO OPENING THE DITCH IN ORDER TO INSURE A NEAT STRAIGHT EDGE. SEE STANDARD SPECIFICATIONS FOR REQUIRED EMBEDMENT.
2. CTB = CEMENT TREATED BASE (CONTAINS AGGREGATE)
CTS = CEMENT TREATED SAND
BOTH MATERIALS SHALL BE MECHANICALLY TAMPED.

D-11	EXISTING STREET BACKFILL AND REPAIR	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		



NOTE:

FOR LINES BEING LAID PRIOR TO NEW STREET CONSTRUCTION, WHICH WILL LIE BENEATH PAVEMENT OR CURB AND GUTTER, BACKFILL ABOVE PIPE EMBEDMENT SHALL CONSIST OF NATIVE MATERIAL, COMPACTED IN MAX. 6" TO 9" LIFTS (COMPACTED THICKNESS) TO 95% STANDARD PROCTOR DENSITY AT OPTIMUM MOISTURE CONTENT $\pm 2\%$.

D-12	STREET BACKFILL PRIOR TO STREET CONSTRUCTION	
CITY OF BURLESON		
ORIGINAL	10/6/06	SWC
REVISION		
REVISION		
REVISION		