CITY OF McAllen

STANDARD DESIGN GUIDE
FOR
PUBLIC INFRASTRUCTURE IMPROVEMENTS

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PREFACE

The Engineering Department is committed to providing a high quality of life by ensuring properly designed and constructed infrastructure for those who work and reside in the City of McAllen. The condition of streets, sidewalks, driveways, storm drainage, water, and sanitary sewer facilities play an integral part in the everyday life of motorists and pedestrians. By responsibly designing, constructing and maintaining quality infrastructure, the City of McAllen reduces its financial burden from personal injuries and damage to property caused by premature failure of facilities.

This document was prepared to assist planners, designers, engineers and architects during the development of infrastructure improvements in public rights of way by standardizing design criteria.

NOTE: This document will be reviewed and revised as necessary in order to adapt to the dynamic nature of infrastructure improvements as well as reflect advances and innovations in standard design practices. It is the responsibility of the user to obtain the most recent revision.

Copies of this standard are available via the City of McAllen Website at http://www.mcallen.net.

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Introduction

This document has been prepared to standardize design requirements for streets, storm drainage, water and sanitary sewer facilities that are primarily constructed as part of residential and commercial subdivisions.

This document is intended to serve as a design guide for planners, designers, engineers and architects involved in the preparation of plans and specifications, which will be submitted for construction within the City of McAllen.

The ultimate goals of this design guide are to:

1. Maintain a high standard for improvements within public rights of way.
2. Maximize the integrity of public facilities.
3. Maximize the protection of motorists and pedestrians.
4. Minimize inconvenience to pedestrians, motoring traffic and landowners adjacent to public rights of way.
5. Minimize the future maintenance cost to the City.

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Pavement Design

Flexible Pavements

The following design criteria shall be applicable to the noted street width. Additional details are noted in Appendix III.

Characteristic	Street Classification			
	Local	**Collector**	**Minor Arterial**	**Principal Arterial**
Street Width (Measured from back of curb to back of curb, B-B)	32' B-B to 40' B-B[4]	40' B-B[4] to 44' B-B	52' B-B to 65' B-B	65' B-B and Greater
Minimum Structural Section				
Subgrade[1]	6 inches	6 inches	12 inches	12 inches
Flexible Base[2]	8 inches	10 inches	12 inches	12 inches
Hot Mix Asphaltic Concrete[3] (HMAC)	2 inches	2.5 inches	3 inches	3 inches
Min. transverse slope	2 %	2%	2.5%	2.5%
Min. longitudinal slope	0.20 %	0.20%	0.20%	0.20%
Min. width of curb and gutter	24 inches	24 inches	24 inches	24 inches

1. Subgrade shall be compacted to 95% maximum dry density, as determined by the standard proctor (ASTM D698), and treated with lime at an applicable rate if the plasticity index of the soils is greater than 20. All compacted subgrade shall extend to a minimum of 1 foot behind the proposed back of curb.

2. The flexible base shall be compacted to 95% maximum dry density, as determined by the standard proctor (ASTM D698), and treated with lime at an applicable rate if the plasticity index of the soils is greater than 12. All compacted flexible base shall extend to a minimum of 1 foot behind the proposed back of curb.

3. All hot mix asphaltic concrete shall consist of Type "D", crushed limestone aggregate and be compacted to 95% of the maximum theoretical dry density.

4. 40' B-B may be designated as a local or collector street depending on the streets function.

If an alternate pavement section is requested, a pavement design analysis will be required for approval by the City Engineer or designee. A minimum 30-year period shall be utilized for all designs.

Concrete Pavement

Concrete pavements sections for all widths shall be designed utilizing the following criteria:

1. Thickness designs for Concrete Highways and Street Pavement, Portland Cement Association, EB109P, Reprinted 1995

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2. Concrete Streets: Typical Pavement Sections and Jointing Details, Portland Cement Association, IS211P, 1980

3. Design and Construction of Joints for Concrete Streets, Portland Cement Association, IS061P, 1992

4. Construction Specification Guideline for Concrete Streets and Local Roads, Portland Cement Association, IS119P, 1998

5. Guide Specifications for Concrete Curbs and Combined Curbs and Gutters, Portland Cement Association, IS110P, 1983

6. A minimum 30-year period shall be utilized for all designs

Alley Design

In all new subdivisions containing alleys, the developer shall construct alleys in accordance with the engineering requirements of the City.

ROW	20 feet
Paving width	16 feet
Minimum Structural Section:	
Subgrade	6 inches
Flexible Base	8 inches
HMAC	2 inches

Additional details are noted in Appendix III. If an alternate pavement section is requested, a pavement design analysis will be required for approval by the City Engineer or designee. A minimum 30-year period shall be utilized for all designs.

Sidewalk Design

The following design criteria shall be applicable to sidewalk designs. Additional details are noted in Appendix III.

1. Sidewalk alignment shall be set at the back of curb. Deviation is permitted to match existing alignment when connecting to existing sidewalk. Any other deviation shall require approval from the City Engineer.

2. Sidewalk shall slope toward the street with a maximum transverse slope of ¼ inch per foot (2%) and a maximum longitudinal slope of ½ inch per foot (5%). Runoff from the sidewalk shall be directed towards the street gutter.

3. Sidewalk shall be 5-foot minimum width when placed adjacent to the curb. When aligned towards an existing offset sidewalk that, it may be reduced to 4 feet to match the existing sidewalk. Sidewalks within State ROW are a minimum of 5 feet in width.

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4. Sidewalks and ramps shall be constructed of 4" thick concrete reinforced with 6" x 6" No. 6 gage wire mesh or No. 3 bars @ 8" O.C.E.W.

5. Bar-lift Plastic Chairs, or approved equal, shall be used to secure steel at center of concrete thickness

6. Subgrade shall be compacted to 90% standard proctor.

7. Minimum 3-inch sand backfill required.

8. Contraction joints shall be scored every 6 feet and expansion joints every 30 feet.

9. Sidewalk shall have a broom finish transverse to the walkway. When exposed aggregate, pavers, tile and/or colored concrete are proposed within the right of way, approval of the pattern and finish is required from the Engineering Department prior to construction.

10. All concrete shall be 5-sack concrete and shall have a minimum compressive strength of 3000 psi.

11. Membrane curing compound shall be applied at a minimum of 1 gallon per 180 square feet of area.

12. Ramps shall be placed at all intersection with roadways or where required by law / City. Curb and gutter must be saw cut.

13. Flatwork is required to meet Texas Accessibility Standards (Texas Civil Statutes, Article 9102).

14. Any admixtures to the concrete mix (i.e. fiber mesh, plasticizers, etc.) shall require approval.

Driveway Apron Design

The following design criteria shall be applicable to residential driveway apron designs. Additional details are noted in Appendix III.

1. Driveway widths:
   Residential minimum is 12 ft. and maximum is 25 ft.
   Commercial minimum is 25 ft and maximum is 45 ft.

2. Curb cut must be a minimum of 6-feet from a side property line.

3. Flow line of new gutter shall match existing flow line.

4. Curb and gutter must be saw cut.

5. Driveway aprons shall be constructed of concrete with a minimum of 6 inches in thickness, reinforced with 6" x 6" No. 6 wire mesh, No. 3 bars @ 12" O.C.E.W. or No. 4 bars @ 18" O.C.E.W.

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6. Bar-lift Plastic Chairs, or approved equal, shall be used to secure steel at center of concrete thickness.

7. Concrete shall have a broom finish. When exposed aggregate, pavers, tile and/or colored concrete are proposed within the right of way, approval of the pattern and finish is required from the Engineering Department prior to construction.

8. All concrete shall be 5-sack concrete and shall have a minimum compressive strength of 3000 psi.

9. Membrane curing compound shall be applied at a minimum of 1 gallon per 180 square feet of area.

10. Subgrade shall be compacted to 95% standard proctor for commercial driveways and 90% standard proctor for residential driveways.

11. Expansion joint required at property line and intersection with sidewalks. Longitudinal expansion joint required at mid-point of driveway if width is greater than 18 feet

12. Longitudinal sawed contraction joint required at 15 ft minimum.

13. If a manhole falls within a driveway pad, the manhole lid shall be placed flush with the elevation of the driveway.

14. Any driveway placed where a drainage bar ditch exists, shall maintain the flow line of the ditch with the placement of a concrete culvert.

15. Driveway wings shall not exceed a 12:1 slope.

16. Any admixtures to the concrete mix (i.e. fiber mesh, plasticizers, etc.) shall require approval.

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Drainage Design

All storm drainage designs shall comply with the City of McAllen Drainage Policy as noted in Appendix I and detailed in Appendix IV. The following is a general summary of the requirements:

1. Calculation of the 10-year storm pre-development runoff is required to be submitted to the City Engineer.

2. Calculation of the 50-year storm post development runoff to be detained on-site, shall be submitted to the City Engineer.

3. Scaled maps showing the drainage basins used in the above calculations will need to be submitted to the City Engineer for review and approval.

4. On-site detention methods shall include ponds or engineered sub-surface systems. Acceptable methods of supplemental detention shall be reviewed and approved by the City Engineer.

5. Drainage outfalls must flow and/or detain a 50-year storm (i.e. Blueline Ditch).

6. Inlet spacing shall not exceed 600 feet, with a maximum surface run of 300 feet from the crest to sag of the roadway profile. In the event the longitudinal slope of the roadway is required to exceed 300 feet, inlets shall still be spaced at 300 feet maximum. Minimum slopes for drainage pipes shall be determined utilizing a design velocity of 3 feet per second.

7. Sites shall be graded in such a manner as to provide positive drainage but shall not adversely affect adjacent drainage patterns. The rear of residential lots shall slope with a minimum 1% slope to the front. A subdivision lot grading plan shall be provided by the subdivision Engineer prior to issuance of any permits for construction of subdivision improvements.

8. Final grades along the perimeter of the proposed subdivision that are above or below the adjacent property elevation may require installation of a retaining wall. Properties shall be graded to drain away from the grade differential.

9. Storm sewer lines shall require gravel bedding of six (6) inches minimum and gravel backfill to the spring line of the reinforced concrete pipe. The remaining trench depth shall be mechanically compacted in one (1) foot lifts to 95% of the maximum dry density as defined by the standard proctor.

10. As part of the as built plans all inlets and manholes shall be surveyed by an RPLS. Survey shall include northing and easting coordinates of the inlet and manhole centerline and elevations of tops and inverts referenced to the City of McAllen benchmark grid.

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Traffic Control Design

The Traffic Control Policy applies to the implementation of all traffic control devices placed within the jurisdiction of the City of McAllen. Any variances of this policy are subject to approval by the City Engineer or designee.

Traffic Signs

1. 'Sign & Markings' plan is required as part of the construction plans.

2. Developer is responsible for installation of all 'Stop', 'Speed Limit', 'Street Name', and 'Warning' signs within the right-of-way in the bounds of new developments.

3. All traffic signs shall conform to the *Texas Manual on Uniform Traffic Control Devices* as well as the City of McAllen's 'Sign Material Standards', 'Sign Installation Details', and 'Sign Location Standards'.

Pavement Markings

1. 'Sign & Markings' plan is required as part of the construction plans.

2. Pavement markings placed on any street within the jurisdiction of the City of McAllen shall conform to the *Texas Manual on Uniform Traffic Control Devices* as well as the City of McAllen's 'Pavement Marking Standards'.

3. Pavement markings shall be installed on streets that meet the *Texas Manual on Uniform Traffic Control Devices* pavement markings warrants or as deemed necessary by the City Engineer or designee.

Temporary Traffic Control

1. A traffic control plan shall be included as part of all construction plans, right of way permits, and special event applications.

2. All temporary traffic control within the City of McAllen's jurisdiction shall conform to the *Texas Manual on Traffic Control Devices* as well as the provisions of this policy including construction work zones, maintenance operations, utility operations, loading and unloading operations, planned road closures, as well as special event traffic control.

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DRAINAGE POLICY

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1. Introduction

This policy shall govern the planning, design, construction and operation of storm drainage facilities within the City of McAllen and its extraterritorial jurisdiction. Any variances to this policy are subject to approval by the City Engineer and/or City Commission.

The design guidelines presented in this policy were prepared to facilitate the design, review and construction of proposed drainage infrastructure improvements. The methodologies appearing in the following sections are consistent with standard engineering practice and are intended to serve as guidance in the design of related infrastructure. Interpretation, implementation and engineering judgment shall be the responsibility of the engineer of record.

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2. General

The following summary presents general drainage policy guidelines. Additional detail may be found in subsequent sections.

A. This Drainage Policy shall apply to all drainage improvements within the limits of the City of McAllen (City) and its Extraterritorial Jurisdiction (ETJ). When a conflict in design arises with applicable criteria (Hidalgo County Drainage District No. 1, Texas Department of Transportation, etc.) the more restrictive criteria shall govern.

B. All drainage reports and plans shall be prepared by a Licensed Professional Engineer holding a valid license to practice in the State of Texas.

C. All proposed development within the City and its ETJ shall require a storm sewer outfall designated in accordance with the Master Drainage Plan.

D. In instances where proposed drainage infrastructure improvements require conveyance to an outfall, the developer shall be responsible for design of the conveyance to accommodate storm water runoff from fully developed conditions within the entire subject drainage basin and all reasonable interconnects. The City may consider a cost share or reimbursement program for costs associated with the construction of the offsite conveyance.

E. All storm sewer conduit and related appurtenances maintained by the City of McAllen shall be located within City right-of-way and/or dedicated drainage easements.

F. All drainage facilities including street gutters, inlets, pipes and related appurtenances to the drainage outfall system shall be designed to intercept and convey runoff from a 10- year frequency storm event and checked for a 25-year frequency storm event.

G. The drainage outfall system ("Blue Lines") shall be designed to convey and/or detain storm water runoff from a 50-year frequency storm. The developer must comply with regulations to attain approval for connection to a drainage outfall system through a jurisdictional entity.

H. Improvements which will increase the frequency of flooding or the depth of inundation of unprotected structures in the 100-year flood plain or areas of flooding shall not be permitted for construction. The developer must comply with City Ordinance Subpart B "Land Use Regulations and Related Activities" Chapter 118 Floods.

I. Off-site discharge for post development conditions shall not exceed the pre-development peak discharge for all storm events up to and including the 10-year storm event.

J. Stormwater runoff generated from developed improvements shall be detained on-site for a 50-year frequency storm event and released into the receiving system at the pre- developed, peak discharge rate for a 10-year frequency storm event.

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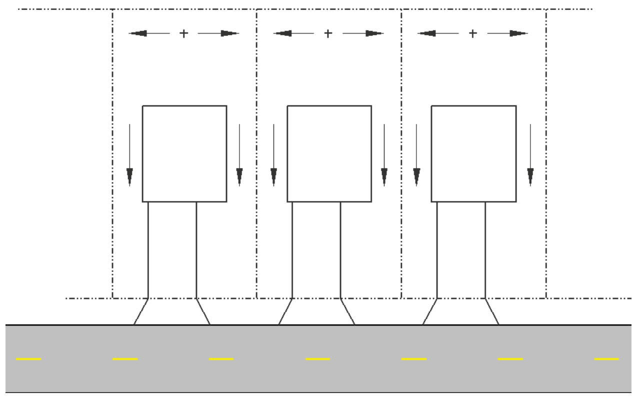
K. For redevelopments that have no existing detention, the pre-developed peak discharge rate shall include land cover prior to any development on site.

L. For master planned developments, stormwater detention requirements shall be reassessed if land use is changed such that calculations show increase in runoff when compared to original approval.

M. Residential lots shall be graded to provide positive drainage towards the front of the lot at a minimum slope of 1%.



Typical Lot Grading

N. In no instance shall site grading on residential or commercial properties adversely affect neighboring properties.

O. In the event of a difference in grade between adjacent properties, each property shall be graded to drain away from the deviation. Grade differentials in excess of 1-foot shall require an engineered retaining structure.

P. Construction activity shall not interfere with the normal operation of existing drainage systems.

Q. Storm drainage designs shall account for off-site drainage patterns affected by any proposed drainage improvements.

R. Variances from procedures described in this policy shall require approval from the City Engineer and/or City Commission, as applicable.

S. All formulas and factors appearing in this policy are presented in English units unless noted otherwise.

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2.1 Minimum Requirements for Drainage Reports and Plans

The drainage report and plans, as applicable, shall contain the minimum information described below:

A. Reports
   1. Summary of project location, existing/proposed conditions Location map
   2. Location of proposed site with respect to FEMA Floodplain Drainage Area Map
   3. All contributing areas delineated
   4. Contours
   5. Spot elevations
   6. Direction of flow
   7. Right-of-way, property lines
   8. Existing/proposed storm sewer systems; outfalls
   9. Design assumptions
   10. Runoff, detention and hydraulic calculation summary
   11. Time of concentration estimates
   12. Runoff coefficient assumptions
   13. Storage volume calculations
   14. Pipe and inlet capacities
   15. Ponded widths and depths
   16. Inlet capacities and bypass
   17. Hydraulic Grade Line (HGL)

B. Storm Sewer Plan and Profile Plan
   1. Right-of-way/property lines
   2. Storm sewer alignment
   3. Direction of flow
   4. High points
   5. Identification of existing and proposed storm sewer
   6. Identification of existing and proposed storm sewer inlets, manholes, and junctions
   7. Profile
   8. Pipe length, size, class, and slope
   9. Identification of inlets, manholes, junction boxes
   10. Flow lines at structures, outfalls; 100-foot intervals along storm sewer length
   11. Finished grade/natural ground
   12. Utility crossings, conflicts
   13. Hydraulic Grade Line (10-year)
   14. Top of curb elevations
   15. Manhole rim elevations
   16. Trench protection limits
   17. Applicable details (other than standard)

C. Bridge/Culvert Layouts
   1. Plan and Profile
   2. Hydraulic calculations
   3. Applicable details

D. Channels and Detention Basins
   1. Grading plan/Earthwork
   2. Calculations
   3. Typical Sections
   4. Hydraulic calculations
   4. Design water surface elevations
   5. Maintenance access
   6. Applicable details

3.0 Stormwater Runoff

3.1 Rational Method

Peak flows may be estimated with use of the Rational Method for areas less than 100-acres.

$$Q = CiA$$

where:
Q = flow (cubic feet/second)
i = intensity (inches/hour)
A = Area (acres)

For areas greater than 100-acres, including phased projects with total area greater than 100 acres, SCS Unit Hydrograph (Ty III rainfall distribution) methodology shall be utilized. In addition, applicable hydrologic software(s) may be utilized with approval from the City Engineer.

3.2 Rainfall and Intensity

Intensity calculations shall utilize Intensity-Duration-Frequency coefficients for Hidalgo County, Texas as presented in Table 3-1 below:

Recurrence Interval (years)	**IDF Coefficients**		
	e	**B**	**d**
2	0.831	74	9.6
5	0.795	80	9.2
10	0.778	87	9.2
25	0.771	98	9.2
50	0.749	99	9.2
100	0.740	103	9.6
Reference: TxDOT *Intensity-Frequency-Duration Coefficients for Texas Counties* HDM (2004)			

Table 3-1: Intensity-Frequency-Duration Coefficients for Hidalgo County, Texas

Intensity can be calculated by the relationship presented below.

$$i = b/(t_c + d)^e$$

where:
i = intensity (inches/hour)
t_c = time of concentration (minutes)

3.3 Time of Concentration

Time of concentration may be estimated by considering the velocity associated with three typical flow regimes; overland/sheet flow, shallow concentrated flow and pipe or channel flow. Time of concentration shall be calculated for each applicable flow regime encountered.

$$t_c = L / 60V$$

where:
t_c= travel time (minutes)
L = watercourse length (feet)
V = average flow velocity (feet/second)

3.4 Velocity Estimates

Velocities for overland/sheet flow and shallow concentrated flow may be estimated with the following relationship.

$$\mathbf{V = K_u k S_P^{1/2}}$$

where:
K_u = 3.28
V = velocity (feet / second)
k = intercept coefficient
S_P = slope (%)

Land Cover / Flow Regime	k
Forest with heavy ground litter; hay meadow (overland flow)	0.076
Trash fallow or minimum tillage cultivation; contour or strip cropped; woodland (overland flow)	0.152
Short grass pasture (overland flow)	0.213
Cultivated straight row (overland flow)	0.274
Nearly bare and untilled (overland flow); alluvial fans in western mountain regions	0.305
Grassed waterway (shallow concentrated flow)	0.457
Unpaved (shallow concentrated flow)	0.491
Paved area (shallow concentrated flow); small upland gullies	0.619

Table 3-2: Intercept Coefficients

Manning's Equation shall be used to estimate average flow velocities in channels and conduits.

$$\mathbf{V = 1.49/n\ R^{2/3}S^{1/2}}$$

Stormwater runoff shall be calculated for fully developed conditions. Minimum inlet time of concentration shall be 10-minutes.

3.5 Drainage Areas

Drainage areas shall be delineated with the aid of available topographic information. Care should be taken when considering existing drainage systems that cross natural drainage divides.

For areas greater than 100-acres, including phased projects with total area greater than 100 acres, SCS Unit Hydrograph (Ty III rainfall distribution) methodology shall be utilized. In addition, applicable hydrologic software(s) may be utilized with approval from the City Engineer.

3.6 Runoff Coefficients

Runoff coefficients shall be determined for each drainage area. Where non-homogeneous conditions exist, a weighted coefficient shall be determined with application of the following formula:

$$C_W = (C_1A_1 + C_2A_2 + C_3A_3 + \ldots + C_nA_n) / A_{Total}$$

where:
C_W = Weighted Runoff Coefficient
C_n = Runoff Coefficient n-th term
A_n = Area of n-th term (acres)
A_{Total} = Total Area (acres)

Table 3-3 presents typical ranges for "C". Runoff coefficients utilized for 25-year and 50-year storm frequencies shall be adjusted by 10% and 20%, respectively.

Type of Drainage Area	Runoff Coefficient, C
Business	
Downtown areas	0.70 - 0.95
Neighborhood areas	0.50 - 0.70
Residential:	
Single-family areas	0.30 - 0.50
Multi-units, detached	0.40 - 0.60
Multi-units, attached	0.60 - 0.75
Suburban	0.25 - 0.40
Apartment dwelling areas	0.50 - 0.70
Industrial:	
Light areas	0.50 - 0.80
Heavy areas	0.60 - 0.90
Parks, cemeteries	0.10 - 0.25
Playgrounds	0.20 - 0.40
Railroad yard areas	0.20 - 0.40
Unimproved areas	0.10 - 0.30
Lawns:	
Sandy soil, flat, 2%	0.05 - 0.10
Sandy soil, average, 2 - 7%	0.10 - 0.15
Sandy soil, steep, 7%	0.15 - 0.20
Heavy soil, flat, 2%	0.13 - 0.17
Heavy soil, average, 2 - 7%	0.18 - 0.22
Heavy soil, steep, 7%	0.25 - 0.35
Streets:	
Asphaltic	0.70 - 0.95
Concrete	0.80 - 0.95
Brick	0.70 - 0.85
Drives and walks	0.75 - 0.85
Roofs	0.75 - 0.95
Reference: FHWA, *Urban Drainage Design Manual* HEC-22, (2001)	

Table 3-3: Runoff Coefficients

In order to assist designers, a flow rate determination table is included in Appendix A.

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4.0 Street Flow

To maintain safe passage of vehicular and pedestrian traffic and to ensure properties are kept reasonably safe from flooding, the designer shall be responsible for determining the depth and width of stormwater runoff. Calculated ponding widths and depths shall be presented on storm sewer plan sheets.

The width of spread on a pavement section shall be contained to provide passage of vehicular traffic as specified in Table 4-1 below.

Functional Classification	Clear Lanes
Local	(a)
Collector	1 - 11 foot
Minor Arterial	2 - 11 foot (1 each way)
Principal Arterial	2 - 11 foot (1 each way)
(a) No width requirement; depth not to exceed top of curb	

Table 4-1: Spread Limits for Roadways

In all cases, depth of flow shall be maintained at or below top of curb. For inlets located at sag points, the designer shall consider the effects resulting depths on existing and/or proposed adjacent grades.

Flow in a gutter section can be calculated with adaptation of Manning's Equation.[1]

$$\mathbf{Q = (K_U/n)\ S_X^{1.67} S_L^{0.5}\ T^{2.67}}$$

Spread width can be determined by the formula

$$\mathbf{T = (Q_n\ /\ K_U S_X^{1.67}\ S_L^{0.5})^{0.375}}$$

where:
K_U = 0.56
N = Manning's roughness coefficient
Q = flow (cubic feet / second)
T = spread width (feet)
S_X = cross slope (foot / foot)
S_L = longitudinal slope (foot / foot)

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Table 4.2 presents acceptable values of Manning's roughness coefficient.

Type of Gutter or Pavement	Manning's n
Concrete gutter, troweled finish	0.012
Asphalt Pavement Smooth Texture Rough Texture	 0.013 0.016
Concrete gutter-asphalt pavement Smooth Rough	 0.013 0.015
Concrete Pavement Float finish Broom finish	 0.014 0.016
For gutters with small slope, where sediment may accumulate, increase above values of "n" by	0.002
Reference: FHWA, *Design Charts for Open Channel Flow* HDS-3 (1961)	

Table 4-2: Manning's Roughness Coefficient, n

Depth of flow in a gutter section can be calculated by the formula

$$\mathbf{D = TS_X}$$

Where:
D = depth of flow (feet)
T = spread width (feet)
S_X = cross slope (foot / foot)

The above formulas are applicable for pavement sections with a uniform, straight cross slope. The designer is referred to consult Reference 1 in Appendix A when composite pavement sections or parabolic crowns are encountered.

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5.0 Inlet Design

Curb and grate inlets shall be used to facilitate the drainage of pavement sections and open areas. Placement of inlets shall consider the safety of pedestrian, vehicular and bicycle traffic. Inlets shall be placed at low points and at intervals necessary to meet maximum permissible spread limits and inlet capacities. In any case, inlet spacing shall not exceed 600-feet, with a maximum surface run of 300-feet from crest to sag of the roadway profile. In the event a longitudinal roadway profile exceeds 300-feet from crest to sag, inlets shall be spaced at a maximum of 300- feet. Flows shall be intercepted upstream of street intersections where practical.

Runoff across roadway intersections consisting of a minor or principal arterial street is prohibited. For inlets on grade, by-pass flows shall be limited to 10% of previously intercepted flows. When curb inlet extensions are required, no more than two extensions shall be used conjunction with a primary inlet. Inlet hydraulics shall be presented on plan sheets. The use of inlets other than curb-opening or grate inlets shall require approval from the City Engineer.

5.1 Curb Inlet Capacity

Capacities for inlets may be determined by the following equations.

A. Curb Opening Inlets on Grade

$$L_T = K_U Q^{0.42} S_L^{0.3} (1/nS_X)$$

where:
L_T = curb opening length for 100% interception (feet)
K_U = 0.6
Q = flow in gutter (cubic feet/second)
S_L = longitudinal slope (foot/foot)
n = Manning's roughness coefficient
S_X = cross slope (foot/foot)

B. Curb Inlets on Grade with Depressed Curb Opening

$$L_T = K_U Q^{0.42} S_L^{0.3} (1/nS_e)$$

In this case the cross slope, S_X is replaced by an equivalent cross slope, S_e that accounts for the depressed gutter section. The equivalent cross slope is calculated by

$$S_e = S_X + S'_W E_O$$

where:
Se = equivalent cross slope (foot / foot)
S_X = pavement cross slope (foot / foot)
S'_W = gutter cross slope; gutter depression/gutter width (foot / foot)
E_O = ratio of flow in depressed section to total gutter flow upstream of inlet

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C. Curb Inlets - Sag Location

Curb opening inlets operate under weir or orifice flow conditions.

1. Weir Condition - Capacity of a curb opening inlet under weir conditions can be estimated by the following relationship.

$$\mathbf{Q_I = C_W (L + 1.8W)\, d^{1.5}}$$

Where:
C_W = 2.3
L = length of curb opening (feet)
W = lateral width of depression (feet)
d = depth at curb measured from normal cross slope (feet)

This formula is applicable for depths less than the curb opening plus the depth of the depression.

where:
h = curb opening height (feet)
a = depth of depression (inches)
or

$$d \leq h + a/12$$

2. Orifice Condition – Curb openings act as orifices at depths greater than approximately 1.4 times the opening heights. The capacity can be computed using the following relationship:

$$\mathbf{Q_I = C_O hL(2gd_O)^{0.5}}$$

Or

$$\mathbf{Q_I = C_O A_g\, [2g\, (d_l - h/2)]^{0.5}}$$

where:
C_O = 0.67 (orifice coefficient)
d_O = head on center of orifice throat (feet)
L = length of orifice opening (feet)
A_g = clear area of opening (square feet)
d_l = depth at lip of curb opening (feet)
h = height of curb opening orifice (feet)

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For curb opening inlet other than vertical face use:

$$d_O = d_I - (h/2)\sin\theta$$

h = orifice throat width (feet)
d_O = effective head on center of orifice throat (feet)

5.2 Grate Inlet Capacity

A. Grate Inlets in Sag Locations – Inlets may be calculated as weir or orifice flow.

1. Weir flow may be calculated using the following relationship:

$$Q_I = C_W P d^{1.5}$$

where:
P = perimeter of the grate (feet) disregarding curb side
C_W = 3.0
d = average depth across grate (feet)

2. As an orifice, flow may be calculated using the following relationship.

$$Q_I = C_O A_g (2gd)^{0.5}$$

where:
C_O = 0.67 (orifice coefficient)
Ag = clear opening area of grate (square feet)
g = 32.2 (feet/second/second)

3. Grate inlet design shall incorporate a 50% factor to account for clogging.

B. When the use or analysis of combination inlets is required, the designer shall consult Reference 1 in Appendix A.

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6.0 Storm Sewer Design

6.1 Design Considerations

Storm sewer systems shall be designed to convey runoff from a 10-year frequency storm event and checked for a 25-year frequency storm event. Storm sewer systems shall utilize rubber-gasketed, Class III reinforced concrete pipe (RCP) with a minimum size of 24 inches. Manholes or junction boxes shall be utilized at all changes in pipe size and direction in both horizontal and vertical planes. Manhole spacing shall be maintained as presented in Table 6.1.

Pipe Size (inches)	**Maximum Spacing** (feet)
12 to 24	300
27 to 36	400
42 to 54	500
60 and greater	1000
Reference: FHWA, *Urban Sewerage Design Manual* HEC-22 (2001)	

Table 6-1: Suggested Manhole Spacing(1)

Pipes shall be matched at soffits when practical. In instances where radial alignment is required, pipe joints shall not be deflected beyond manufacturer's suggested tolerances. Pipe slopes shall be designed to provide a minimum velocity of 3-feet per second and a maximum velocity of 12-feet per second. Table 6-2 on page 2 presents the minimum slopes necessary to achieve the minimum velocity.

Diameter (inches)	**Slope** (foot/foot)	**Slope** (%)
24	0.00174	0.174
27	0.00148	0.148
30	0.00129	0.129
36	0.00101	0.101
42	0.00082	0.082
48	0.00069	0.069
54	0.00059	0.059
60	0.00051	0.051
66	0.00045	0.045
72	0.00040	0.040
Based on Manning's Equation; v = 3 fps, n = 0.013		

Table 6-2: Minimum Pipe Slopes

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All outfalls shall incorporate the use of a concrete sloped-end treatment as per the City of McAllen standard drainage detail. Where outlet velocities exceed maximums, velocity dissipation shall be required.

Minimum depth of cover for all storm sewer pipe shall be 3-feet from finished grade to the crown of the pipe. Depth of cover not meeting this requirement shall require structural calculations as approved by the City Engineer.

Trench protection shall be required for storm sewer system installations exceeding depths of 5-feet.

6.2 Hydraulic Grade Line Analysis

A hydraulic grade line (HGL) analysis is required for all proposed storm sewer system improvements.

The analysis shall include determination and presentation of the 10-year HGL. The HGL shall be shown on all storm sewer profile plans. The hydraulic grade line shall be maintained at or below the throat of the inlet. Computations shall include determination of major and minor losses.

Starting water surface elevations shall be calculated from the best available data. The designer shall document all assumptions. For starting water surface elevations where an outfall is provided at a channel, a backwater analysis shall be utilized where no water surface data is available. Similarly, starting water surface elevations at ties to existing storm sewer systems shall utilize best available data and shall be reviewed and approved by the City Engineer.

A. Major Losses due to friction may be calculated by the relationship:

$$\mathbf{H_f = S_f L}$$

where:
H_f = loss due to friction (feet)
S_f = friction slope (feet)
L = length of conduit (feet)

$$\mathbf{S_f = (Qn / K_Q D^{2.67})^2}$$

Q = flow (cubic feet/second)
n = Manning's roughness coefficient
K_Q = 0.46
D = pipe diameter (feet)

Manning's roughness coefficient may be assumed as 0.013 for concrete pipe.

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B. Minor Losses result from flow disturbances at junctions such as inlets, manholes or junction boxes. Minor losses may be calculated with application of the formula

$$H_m = K (V^2/2g)$$

where:
H_m = minor losses (feet)
K = constant of proportionality
V = velocity (feet / second)
g = gravitational acceleration constant (32.2 feet/second/second)

$$K = K_O C_D C_d C_Q C_p C_B$$

K = constant of proportionality
K_O = initial head loss coefficient based on relative access hole size
C_D = correction factor for pipe diameter (pressure flow only)
C_d = correction factor for flow depth
C_Q = correction factor for relative depth
C_p = correction factor for plunging flow
C_B = correction factor for benching

Relative Manhole size, K_O
This is estimated as a function of the relative structure size and angle of deflection between the inflow and outflow pipe.

$$K_O = 0.1(b/D_O)(1-\sin\theta) + 1.4(b/D_O)^{0.15}\sin\theta$$

θ = angle between pipes (degrees)
b = manhole/junction diameter (feet)
D_O = diameter of outlet pipe

Pipe Diameter, C_D
A change in head loss due to differences in pipe diameter is only significant in pressure flow situation where the depth in the structure to outlet pipe diameter ratio (depth/D_O) is greater than 3.2, otherwise C_D is set to equal to 1.0.

$$C_D = (D_O/D_I)^3$$

D_O = diameter of outlet pipe
D_I = diameter of incoming pipe

Flow Depth, C_d

This formula is applicable in cases of free surface flow or low pressures where depth/D_O is less than 3.2, otherwise C_d is equal to 1.0. Depth in the access hole is estimated as HGL at upstream end of outlet pipe.

$$C_d = 0.5\ (d_{mh}/D_O)^{0.6}$$

d_{mh} = depth in mh/junction
D_O = diameter of outlet pipe

Relative Flow, C_Q

This formula is applied when 3 or more pipes enter the structure at approximately the same elevation, otherwise C_Q is equal to 1.0.

$$C_Q = (1\text{-}2\ \sin\theta)(1\text{-}Q_I/Q_O)^{0.75} + 1$$

where:
θ = angle between pipes
Q_I = flow in incoming pipe
Q_O = flow in outgoing pipe

Plunging Flow, C_p

This corresponds to the effect of another inflow pipe or surface flow from an inlet, plunging into the structure, on the inflow pipe for which the head loss is being calculated. It is applicable if $h > d_{mh}$ and if the plunging flow is at a higher elevation and inflow and outflow pipes are at the bottom of the manhole / junction. This correction factor is also applied at curb and grate inlets functioning as junctions.

$$C_p = 1 + 0.2\ (h/D_O)\ ((h\text{-}d_{mh})/D_O)$$

where:
h = elevation difference between the invert of plunging flow pipe to center of outflow pipe
D_O = outlet pipe diameter
d_{mh} = depth of water in manhole relative to outlet pipe invert

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Benching, C_B

The correction factor is applied to address benching configurations for either submerged or unsubmerged conditions.

Bench Type	C_B Submerged[(1)]	C_B Unsubmerged[(2)]
Flat or Depressed Floor	1.00	1.00
Half Bench	0.95	0.15
Full Bench	0.75	0.07
(1) pressure flow $d_{mh}/D_O \geq 3.2$		
(2) free surface flow $d_{mh}/D_O \leq 1.0$		
Reference: FHWA, *Urban Sewerage Design Manual* HEC-22 (2001)		

Table 6.3: Bench correction factor, C_B

C. Exit Losses

Exit losses shall be accounted for at all outfalls.

$$\mathbf{H_E = 1.0\ (V^2o/2g\ -\ V^2r/2/g)}$$

where:
Vo = average velocity at outlet (feet / second)
Vr = velocity of receiving stream (feet / second)

D. All hydrologic and hydraulic design computations may be completed with the aid of design software approved by the City Engineer.

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7.0 Detention Design

7.1 Design Considerations

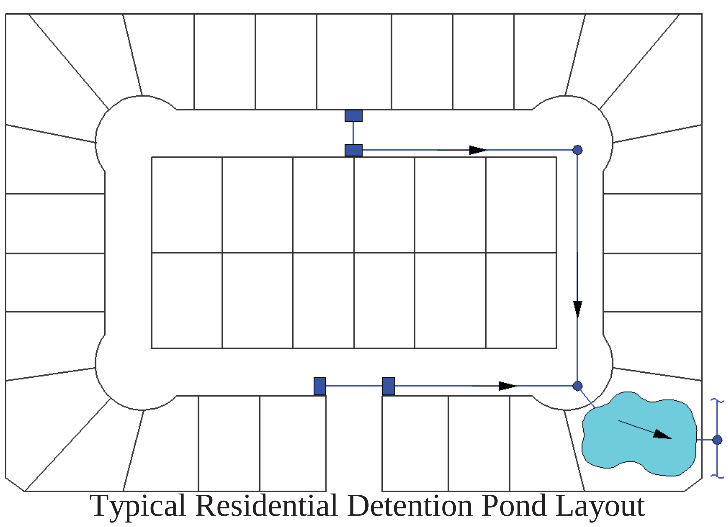
Stormwater runoff generated from developed improvements shall be detained on-site for a 50-year frequency storm event and released into the receiving system at the pre-developed rate for a 10-year frequency storm event. The Modified Rational Method (MRM) shall be used to determine stormwater storage requirements for areas less than 10-acres. For areas greater than 10-acres, the MRM may be used to estimate storage requirements. However, final detention design shall implement appropriate hydrograph routing procedures that account for the storage characteristics of the basin and discharge characteristics of the outlet structure. Applicable software programs may be implemented with approval from the City Engineer.

Existing drainage facilities (i.e. City of McAllen Bluelines, Regional Stormwater Detention Facilities, etc.) shall not take the place of dedicated facilities unless previously included in the City of McAllen's Master Drainage Plan.

Methods of on-site detention shall include ponds or engineered sub-surface systems with an outlet structure connecting into an approved drainage system. Detention pond areas shall be vegetated to prevent erosion and deposition of silts. Common Bermuda, Winter Rye or a combination of the grasses may be used. Vegetated areas shall include provisions for irrigation systems. Detention areas may be incorporated into landscape and greenbelt areas if vegetation does not adversely affect required design volumes or impede hydraulic efficiency. Areas designated as dual use areas (detention/landscape, detention/green space, etc.) shall display appropriate signage indicating so.

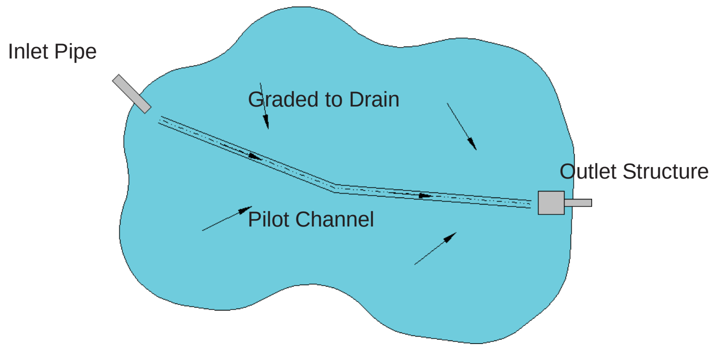
Maintenance of detention areas shall be the responsibility of the property owner’s or home owner's association as applicable. The City shall have the authority to assume the responsibility of maintaining the detention areas and impose applicable fees in the event the property owner or home owner's association fails to comply with the maintenance requirements.

On-site detention facilities shall be situated in dedicated areas.



Typical Residential Detention Pond Layout

Side slopes shall not exceed 3:1 (H:V). Detention pond depths at or exceeding 2.5-feet shall require a safety buffer in the form of benching or 4 ft tall fencing around the perimeter of the pond.



Typical Dry Stormwater Detention Pond

The bottom of the basin shall be graded to drain towards the outlet structure. A pilot channel shall be placed along the flow line from inlet to outlet to ensure positive flow.

Trash racks shall be incorporated into outlet structure design.

A minimum width of 6-feet shall be maintained around the perimeter of the pond to allow for routine maintenance and/or repair. Detention area design shall consider proximity and elevation of adjacent building structures. Bank areas shall be graded to drain away from such structures.

No freeboard above design pool elevation shall be required, however, the design of detention areas shall incorporate diversion of overflows into street rights-of-way or drainage/flowage easements in the event of an extreme event or outlet structure failure.

For single family residential developments with 5 lots or less, detention storage may be achieved within shallow swales along the perimeter of the lot. Shallow swale side slopes shall not exceed 2:1. Storm water runoff may be conveyed via storm sewer networks, flumes and curb cuts within the lot. The bottom of swale shall be graded to drain towards the outlet structure to an approved drainage system.

7.2 Modified Rational Method

The Modified Rational Method may be used to estimate storage volumes. The MRM produces a trapezoidal runoff hydrograph based on the Rational formula. Storage requirements are based upon differences in volume between pre and post development runoff hydrographs for various storm durations. Calculations are best carried out in tabular form.

(A)	(B)	(C)	(D)	(E)	(F)	(G)
Duration	Intensity	Q_{in}	Vol_{in}	Q_{out}	V_{out}	Storage
(min)	(in/hr)	(cfs)	(ft^3)	(cfs)	(ft^3)	(ft^3)

Column A: Duration in minutes
Column B: Intensity for respective duration (50-year event)
Column C: Developed conditions peak discharge (C_{dev} x i_{50} x Area)
Column D: Developed conditions Runoff Volume (Q_{in} x Duration x 60)
Column E: Pre-developed peak discharge (C_{pre} x i_{10} x Area)
Column F: (0.5 x [duration + $t_{c\ dev}$] x Q_{out} x 60)
Column G: Required storage (V_{in} - V_{out})

The calculations are carried out iteratively until a duration yielding the greatest storage volume is achieved. The following example illustrates application of the MRM.

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7.3 Modified Rational Method Example

Site Area: 5.3-acres

<u>Pre-developed Conditions</u>
C = 0.25
t_c = 60 min
i_{10} = 3.22 in/hr
Q_{peak} = 4.27 cfs

<u>Post-developed Conditions</u>
C = 0.60
t_c = 20 min
i_{50} = 7.91in/hr
Q_{peak} = 30.18 cfs

Duration	**Intensity**	**Q_{in}**	**Vol_{in}**	**Q_{out}**	**V_{out}**	**Storage**
(min)	(in/hr)	(cfs)	(ft^3)	(cfs)	(ft^3)	(ft^3)
10	10.83	41.31	24,786	4.27	3,840	20,945
20	7.91	30.18	36,212	4.27	5,121	31,092
30	6.34	24.20	43,566	4.27	6,401	37,165
40	5.35	20.42	48,997	4.27	7,681	41,317
50	4.66	17.77	53,321	4.27	8,961	44,360
60	4.14	15.81	56,925	4.27	10,241	46,684
70	3.75	14.29	60,027	4.27	11,521	48,506
80	3.43	13.07	62,757	4.27	12,801	49,956
90	3.16	12.07	65,200	4.27	14,081	51,119
100	2.94	11.24	67,416	4.27	15,362	52,055
110	2.76	10.52	69,447	4.27	16,642	52,806
120	2.60	9.91	71,325	4.27	17,922	53,403
130	2.45	9.37	73,072	4.27	19,202	53,870
140	2.33	8.89	74,708	4.27	20,482	54,226
150	2.22	8.47	76,248	4.27	21,762	54,486
160	2.12	8.09	77,704	4.27	23,042	54,662
170	2.03	7.75	79,085	4.27	24,322	54,762
180	1.95	7.44	80,400	4.27	25,603	54,797
190	1.88	7.16	81,655	4.27	26,883	54,772
200	1.81	6.90	82,856	4.27	28,163	54,693
210	1.75	6.67	84,009	4.27	29,443	54,566
220	1.69	6.45	85,117	4.27	30,723	54,394

Required storage = 54,797 ft^3 = 1.25 ac-ft with a controlled release of 4.27 cfs.

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8.0 Channel Design

City maintained/dedicated Channels shall be designed to convey and or detain stormwater runoff resulting from the 50-year storm. Typical channel sections shall incorporate maximum side slopes of 3:1 (H:V). Side slopes shall be vegetated to prevent erosion and degradation of slopes.

A. Utility crossings within the banks of a channel are discouraged. In instances where such crossings are unavoidable, utilities shall be designed to maximize the cross-sectional area of the channel in the vicinity of crossing. Utility crossings shall be protected from floating debris and scour.

B. Water surface profiles shall be prepared utilizing standard-step backwater calculations or hydraulic modeling software such as HEC-RAS. Calculations shall account for losses at bridge and culvert crossings.

C. Typical channel sections shall incorporate the use of a pilot channel with a minimum 10-foot maintenance bench on either side (12' preferred). Maintenance benches shall be graded to slope toward the pilot channel at a minimum slope of 12:1 (H:V). Access to maintenance benches shall be provided at end sections of the channel at grades not exceeding 5%.

D. Culverts shall be sized to convey the 50-year storm and shall be designed in accordance with criteria as specified in Chapter 8 of the Texas Department of Transportation Hydraulic Design Manual.[(5)]

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References

1. Federal Highway Administration, "Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22", FHWA-NHI-01-021, Washington, D.C., August 2001.

2. Federal Highway Administration, "Drainage of Highway Pavements, Hydraulic Engineering Circular No. 12", FHWA-TS-84-202, Washington, D.C., March 1984.

3. Gribbin, J.E., "Hydraulics and Hydrology for Stormwater Management", Delmar, New York, 1987.

4. United States Department of Commerce, "Rainfall Frequency Atlas of the United States, Technical Paper No. 40", Washington, D.C., May 1961.

5. Texas Department of Transportation, "Hydraulic Design Manual", Austin, Texas, March 2004.

6. United States Department of Agriculture Natural Resources Conservation Service, "National Engineering Handbook, Section 4, Hydrology", August 1972.

7. Federal Highway Administration, "Design Charts for Open Channel Flow Hydraulic Design Series-3", Washington, D.C., August 1961.

8. Federal Highway Administration, "Highway Hydrology, Hydraulic Design Series No. 2", FHWA-NHI-02-001, Washington, D.C., October 2002.

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TRAFFIC IMPACT ANALYSIS POLICY

TIA Requirements

The Traffic Impact Analysis (TIA) policy applies to new development, changes to existing development, and conditional use permits. The TIA shall assist City of McAllen staff in assessing the roadway system's ability to serve the development.

It shall be the responsibility of the developer and shall be submitted with plat/site plan and conditional use permit applications. The TIA will be used by City of McAllen staff to:

- Evaluate site access and traffic circulation
- Evaluate the ability of the roadway system to support the proposed development
- Determine specific on-site and off-site roadway system mitigation requirements
- Determine the developer's share of future roadway improvements

All Traffic Impact Analyses performed under this policy shall be conducted under the direction of a registered/licensed professional engineer. The final report shall be signed and sealed by the registered professional engineer responsible for the document. The Professional Engineer's license shall be valid in the State of Texas. Engineers performing the study shall discuss study requirements (trip generation, trip distribution, growth rates, e.g.) with the City of McAllen Engineering Department's designated staff to confirm each of these elements prior to completing the study.

1. TIA Scope

The scope of the Traffic Impact Analysis shall be based on the peak hours trips projected to be generated by the proposed development, as set for in the following table.

Nonresidential Peak Hour Trips	Residential Peak Hour Trips	TIA Scope
100 or less	100 or less	*Trip Generation Worksheet Required. No TIA Required.
101-300	101-300	The frontage of the property, all access points (including common access), and all intersections within a 1/4 mile radius of the proposed development.
301-500	301-500	The frontage of the property, all access points (including common access), and all intersections within a 1/2 mile radius of the proposed development.
501 or more	501 or more	The frontage of the property, all access points (including common access), and all intersections within a 1 mile radius of the proposed development.
* If no TIA is required then intersection sight triangles to be submitted for all intersections.		

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2. Trip Generation

Trip generation shall be based on the specific site use and calculated using the latest addition of the Institute of Transportation Engineers (ITE) *Trip Generation Manual*.

3. Trip Distribution

Trip distribution shall be based on current peak hour traffic movements and may be adjusted to reflect future, financially assured, roadway improvements.

4. Study Time Frames

The analysis should include the following conditions:

- Existing traffic volumes and roadway conditions
- Existing traffic volumes and roadway conditions plus projected site generated traffic
- Existing traffic volumes with improved roadway conditions plus projected site generated traffic (when specified by City of McAllen staff)

The analysis should be performed for a typical week day unless specified by City of McAllen staff. The analysis shall include both the AM and PM peak hours, 24-hour generations, and special times or days of the week dependent of the land use's peak traffic generating time periods as determined from the *Trip Generation Manual.*

5. Access Analysis

Intersection needs at all the development's access points shall be determined. Spacing of the access points shall be determined both by the City of McAllen's 'Access Management Policy' and the operational analysis. This operational evaluation shall include on-site circulation as it may affect access, on-site and off-site turn lanes, required storage, potential for signalization, review of sight distance and other intersection safety aspects. Site distance triangles shall be shown on the site plan/ plat and calculated using the latest addition of the *American Association of State Highway and Transportation Officials*, "*A Policy on Geometric Design of Highways and Streets" (Green Book).* Usage of common access driveways is encouraged to reduce the total number of connections to the roadway network.

6. Level of Service Evaluation

Both roadway capacity and intersection capacity shall be evaluated as part of the level of service analysis. The level of service evaluation for roadways shall be based on the latest edition of *The Highway Capacity Manual (HCM)*. The volume to capacity ratio (v/c) is an important indicator of roadway capacity and shall be included as part of the level of service tables. Intersection level of service shall be calculated using the latest *Intersection Capacity Utilization (ICU)* methodologies. The intersection level of service tables shall include volume to capacity ratios (v/c) as well as volume to saturated flow ratios (v/s).

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7. Recommendations

Recommendations shall be put forth to preserve existing roadway network operations. The recommendation may include the following incremental improvements:

- Left turn bays
- Increased storage lanes
- Right turn declaration lanes
- Conversion of Two-way Stop control to All-way Stop control, if warrants are met and staff approves
- Conversion of All-way Stop control to roundabout or traffic signal, if warrants are met and staff approves
- The installation of a traffic signal, if warrants are met and staff approves
- Improved signal timing or phasing
- Roadway expansion or extension
- Various access management measures to improve overall circulation and/or safety

Any suggested changes to signal timing must evaluate the effects to the entire network of affected signals and not just the signalized intersections in question. Recommendations put forth to expand or extend roadways shall conform to the *Foresight McAllen* comprehensive plan.

8. Mitigation

Mitigation may be required based on the TIA recommendations or to account for the cumulative effect of development on the roadway network. In the case of cumulative mitigation, fees may be charged proportionately to fund future roadway improvements.

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Standard Details

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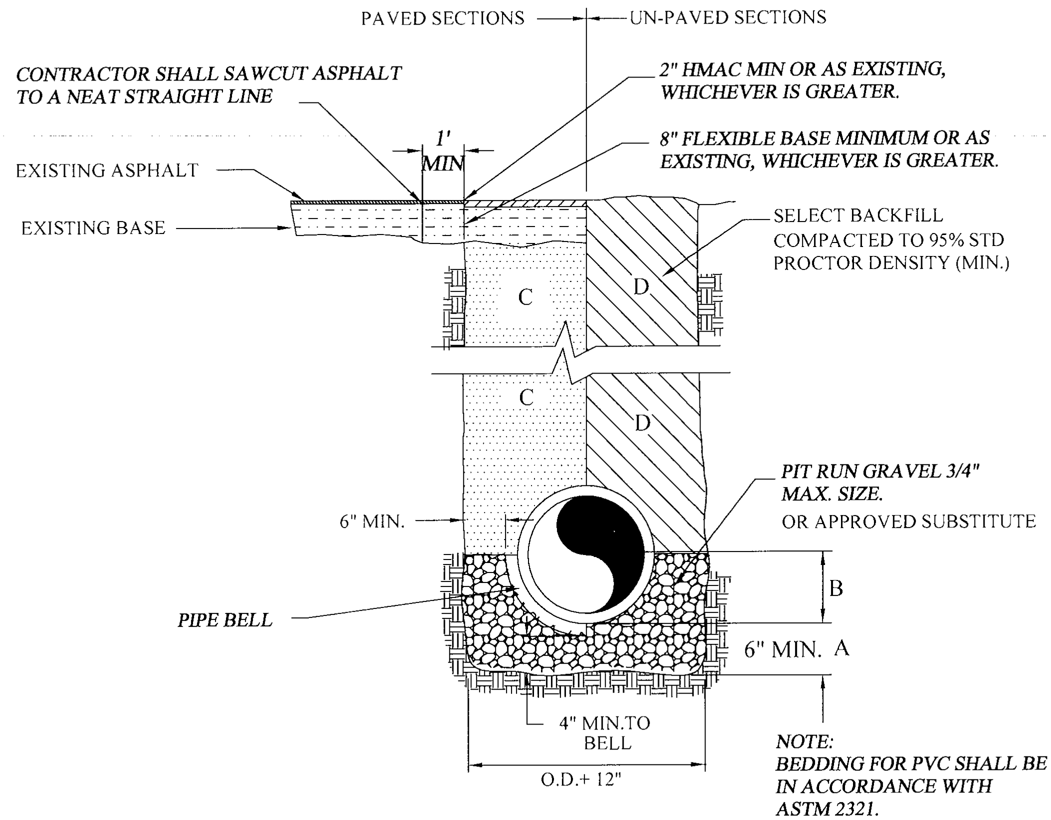


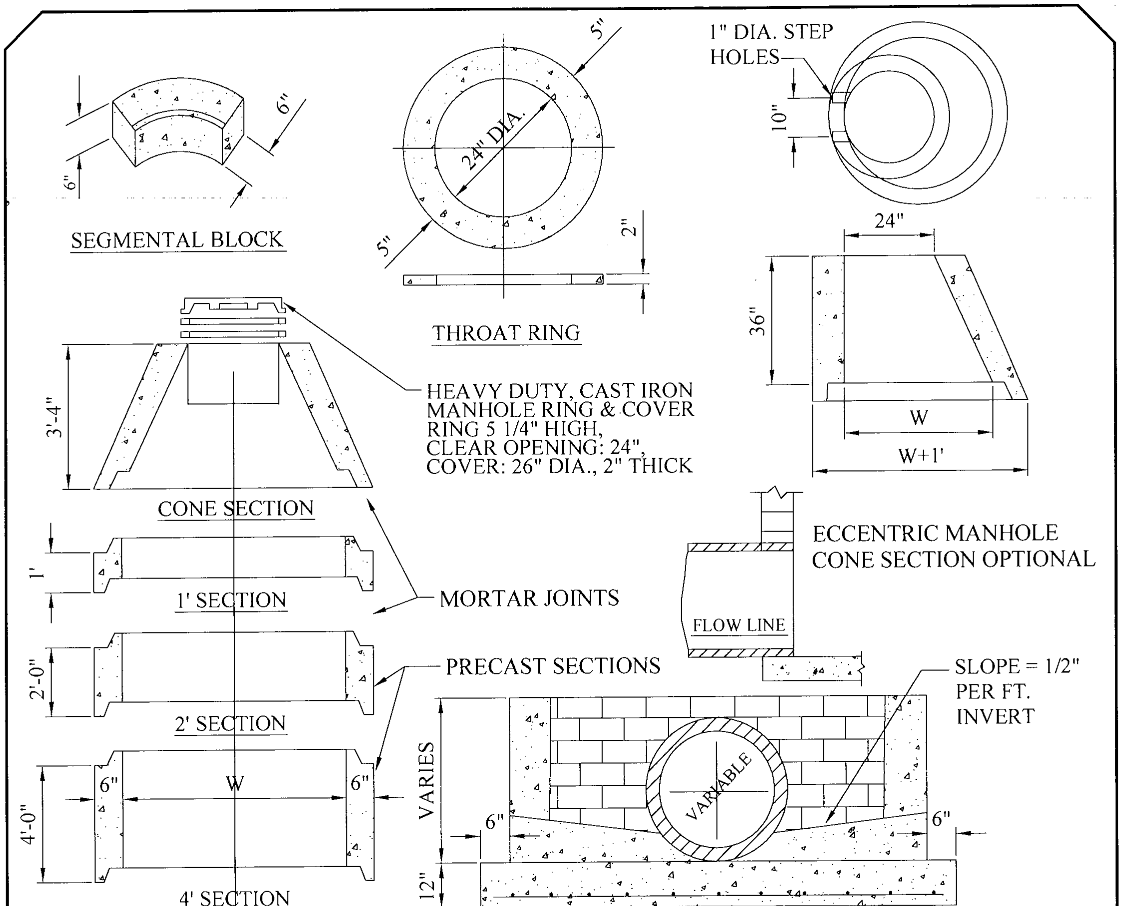
A. GRAVEL BEDDING PLACED BEFORE PIPE IS LAID UP TO FLOW LINE OF PIPE (MIN. THICKNESS=6") PIT RUN GRAVEL 3/4" MAX SIZE.
B. GRAVEL PLACED AFTER PIPE IS LAID, FROM BOTTOM OF PIPE TO THE SPRING LINE. PIT RUN GRAVEL 3/4" MAX. SIZE OR APPROVED SUBSTITUTE.
C. CITY STREETS PARKING AREA, DRIVEWAYS: SELECT EXCAVATED BACK FILL COMPACTED 95% STD, 8" LIFTS, MECHANICAL COMPACTION.
D. STATE MAINTAINED ROADWAYS: COMPACTED SAND/CEMENT STABILIZED BACK FILL 7% PORTLAND CEMENT COMPACTED AS PER ASTM D-4253 AND ASTM D-698.
E. SELECT EARTH BACKIFLL COMPACTED TO 95% STD. PROCTOR DENSITY (12" LIFTS, MECHANICAL COMPACTION) FOUNDATION PREPARATION (WELLPOINTS, GRAVEL OR CEMENT STABILIZATION, OR APPROVED SUBSTITUTE) SHALL BE REQUIRED WHEN TRENCH BOTTOM IS UNSTABLE. BACKFILLING AT STRUCTURES SHALL BE PLACED IN UNIFORM LAYERS, MOISTENED AS REQUIRED TO APPROXIMATE OPTIMUM MOISTURE CONTENT, AND COMPACTED TO 95% STD. PROCTOR DENSITY (USE RELATIVE DENSITY TEST PER ASTM D-4253 & ASTM D-698). THE THICKNESS OF EACH LOOSE LAYER SHALL NOT EXCEED 8". STRUCTURE BACK FILL MATERIAL SHALL BE SAND, EXCAVATED MATERIAL, OR OTHER APPROVED SUBSTITUTE.

City of McAllen
ENGINEERING DEPARTMENT

TYPICAL STORM SEWER PIPE BEDDING DETAIL

DETAIL 101
02/2009

Standard Details



GENERAL NOTES:

1. SEGMENTAL BLOCK SECTION & PRE-CAST SECTION MAY BE ALTERNATED.
2. PRE-CAST SECTIONS MAY BE PLACED IN ANY ORDER.
3. FOOTING (BASE) TO BE POURED ON UNDISTURBED SOIL & TO BE UNIFORM IN THICKNESS.
4. ALL TIE-INS TO BE AT BOTTOM OF MANHOLE. NO DROP CONNECTIONS ACCEPTABLE.
5. 1/2" OF MORTAR TO BE PLACED ON INSIDE AND OUTSIDE OF SEGMENTAL BLOCK MANHOLE.
6. SEGMENTAL BLOCKS TO BE USE AS DIRECTED BY ENGINEER.
7. THROAT RINGS SHALL BE REINFORCED CONCRETE H-20 RATING. 2 RINGS MIN / 5 RINGS MAX. TO ALLOW FOR FUTURE ADJUSTMENT.
8. CONCRETE TO HAVE A MIN 28 DAY COMPRESSIVE STRENGTH OF 3,000 PSI.
9. NEW MANHOLE INSTALLATION ON EXISTING LINES SHALL CONFORM TO THIS DETAIL.
10. GRAVEL BEDDING IS REQUIRED IF UNSTABLE SOIL OR GROUND WATER IS FOUND.

City of McAllen
ENGINEERING DEPARTMENT

TYPICAL CONCRETE STORM MANHOLE

DETAIL 102
02/2009

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Standard Details

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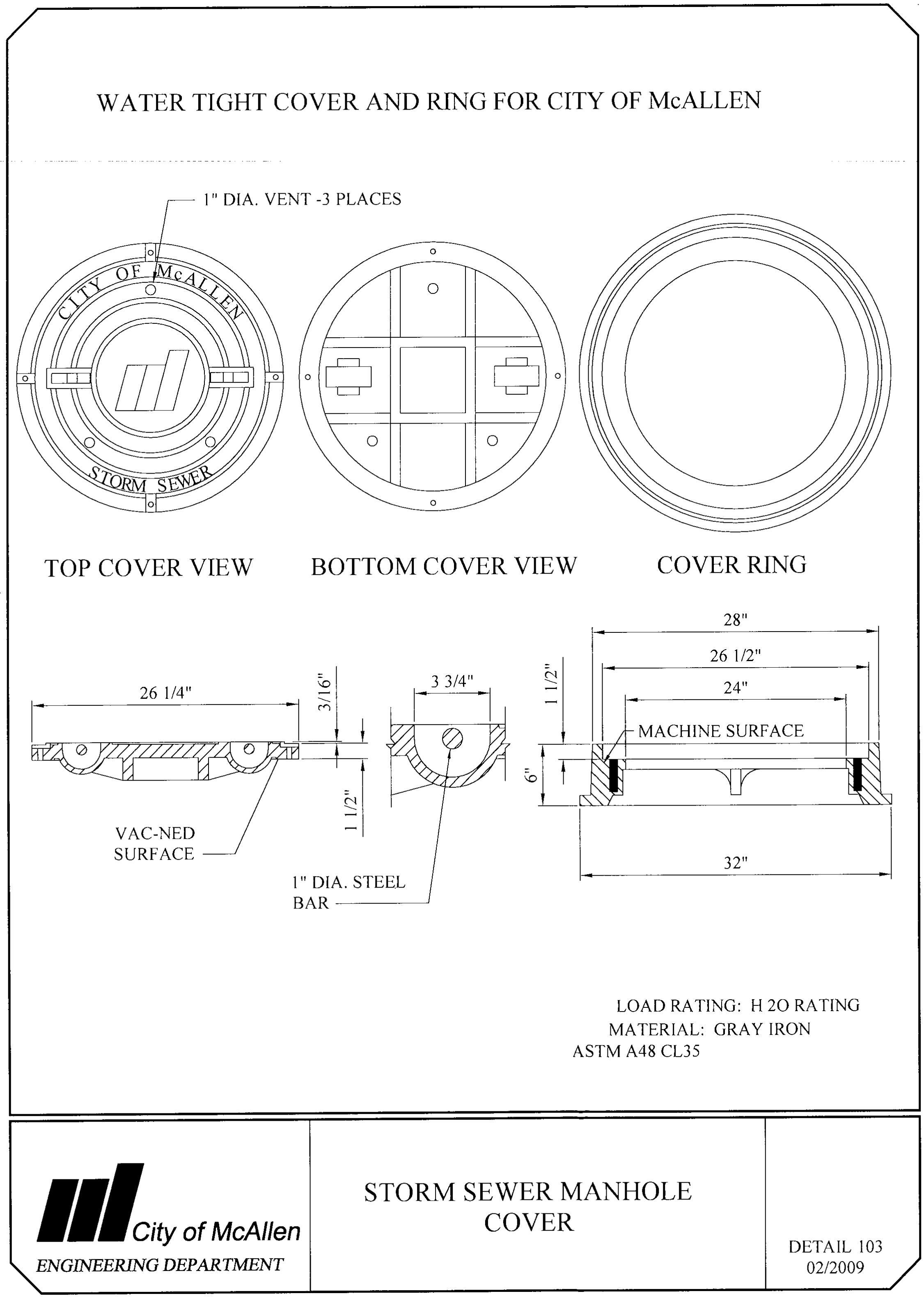

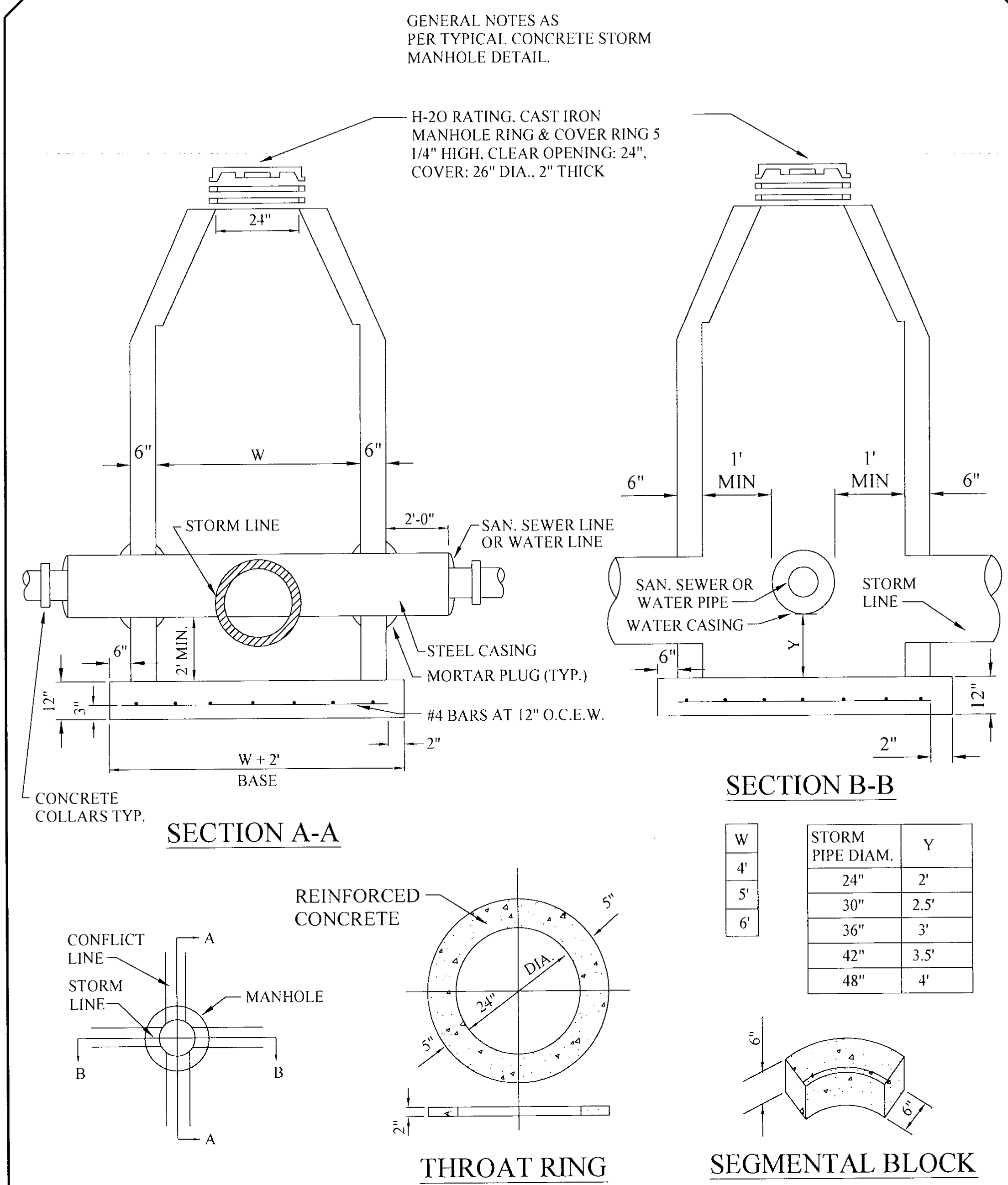

W
4'
5'
6'

STORM PIPE DIAM.	Y
24"	2'
30"	2.5'
36"	3'
42"	3.5'
48"	4'

City of McAllen
ENGINEERING DEPARTMENT

TYPICAL CONCRETE STORM CONFLICT MANHOLE

DETAIL 104
02/2009

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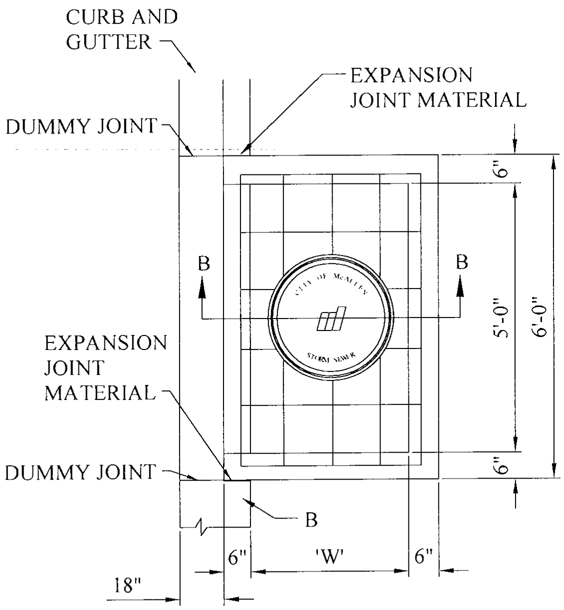
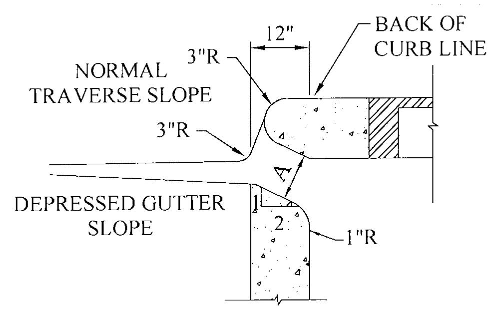
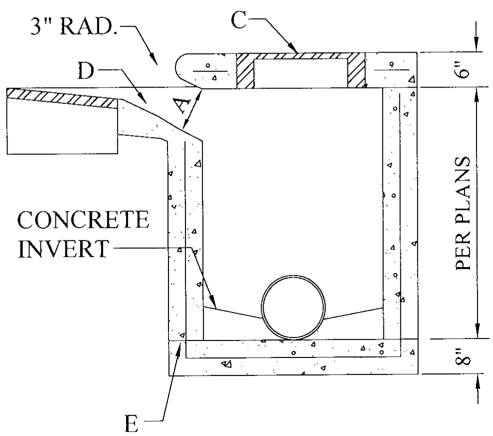


TOP VIEW
TYPE "A" INLET



THROAT DETAIL

INLET TYPE	W	MAX. PIPE SIZE ALLOW (DIA.)
A	3'-0"	24"
A-1	4'-0"	36"
A-2	5'-0"	48"
A-3	6'-0"	60"



City of McAllen
ENGINEERING DEPARTMENT

TYPE 'A' INLET

SHEET 1 OF 2

DETAIL 105.1
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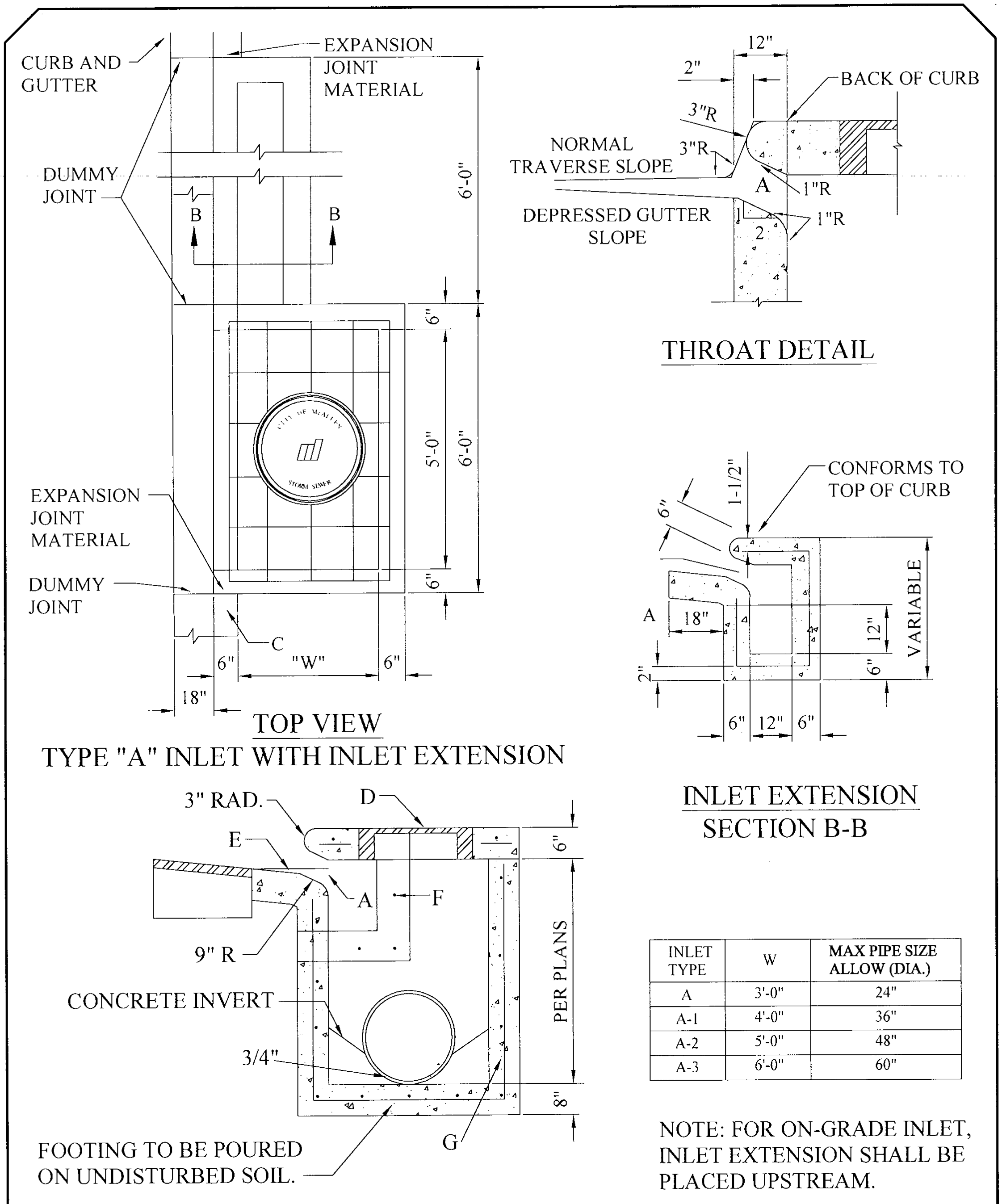

INLET TYPE	W	MAX PIPE SIZE ALLOW (DIA.)
A	3'-0"	24"
A-1	4'-0"	36"
A-2	5'-0"	48"
A-3	6'-0"	60"

NOTE: FOR ON-GRADE INLET, INLET EXTENSION SHALL BE PLACED UPSTREAM.

City of McAllen
ENGINEERING DEPARTMENT

TYPE "A" INLET
WITH EXTENSION

SHEET 1 OF 2

DETAIL 106
02/2009

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GENERAL NOTES:

1. SLOPE BOTTOM OF INLET EXTENSION 1/2" PER FOOT TOWARD INLET.
2. EXTENSION TO INLET TO BE MADE IN INCREMENTS OF 3'-0" OR 6'-0" ONLY.
3. INLET EXTENSION MUST BE APPROVED BY CITY ENGINEERING PRIOR TO CONSTRUCTION.
4. TRANSITION NORMAL GUTTER TO INLET FLOW SLOPE APPROX. 3".
5. INLETS SHALL BE COMPOSED OF PRE-CAST SECTIONS, CAST IN PLACE OR A COMBINATION OF BOTH.
6. 6" GRAVEL BEDDING IS REQUIRED IF UNSTABLE SOIL OR GROUND WATER IS FOUND.

CONSTRUCTION NOTES:

A. 5" CLEAR OPENINGS.
B. 6" X 6" CONCRETE SUPPORT USED WHEN EXTENSION BOX CALLED FOR.
C. REGULAR CURB & GUTTER SECTION.
D. C.I. MANHOLE RING & COVER SHALL BE ALAMO 860-22 OR EQUAL 20, 3/8"
E. DEPRESS 2" BELOW NORMAL GUTTER.
F. DOWEL BARS. IF NOT PRE-CAST
G. ALL REINFORCING NO. 4 BARS 12" O.C.E.W.

City of McAllen *ENGINEERING DEPARTMENT*	TYPE "A" INLET WITH EXTENSION SHEET 2 OF 2	DETAIL 106.2 02/2009

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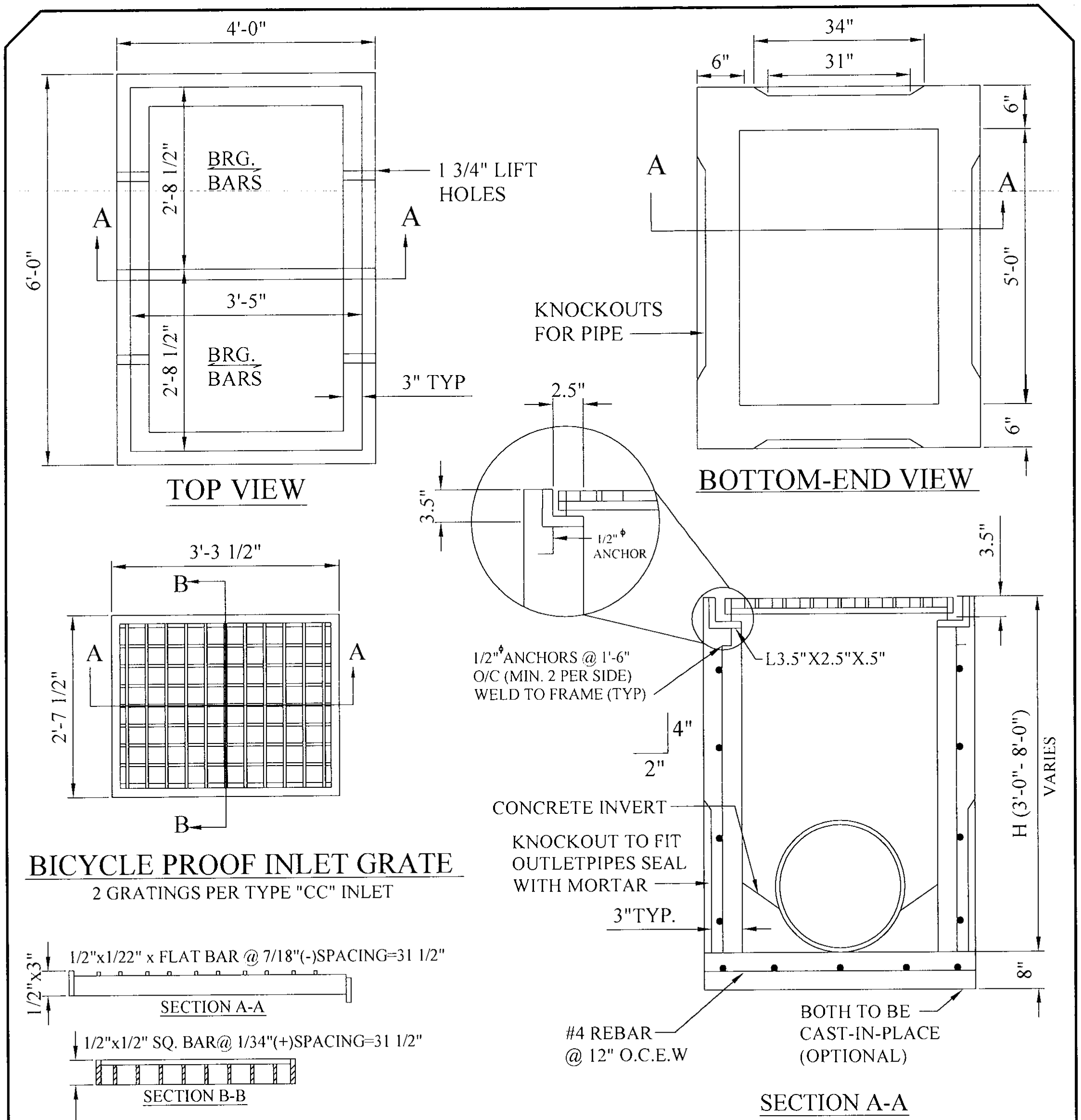

GENERAL NOTES:

1. REINFORCEMENT: #4 BARS AT 12" O.C. EACH WAY.
2. CONCRETE TO HAVE A MIN. 28 DAY COMPRESSIVE STRENGTH OF 3000 P.S.I.
3. DIMENSION "H" AVAILABLE IN 6" INCREMENTS FROM 3'-0" TO 8'-0".
4. INLETS SHALL BE COMPOSED OF PRE-CAST SECTIONS, CAST IN PLACE OR A COMBINATION OF BOTH.
5. 6" GRAVEL BEDDING IS REQUIRED IF UNSTABLE SOIL OR GROUND WATER IS FOUND.

City of McAllen ENGINEERING DEPARTMENT	TYPE "CC" INLET	DETAIL 107 02/2009

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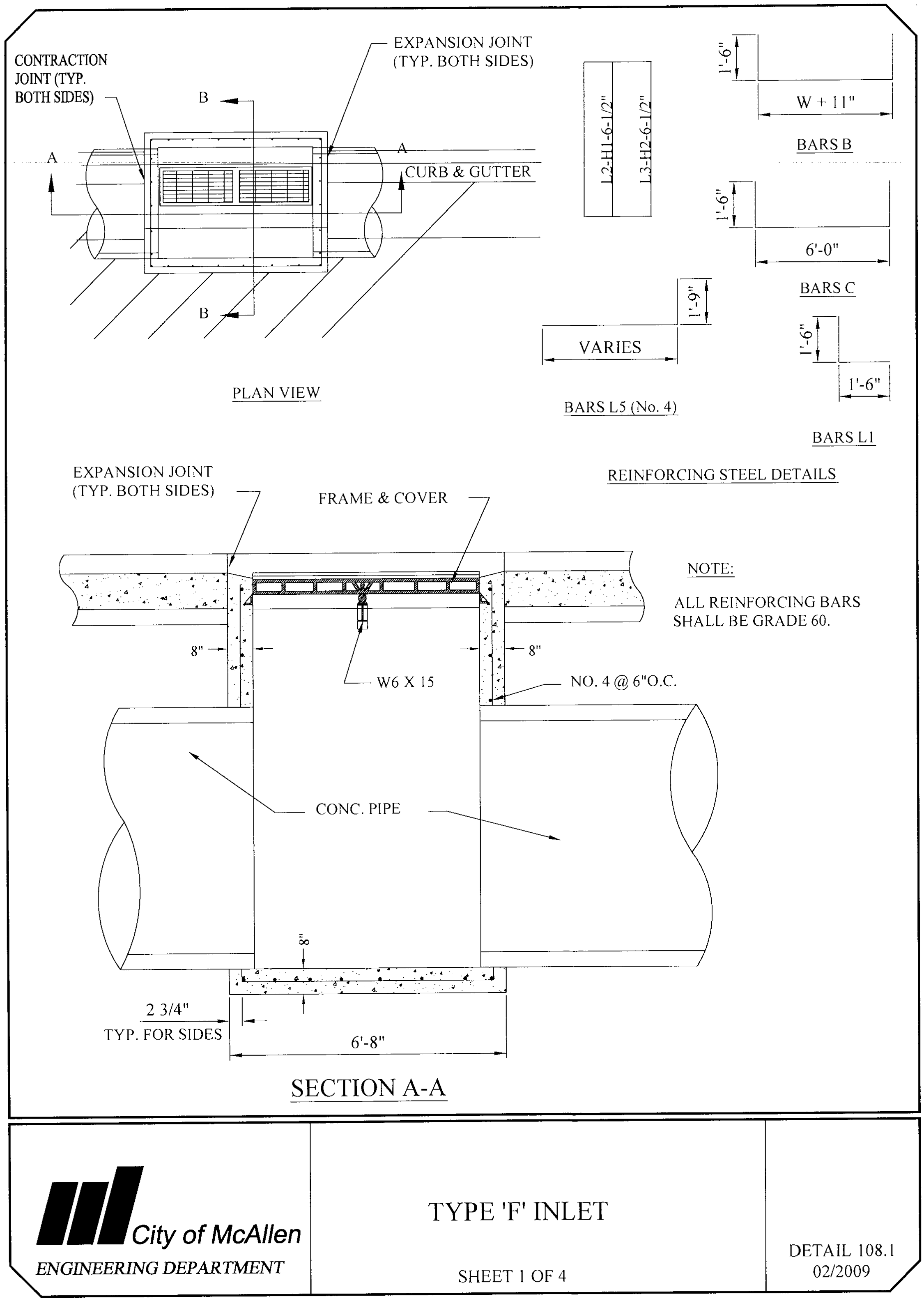

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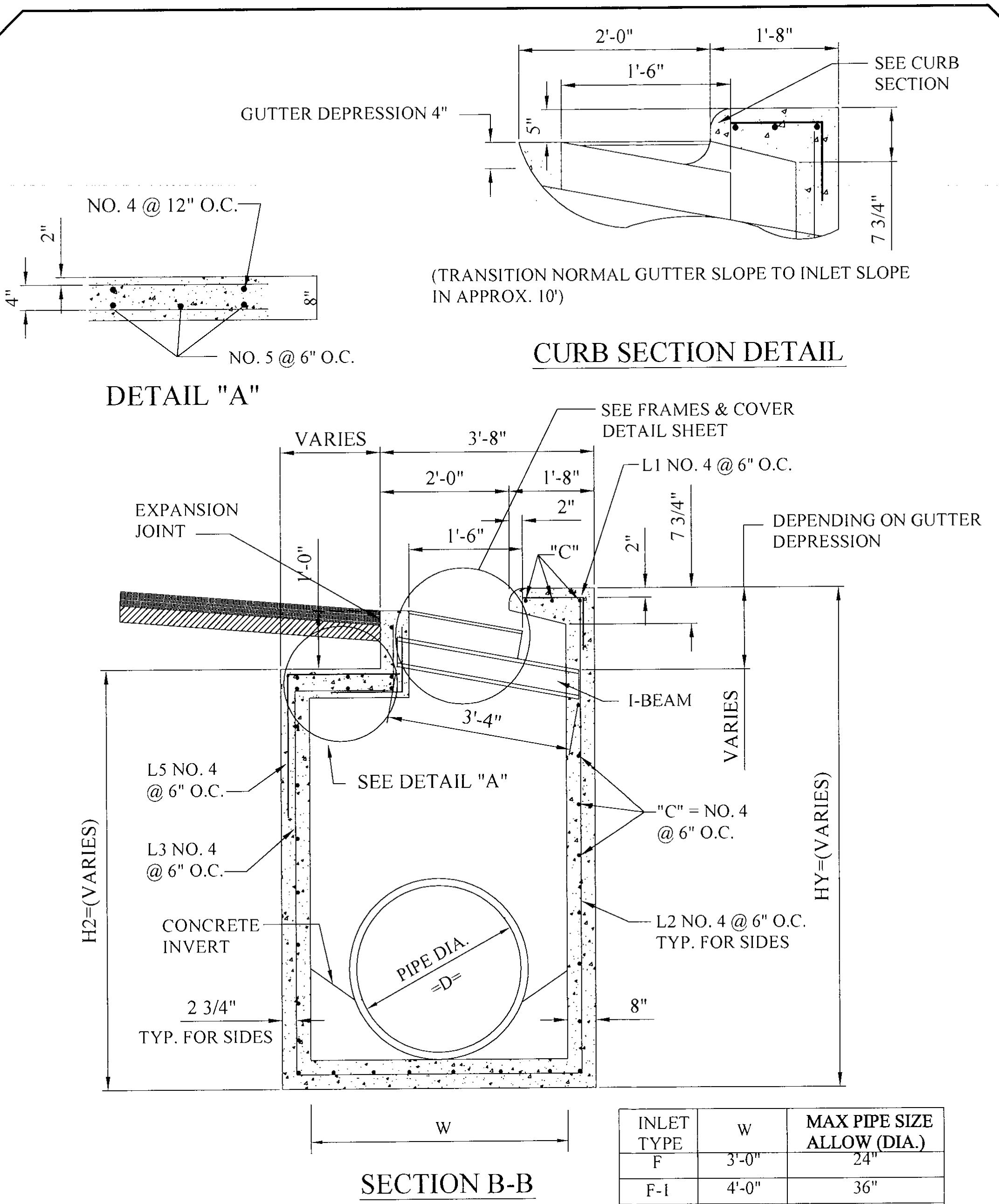

INLET TYPE	W	MAX PIPE SIZE ALLOW (DIA.)
F	3'-0"	24"
F-1	4'-0"	36"
F-2	5'-0"	48"
F-3	6'-0"	60"

City of McAllen
ENGINEERING DEPARTMENT

TYPE 'F' INLET

SHEET 2 OF 4

DETAIL 108.2
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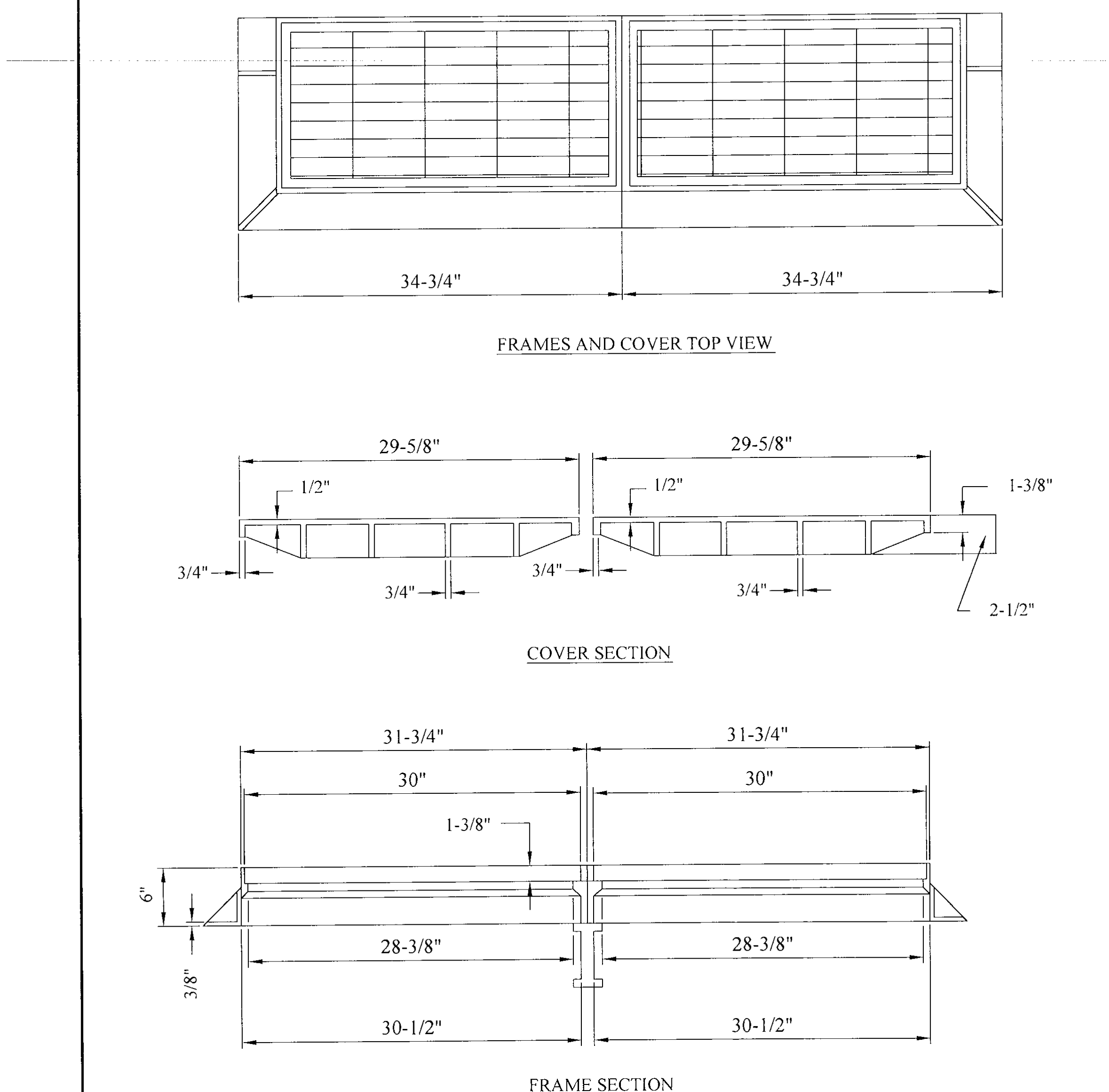

City of McAllen
ENGINEERING DEPARTMENT

TYPE 'F' INLET

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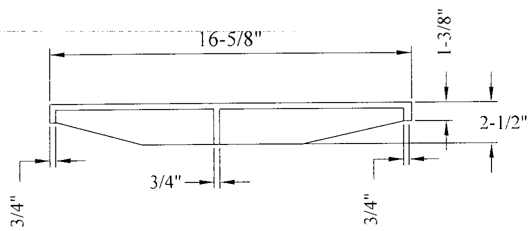
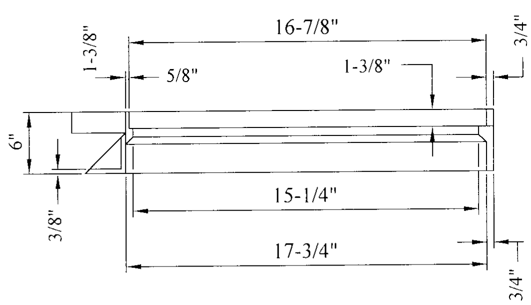
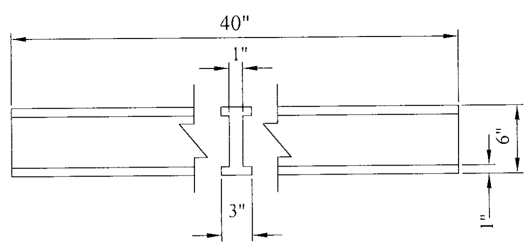


COVER SECTION



FRAME SECTION



I-BEAM DETAILS (W6 X 15)

NOTES

1. ALL STEEL TO BE No. 4 BARS AT 6" SPACING IN BOTH DIRECTIONS.
2. SLOPE BOTTOM OF INLET EXTENSION 1/2" PER FT. TOWARD INLET.
3. ALL FRAMES AND GRATES USED IN PAVED AREAS SHALL BE A36 GR. 50 STRUCTURAL STEEL. ALL WELDING SHALL BE IN ACCORDANCE WITH ITEM "STEEL STRUCTURES" OR ITEM "FIELD WELDING" AS REQUIRED.
4. INLETS SHALL BE COMPOSED OF PRE-CAST SECTIONS, CAST IN PLACE OR A COMBINATION OF BOTH.
5. 6" GRAVEL BEDDING IS REQUIRED IF UNSTABLE SOIL OR GROUND WATER IS FOUND.

ESTIMATED WEIGHT - LBS.

COVER 110 LBS. EACH
FRAME 155 LBS. EACH
I-BEAM 82 LBS.

City of McAllen
ENGINEERING DEPARTMENT

TYPE 'F' INLET

SHEET 4 OF 4

DETAIL 108.4
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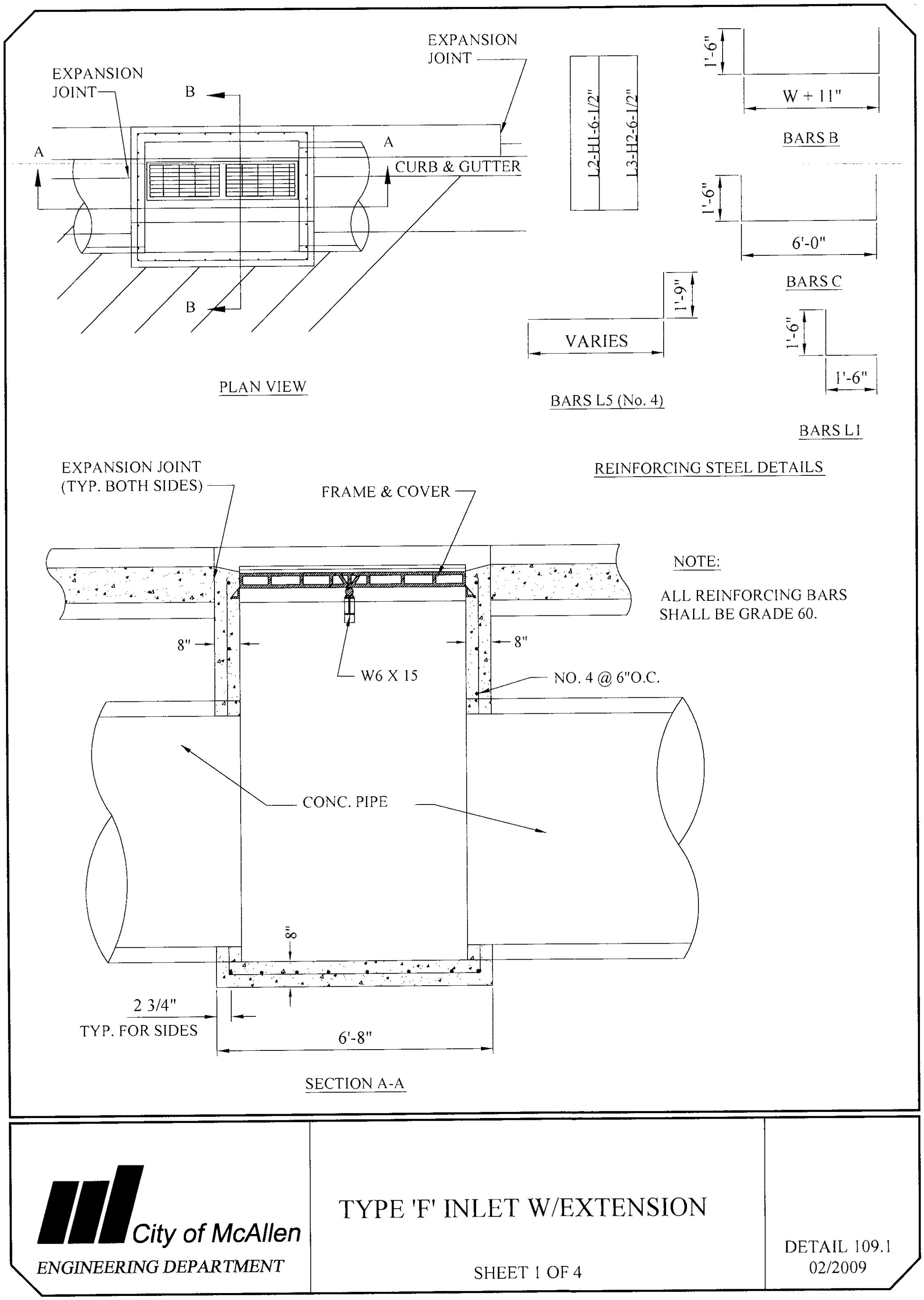

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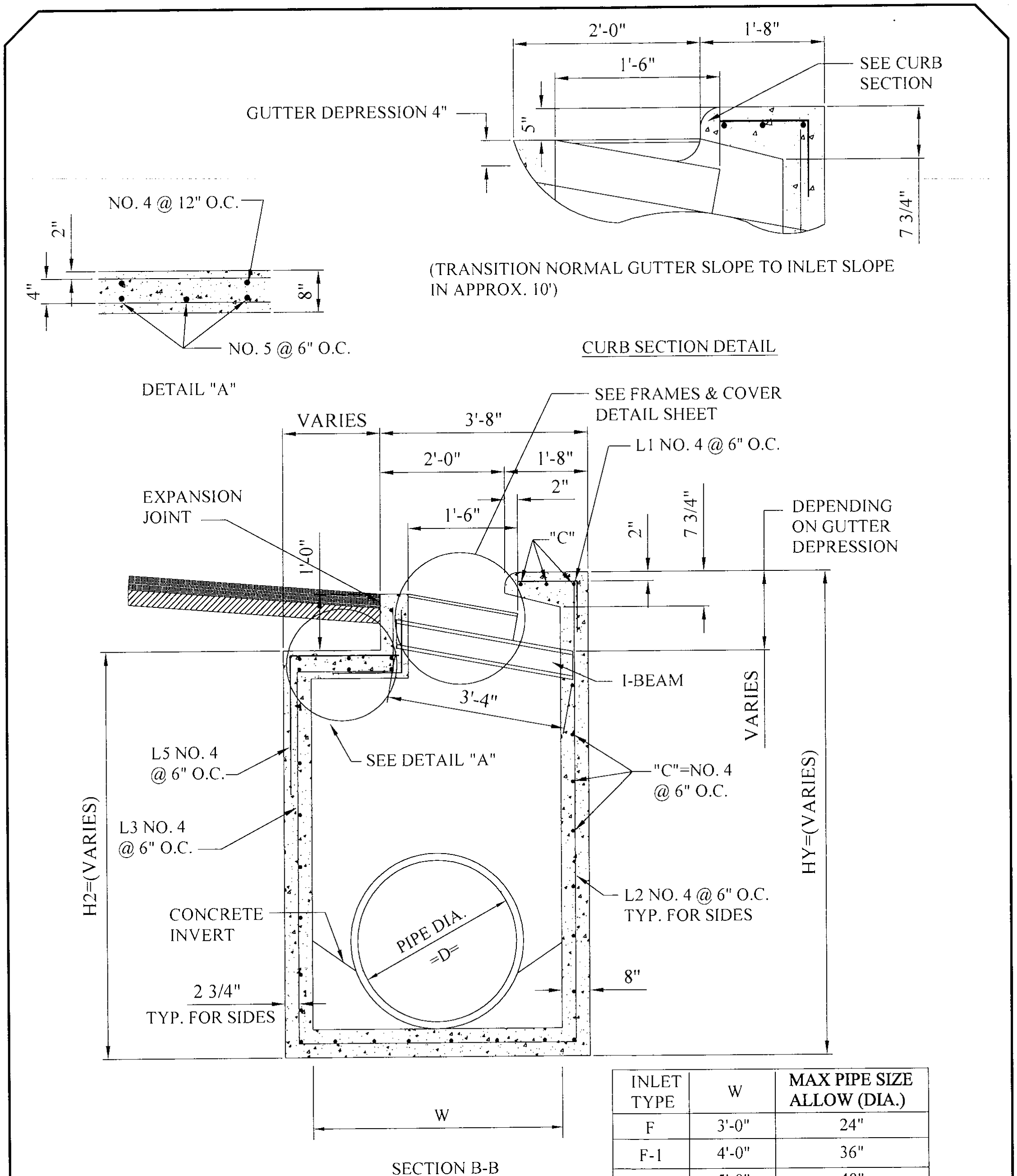

INLET TYPE	W	MAX PIPE SIZE ALLOW (DIA.)
F	3'-0"	24"
F-1	4'-0"	36"
F-2	5'-0"	48"
F-3	6'-0"	60"

City of McAllen
ENGINEERING DEPARTMENT

TYPE 'F' INLET W/EXTENSION

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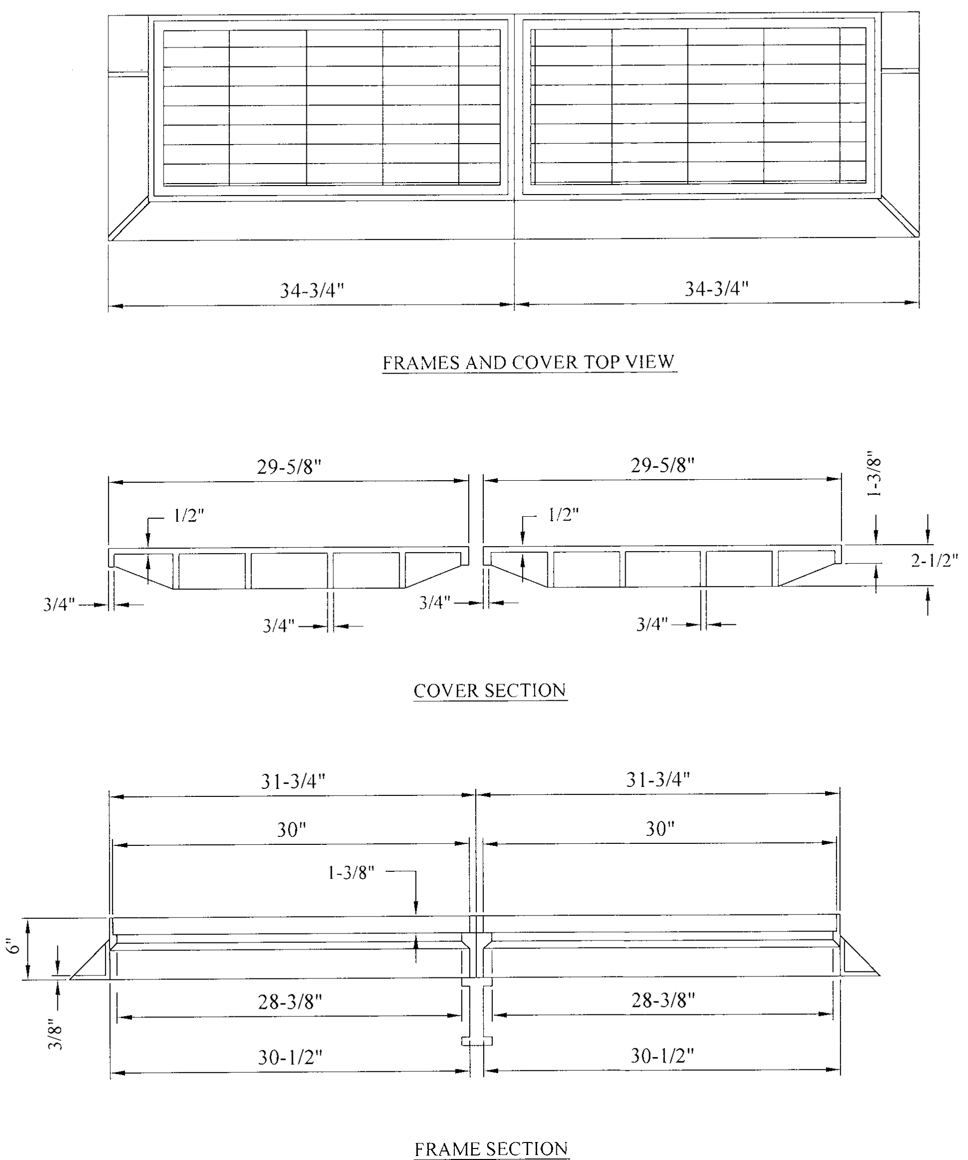

City of McAllen
ENGINEERING DEPARTMENT

TYPE 'F' INLET W/EXTENSION

SHEET 3 OF 4

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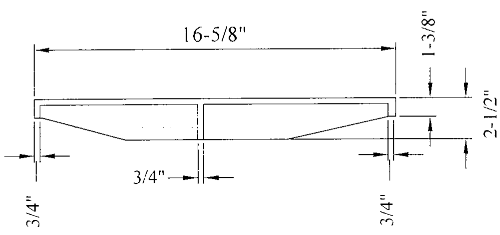
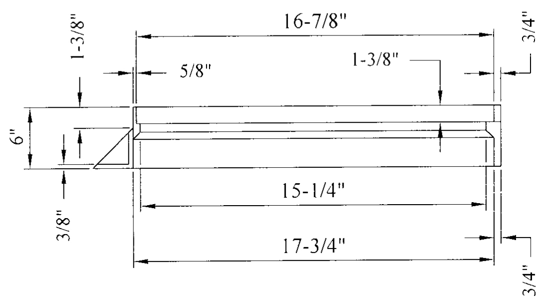
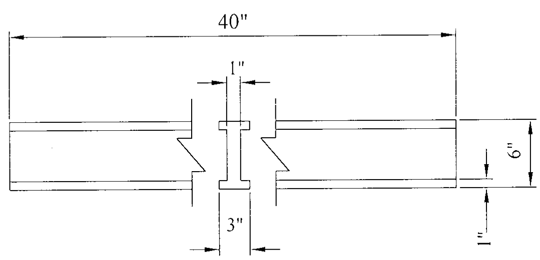


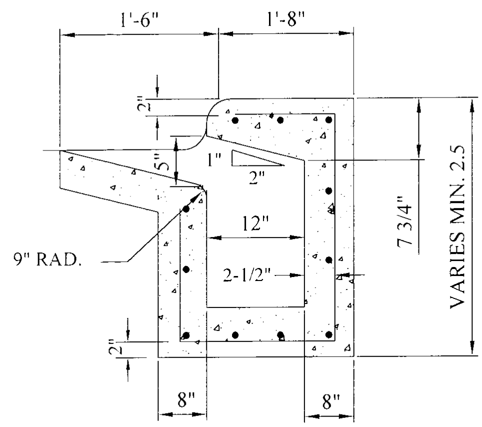
COVER SECTION



FRAME SECTION



I-BEAM DETAILS (W6 X 15)



INLET EXTENSION

MATCH EXIST. CURB SECTION CURB CAN BE TYPE "A" (BARRIER) OR TYPE "B" (MOUNTABLE)

NOTES

1. ALL STEEL TO BE No. 4 BARS AT 6" SPACING IN BOTH DIRECTIONS.
2. SLOPE BOTTOM OF INLET EXTENSION 1/2" PER FT. TOWARD INLET.
3. ALL FRAMES AND GRATES USED IN PAVED AREAS SHALL BE A36 GR. 50 STRUCTURAL STEEL. ALL WELDING SHALL BE IN ACCORDANCE WITH ITEM "STEEL STRUCTURES" OR ITEM "FIELD WELDING" AS REQUIRED.
4. INLETS SHALL BE COMPOSED OF PRE-CAST SECTIONS, CAST IN PLACE OR A COMBINATION OF BOTH.
5. 6" GRAVEL BEDDING IS REQUIRED IF UNSTABLE SOIL OR GROUND WATER IS FOUND.

ESTIMATED WEIGHT - LBS.

COVER 110 LBS. EACH
FRAME 155 LBS. EACH
I-BEAM 82 LBS.

City of McAllen
ENGINEERING DEPARTMENT

TYPE 'F' INLET W/EXTENSION

SHEET 4 OF 4

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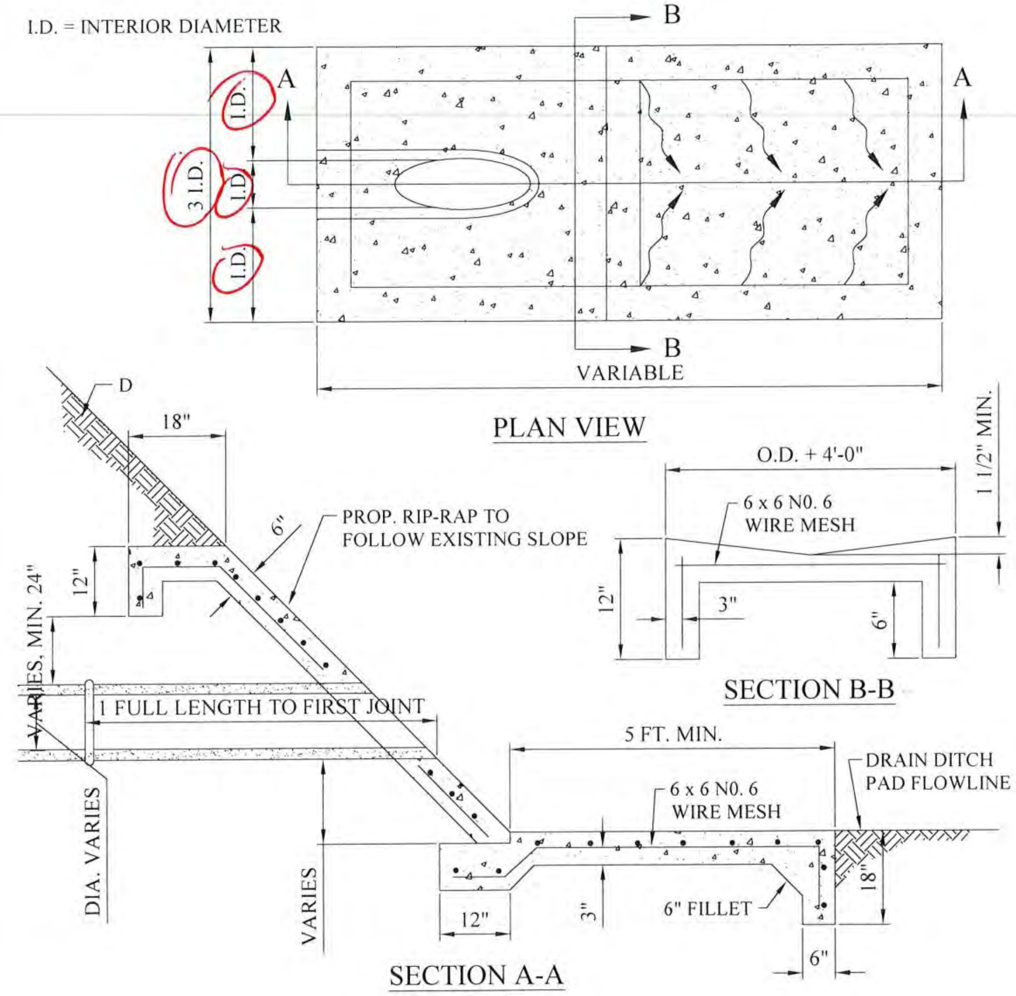

GENERAL NOTES:

1. CONCRETE TO HAVE 3000 P.S.I. MIN. AT 28 DAY COMPRESSIVE STRENGTH.
2. ALL STEEL TO BE GRADE 60.
3. MIN. 90% COMPACTION STD. PROCTOR DENSITY
4. STANDARD DETAIL FOR CITY OF MCALLEN DITCHES

City of McAllen
ENGINEERING DEPARTMENT

CONCRETE SLOPED-END TREATMENT

DETAIL 110
02/2009

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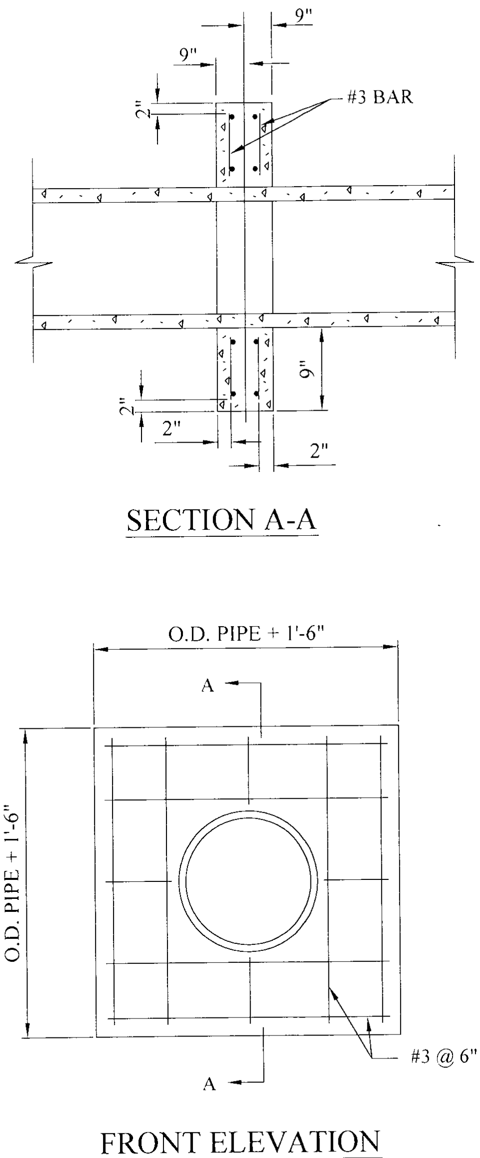

City of McAllen
ENGINEERING DEPARTMENT

CONCRETE PIPE COLLAR

DETAIL 111
02/2009

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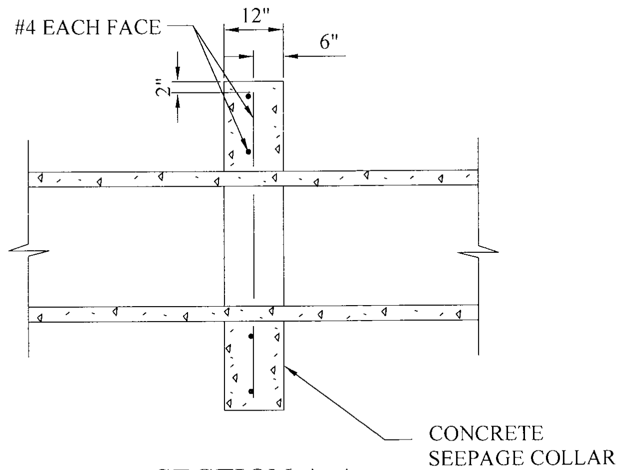
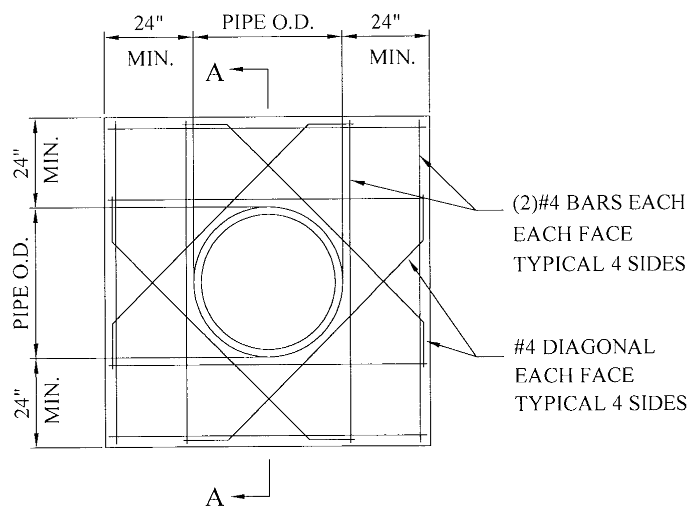


SECTION A-A

N.T.S.



FRONT ELEVATION

N.T.S.

NOTE:

1. NO BLOCK OR OTHER FILLER ALLOWED.
2. NOTCH ALL SIDES IN TO UNDISTURBED SOIL.
3. COLLAR MUST BE ADEQUATELY FRAMED USING WOOD OR OTHER ACCEPTABLE MATERIAL.
4. SEEPAGE COLLAR SHALL BE CONTRUCTED UPSTREAM OF OUTFALL AT DRAINAGE R.O.W.

City of McAllen ENGINEERING DEPARTMENT	CONCRETE SEEPAGE COLLAR	DETAIL 112 02/2009

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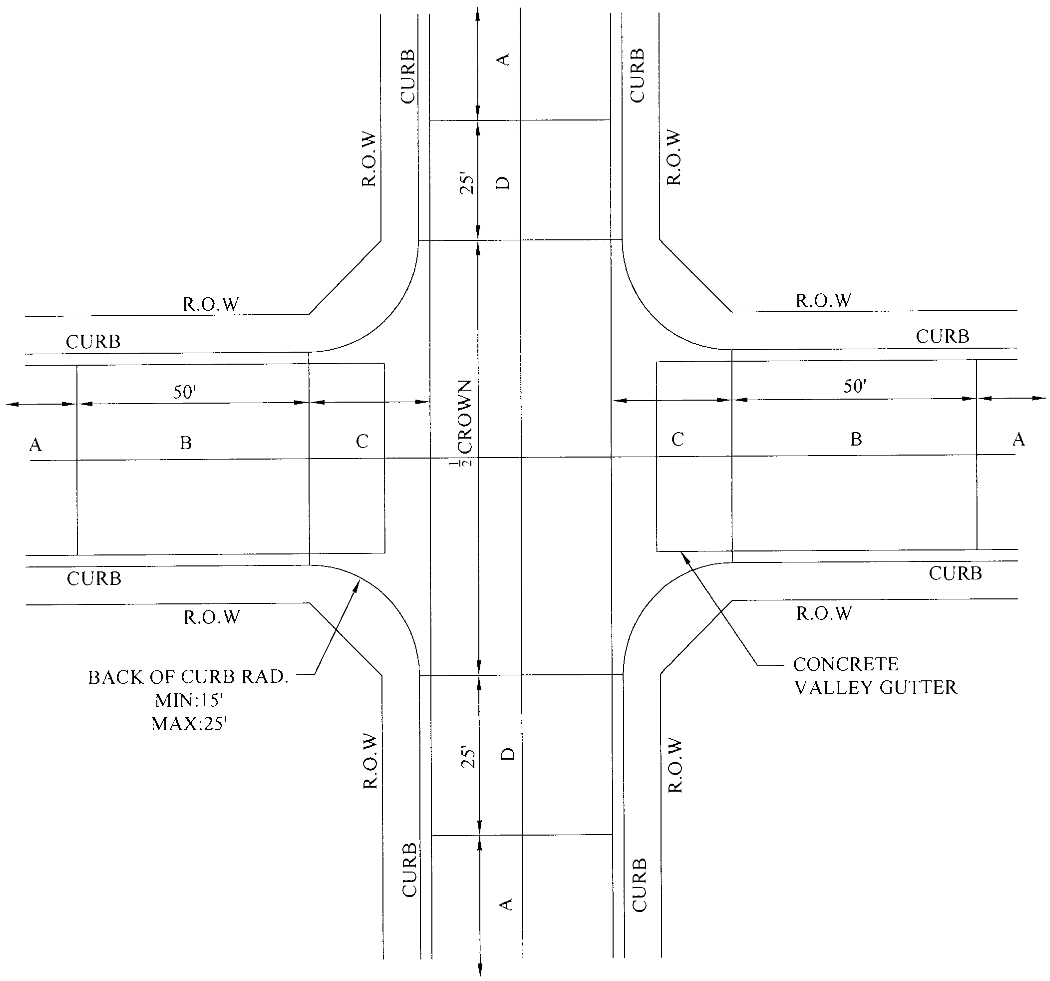

NOTE:
TYPICAL FOR THE INTERSECTION OF TWO LOCAL STREETS.
ALL OTHER INTERSECTIONS SHALL BE APPROVED BY CITY ENGINEER.

City of McAllen ENGINEERING DEPARTMENT	TYPICAL LOCAL STREET INTERSECTION SHEET 1 OF 2	DETAIL 201.1 02/2009

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GENERAL NOTES:

1. REDUCE NORMAL CROWN TO NO CROWN SECTION WHEN APPROACHING PERPENDICULAR TO VALLEY GUTTER.
2. REDUCE NORMAL CROWN TO HALF CROWN SECTION WHEN STREET IS PARALLEL TO VALLEY GUTTER.
3. FOR "T" INTERSECTION THE THROUGH STREET WILL RETAIN NORMAL CROWN & THE LEG OF THE "T" WILL REDUCE NORMAL CROWN TO NO CROWN SECTION WHEN APPROACHING PERPENDICULAR TO VALLEY GUTTER.
4. CONSTRUCTION PLANS WILL DETAIL "T" INTERSECTION WHEN DRAINAGE FLOWS ACROSS THROUGH STREET OF INTERSECTION.
5. CONSTRUCTION PLANS WILL SPECIFY RADII CURB RETURNS.
6. VALLEY GUTTER SHALL BE 6 FEET WIDE PER STANDARD DETAIL.

CONSTRUCTION NOTES:

A. NORMAL CROWN FOR RESIDENTIAL STREET.
B. TRANSITION SECTION FROM FULL CROWN TO NO CROWN SECTION.
C. NO CROWN SECTION.
D. TRANSITION SECTION FROM FULL CROWN TO HALF CROWN SECTION.

City of McAllen *ENGINEERING DEPARTMENT*	TYPICAL LOCAL STREET INTERSECTION SHEET 2 OF 2	DETAIL 201.2 02/2009

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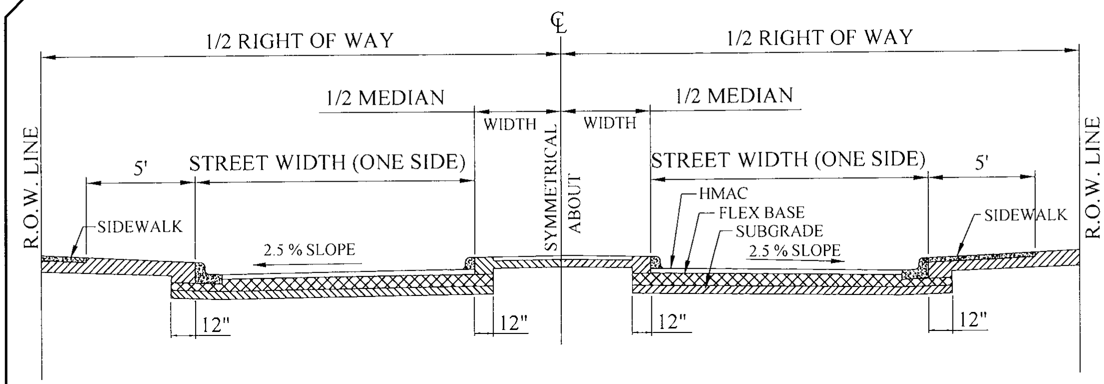
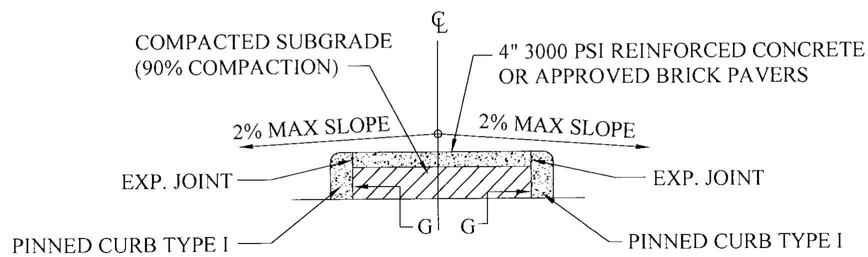
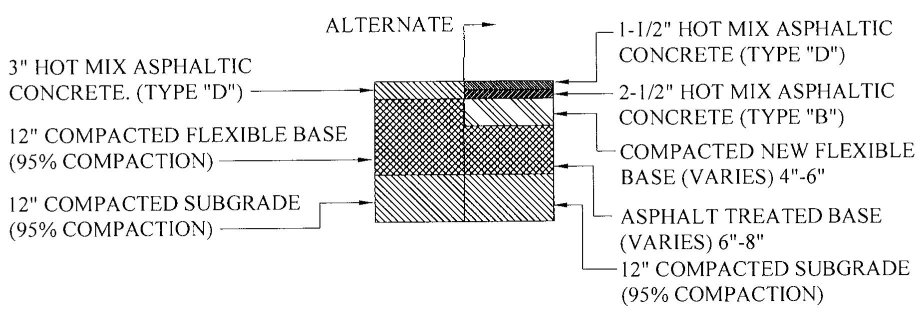


TYPICAL PRINCIPAL ARTERIAL OR MINOR ARTERIAL STREET SECTION WITH MEDIAN



CONCRETE MEDIAN PAVING SECTION



PAVEMENT SECTION

ASPHALT CONCRETE

REINFORCED CONCRETE PAVEMENT MAY BE REQUIRED FOR HEAVY VEHICULAR TRAFFIC LOADS. DESIGN SHALL BE SUBMITTED TO CITY ENGINEER FOR APPROVAL.

City of McAllen

ENGINEERING DEPARTMENT

PRINCIPAL ARTERIAL/MINOR ARTERIAL STREET SECTION WITH MEDIAN

DETAIL 202
02/2009

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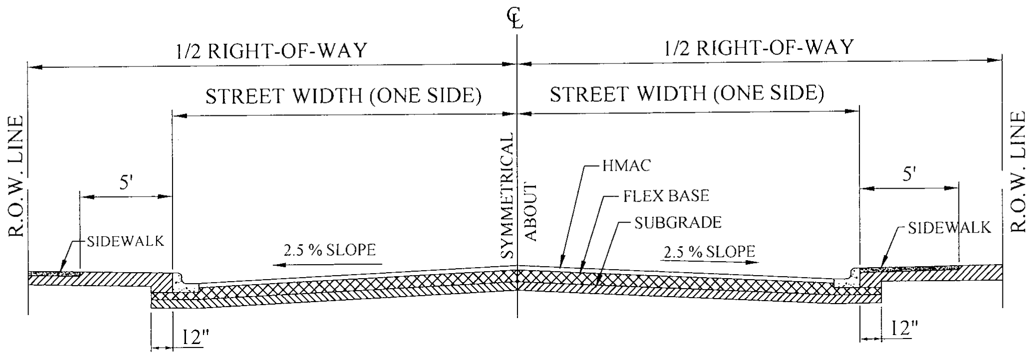
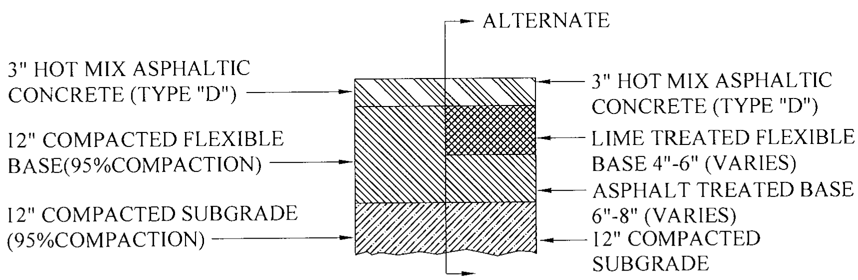


TYPICAL PRINCIPAL ARTERIAL OR MINOR ARTERIAL SECTION WITHOUT MEDIAN



PAVEMENT SECTION

ASPHALT CONCRETE

REINFORCED CONCRETE PAVEMENT MAY BE REQUIRED FOR HEAVY VEHICULAR TRAFFIC LOADS. DESIGN SHALL BE SUBMITTED TO CITY ENGINEER FOR APPROVAL.

City of McAllen *ENGINEERING DEPARTMENT*	PRINCIPAL ARTERIAL/MINOR ARTERIAL STREET SECTION WITHOUT MEDIAN	DETAIL 203 02/2009

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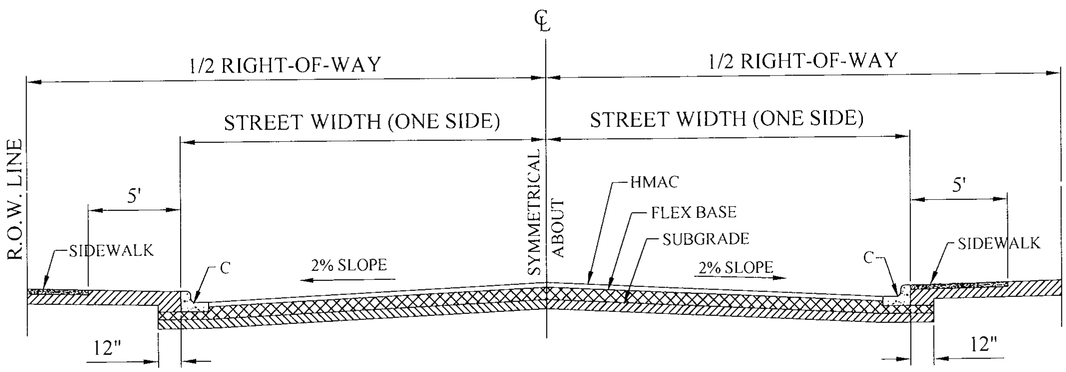
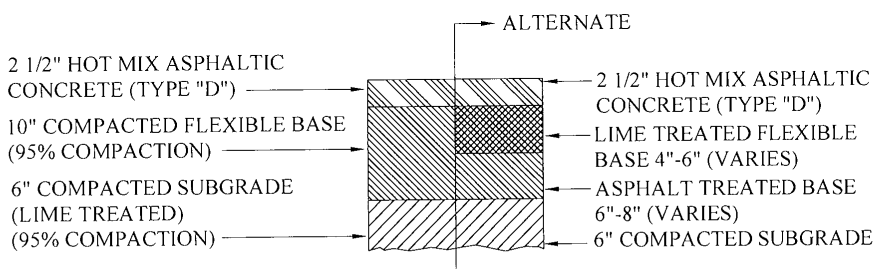


TYPICAL COLLECTOR STREET SECTION



PAVEMENT SECTION
ASPHALT CONCRETE

REINFORCED CONCRETE PAVEMENT MAY BE REQUIRED FOR HEAVY VEHICULAR TRAFFIC LOADS. DESIGN SHALL BE SUBMITTED TO CITY ENGINEER FOR APPROVAL.

City of McAllen ENGINEERING DEPARTMENT	COLLECTOR STREET SECTION	DETAIL 204 02/2009

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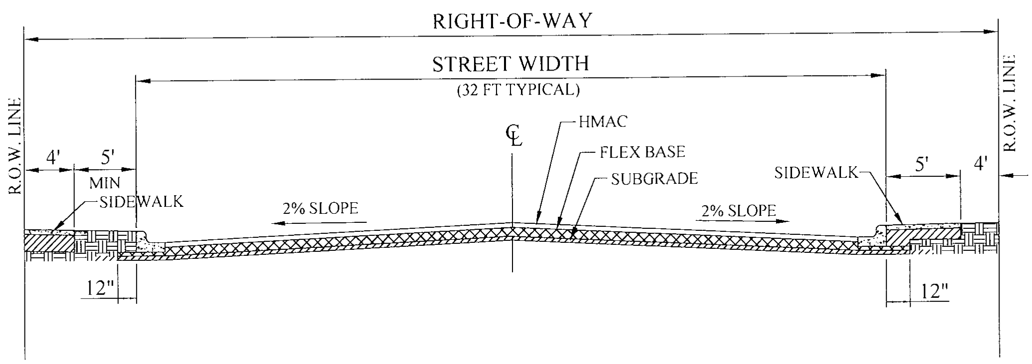
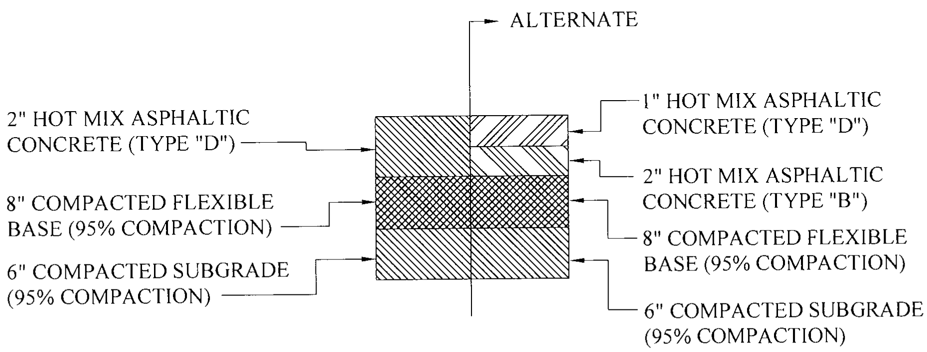


TYPICAL LOCAL STREET SECTION



PAVEMENT SECTION

ASPHALT CONCRETE

City of McAllen

ENGINEERING DEPARTMENT

LOCAL STREET SECTION

DETAIL 205

02/2009

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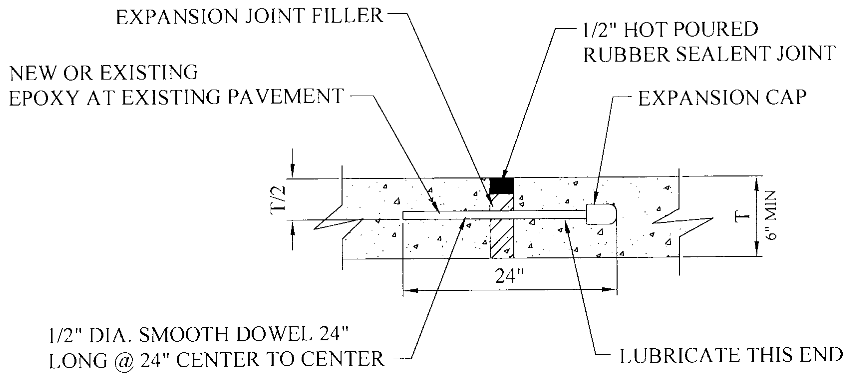
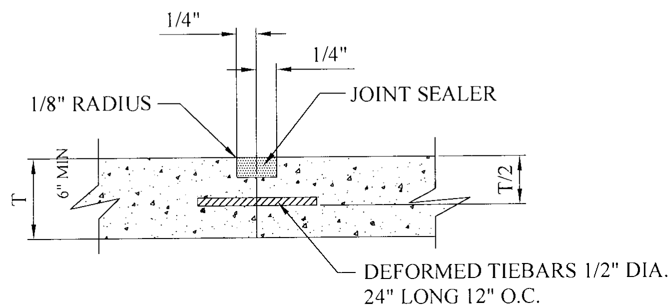
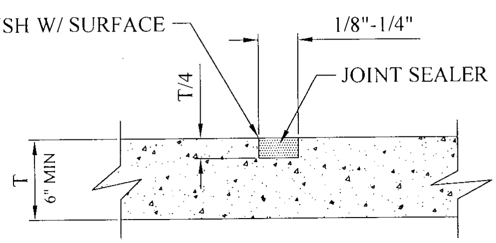
Standard Details



EXPANSION JOINT



CONSTRUCTION JOINT



SAWED OR PREMOLDED STRIP
LONGITUDINAL OR TRANSVERSE

SAWED CONTRACTION JOINT

City of McAllen
ENGINEERING DEPARTMENT

TYPICAL CONCRETE JOINT DETAILS

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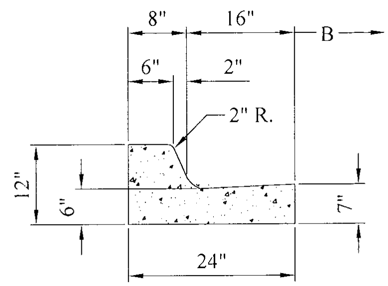
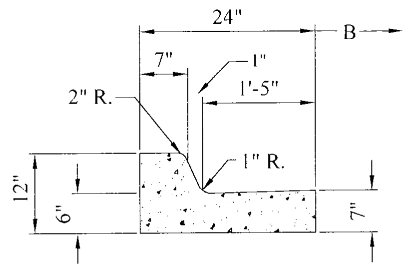
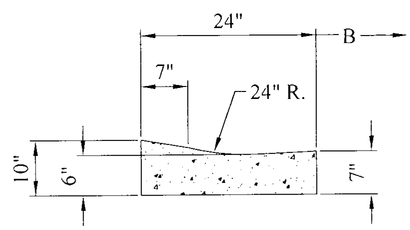


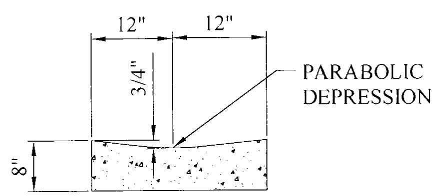
STANDARD CURB & GUTTER TYPE A



STANDARD CURB & GUTTER TYPE B



LAYDOWN CURB & GUTTER



24" VALLEY GUTTER

City of McAllen
ENGINEERING DEPARTMENT

CONCRETE CURB & GUTTER

SHEET 1 OF 3

DETAIL 207.1
02/2009

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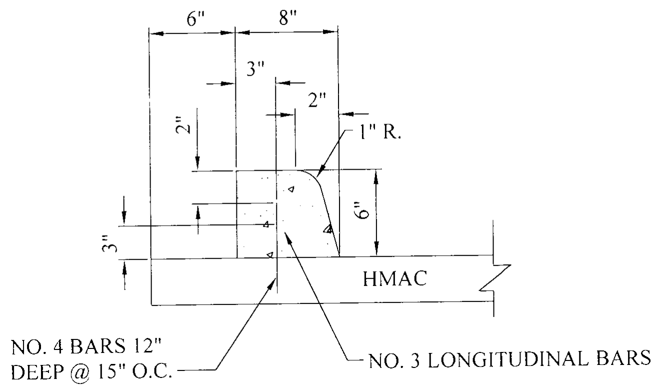
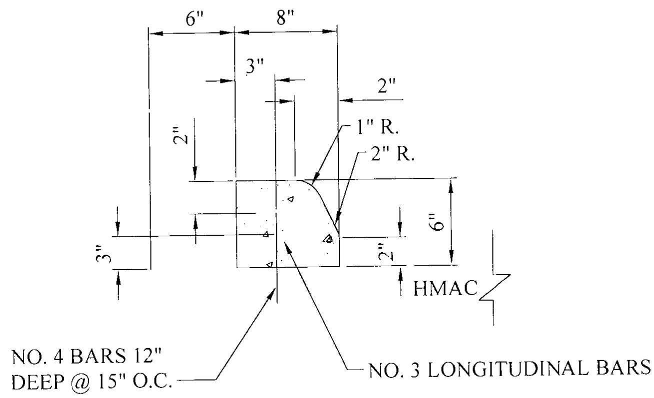
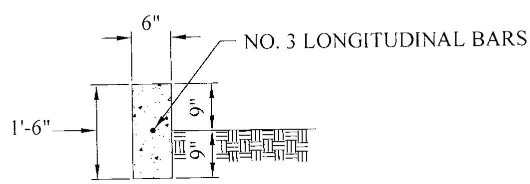


PINNED CURB TYPE I



PINNED CURB TYPE II



HEADER CURB

City of McAllen
ENGINEERING DEPARTMENT

CONCRETE CURB & GUTTER

SHEET 2 OF 3

DETAIL 207.2
02/2009

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GENERAL NOTES:

1. CURBS AND GUTTERS TO BE CONSTRUCTED OF 3000 PSI CONCRETE.
2. FOR NON-REINFORCED STANDARD CURB OR CURB & GUTTER PROVIDE SAWED CONTRACTION JOINTS 10' O.C. MAX. ALSO PROVIDE 1/2" EXPANSION JOINTS AT 30' O.C. MAX. AT POINTS OF CURVATURE, CURB INLETS, BOX CULVERTS, AT EACH SIDE OF DRIVEWAYS AND ADJACENT TO SIDEWALK.
3. FOR REINFORCED STANDARD CURB OR CURB & GUTTER PROVIDE SAWED CONTRACTION JOINTS 10' O.C. MAX AND EXPANSION JOINTS SHALL BE SPACED AT 120' O.C. MAX, AT POINTS OF CURVATURE, CURB INLETS, BOX CULVERTS, AT EACH SIDE OF DRIVEWAYS, AND ADJACENT TO SIDEWALKS.
4. EDGES NOT SPECIFIED WITH DIMENSIONS SHALL BE EDGED WITH A 3/8" EDGING TOOL.
5. A MEMBRANE CURING COMPOUND SHALL BE APPLIED TO EXPOSED CURB OR CURB & GUTTER AFTER THE SURFACE FINISH HAS BEEN COMPLETED AT A MIN. RATE OF 1 GAL/180 S.F. OF SURFACE AREA.
6. DESIGN ELEVATIONS TO BE GIVEN AT PC, PT AND MID POINT OF THE CURB RADII (FLOW OF CURB ELEVATION) AND AT INTERSECTIONS OF PROJECTED FLOWLINES (FLOWLINE ELEVATION).
7. ON UPSTREAM AND DOWNSTREAM ENDS OF THE INTERSECTION, VALLEY GUTTER CONSTRUCTION SHALL EXTEND TO THE END OF RETURNS.
8. THE VALLEY GUTTER TO BE REINFORCED WITH 6"X 6" X NO. 6 GA. WIRE MESH. OR NO. 3 @ 12" O.C.E.W. 4. INVERT OF VALLEY GUTTER TO EXTEND FROM FLOWLINE OF UPSTREAM CURB RETURN TO FLOWLINE OF DOWNSTREAM CURB RETURN.
9. FOR NEW CONSTRUCTION, VALLEY GUTTER SHALL BE CONSTRUCTED PRIOR TO ADJACENT PAVEMENT.
10. PRIOR TO CONSTRUCTION OF NEW VALLEY GUTTER ON EXISTING ACCEPTED STREETS, PAVEMENT SHALL BE REMOVED AS SHOWN ON PLANS.
11. FOR HANDICAP RAMP, SEE DETAIL.
12. EXISTING CURB OR PAVEMENT SHALL BE SAWCUT WHERE NECESSARY TO CONNECT TO PROPOSED VALLEY GUTTER.

City of McAllen *ENGINEERING DEPARTMENT*	CONCRETE CURB & GUTTER SHEET 3 OF 3	DETAIL 207.3 02/2009

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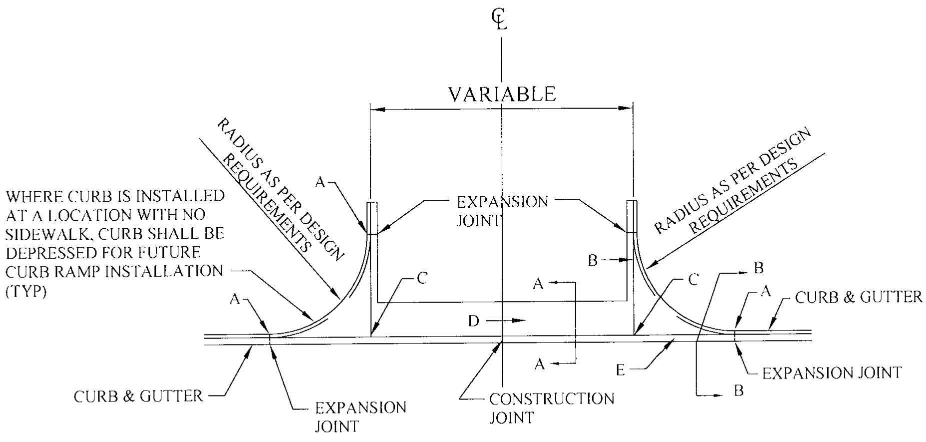
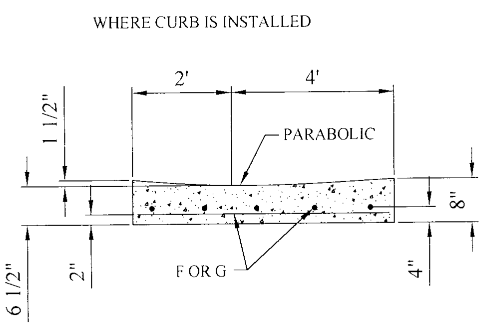
NOTES:

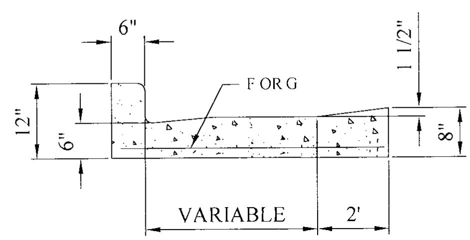
REFER TO SHEET 2 OF 2 FOR GENERAL AND CONSTRUCTION NOTES:



PLAN



SECTION A-A



SECTION B-B

City of McAllen

ENGINEERING DEPARTMENT

CONCRETE VALLEY GUTTER

SHEET 1 OF 2

DETAIL 208.1

02/2009

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Standard Details

GENERAL NOTES:

1. DESIGN ELEVATIONS TO BE GIVEN AT PC, PT AND MID POINT OF THE CURB RADII (FLOW OF CURB ELEVATION) AND AT INTERSECTIONS OF PROJECTED FLOWLINES (FLOWLINE ELEVATION).
2. ON UPSTREAM AND DOWNSTREAM ENDS OF THE INTERSECTION, VALLEY GUTTER CONSTRUCTION SHALL EXTEND TO THE END OF RETURNS.
3. THE VALLEY GUTTER TO BE REINFORCED WITH 6"X 6" X NO. 6 GA. WIRE MESH. OR NO. 3 @ 12" O.C.E.W.
4. INVERT OF VALLEY GUTTER TO EXTEND FROM FLOWLINE OF UPSTREAM CURB RETURN TO FLOWLINE OF DOWNSTREAM CURB RETURN.
5. FOR NEW CONSTRUCTION, VALLEY GUTTER SHALL BE CONSTRUCTED PRIOR TO ADJACENT PAVEMENT.
6. PRIOR TO CONSTRUCTION OF NEW VALLEY GUTTER ON EXISTING ACCEPTED STREETS, PAVEMENT SHALL BE REMOVED AS SHOWN ON PLANS.
7. VALLEY GUTTER SHALL BE PLACED USING 3000 P.S.I CONCRETE.
8. FOR HANDICAP RAMP, SEE DETAIL.
9. EXISTING CURB OR PAVEMENT SHALL BE SAWCUT WHERE NECESSARY TO CONNECT TO PROPOSED VALLEY GUTTER.

CONSTRUCTION NOTES:

A. END OF CURB RETURN, SEE NOTE 1.
B. PROJECTED FLOW LINE OF 1 1/2" INVERT SEE NOTE 2.
C. INTRSECTION OF FLOWLINES, SEE NOTE 1.
D. DIRECTION OF FLOW
E. FLOWLINE
F. 6" X 6" NO. 6 GA. WIRE MESH
G. NO. 3 BARS AT 12" O.C.E.W.
H. THE 1 1/2" INVERT DEPTH MAY BE REDUCED TO IMPROVE DRIVEABILITY WITH APPROVAL FROM THE CITY ENGINEER.

City of McAllen ENGINEERING DEPARTMENT	CONCRETE VALLEY GUTTER SHEET 2 OF 2	DETAIL 208.2 02/2009

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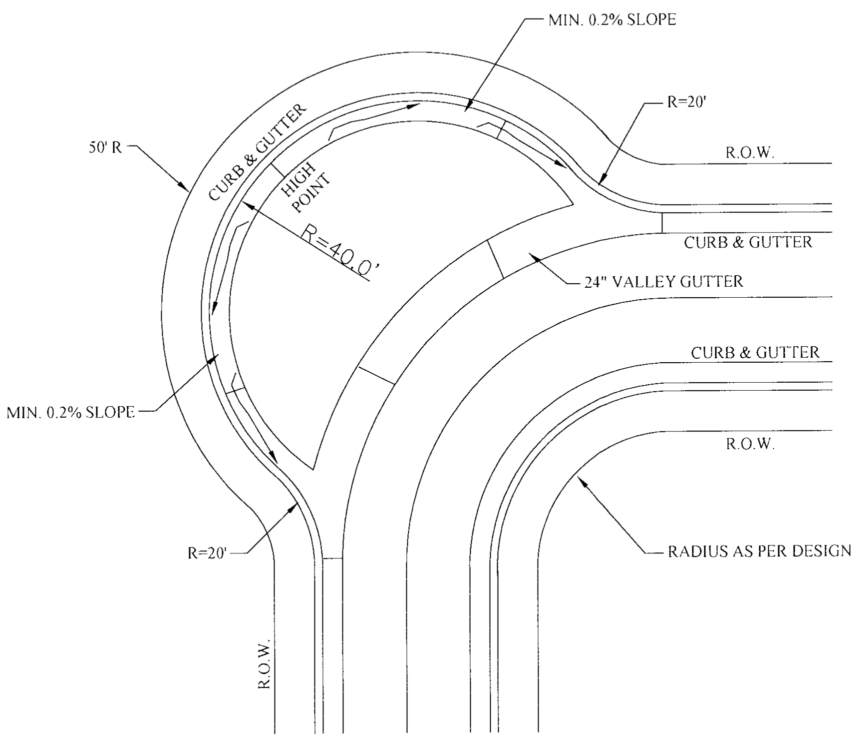

KNUCKLE

GENERAL NOTES

1. KNUCKLE REQUIRED AT INTERSECTIONS WHICH ARE NOT "+" ,"T", OR "Y" INTERSECTIONS THAT HAVE PAVEMENT WIDTHS LESS THAN 40 FEET.

2. DEVIATIONS SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.

City of McAllen ENGINEERING DEPARTMENT	TYPICAL KNUCKLE DETAIL	DETAIL 209 02/2009

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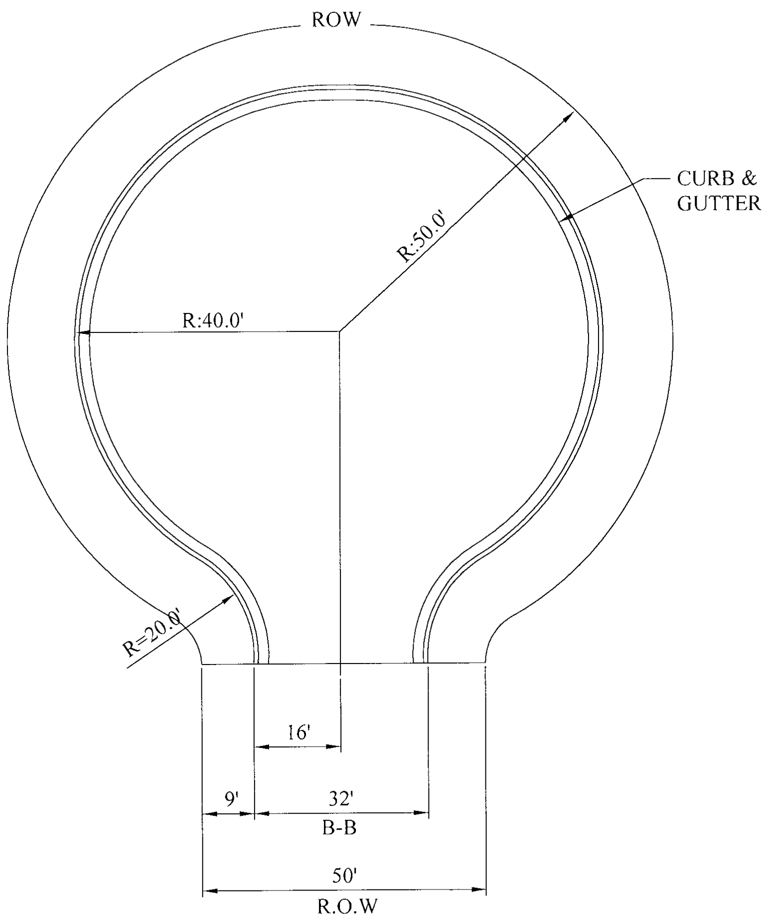

GENERAL NOTES:

1. ANY DESIGN CALLING FOR A CUL-DE-SAC WITH LESS THAN A 40 FT. BACK OF CURB RADIUS MUST BE INDIVIDUALLY APPROVED BY CITY ENGINEER.

2. LOCAL PAVEMENT SECTION SHALL BE USED FOR CUL-DE-SAC PAVEMENT.

City of McAllen ENGINEERING DEPARTMENT	CUL-DE-SAC DETAIL (TEMPORARY OR PERMANENT)	DETAIL 210 02/2009

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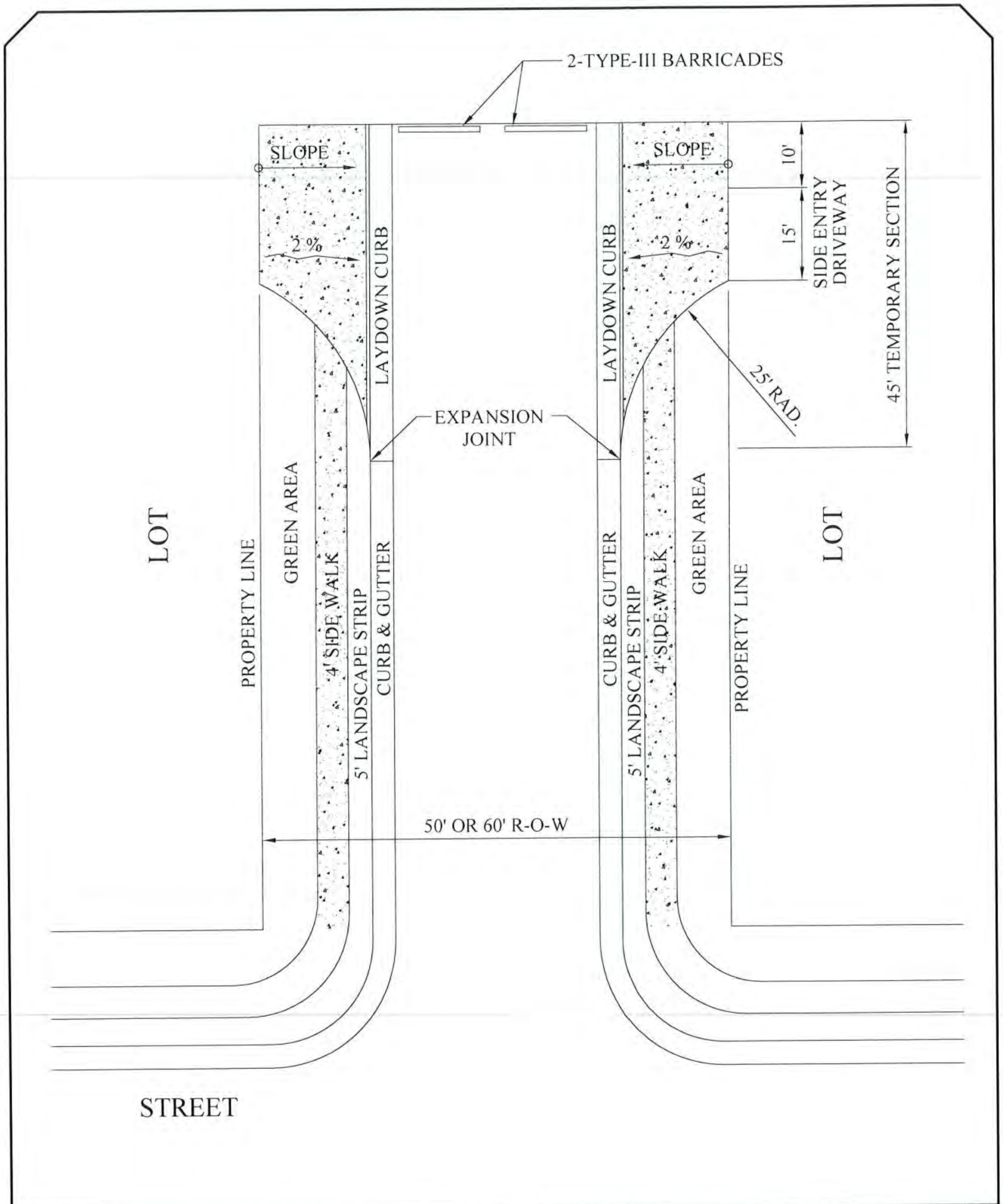

City of McAllen
ENGINEERING DEPARTMENT

TEMPORARY HAMMERHEAD
TURN-AROUND

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02/2009

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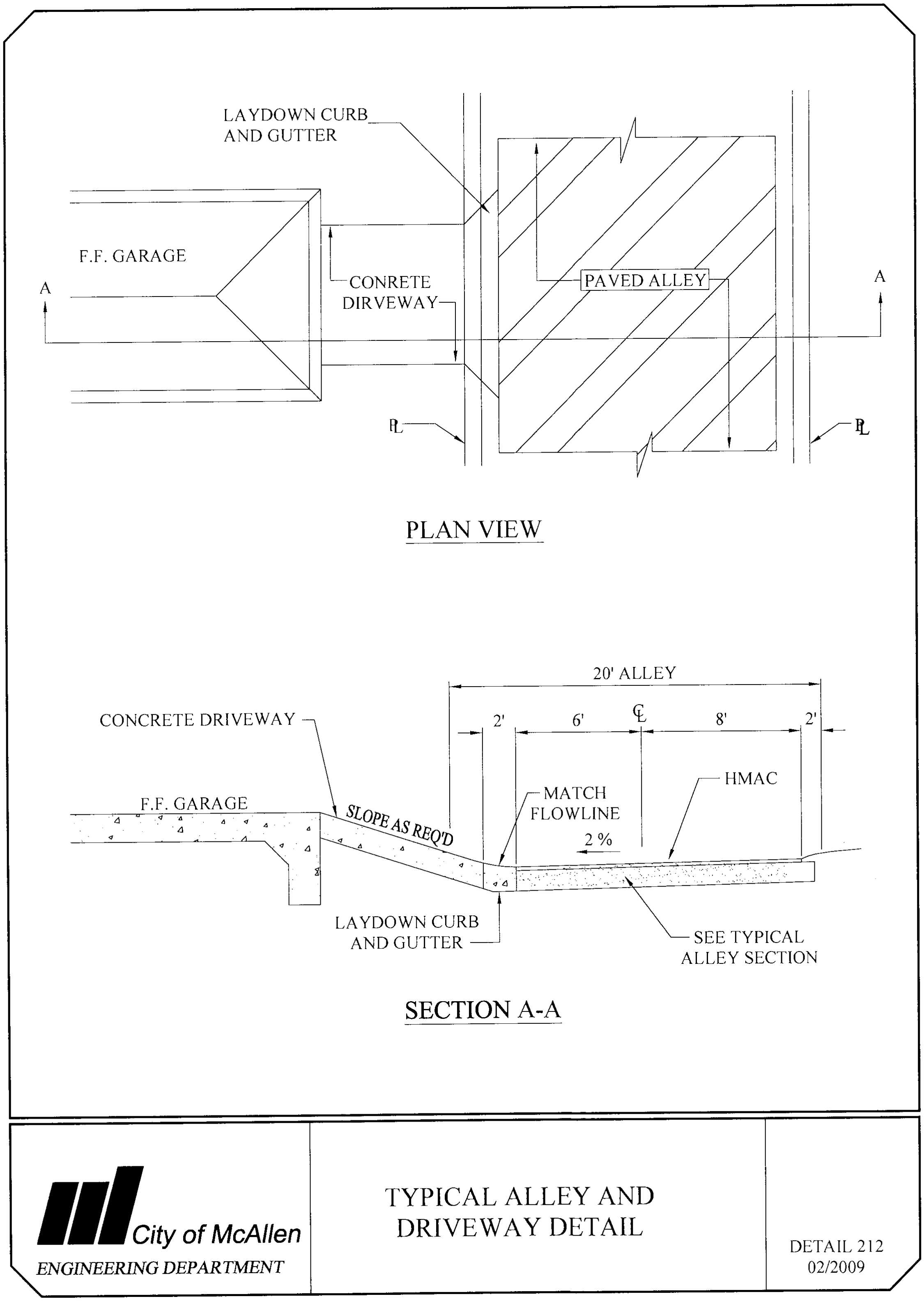

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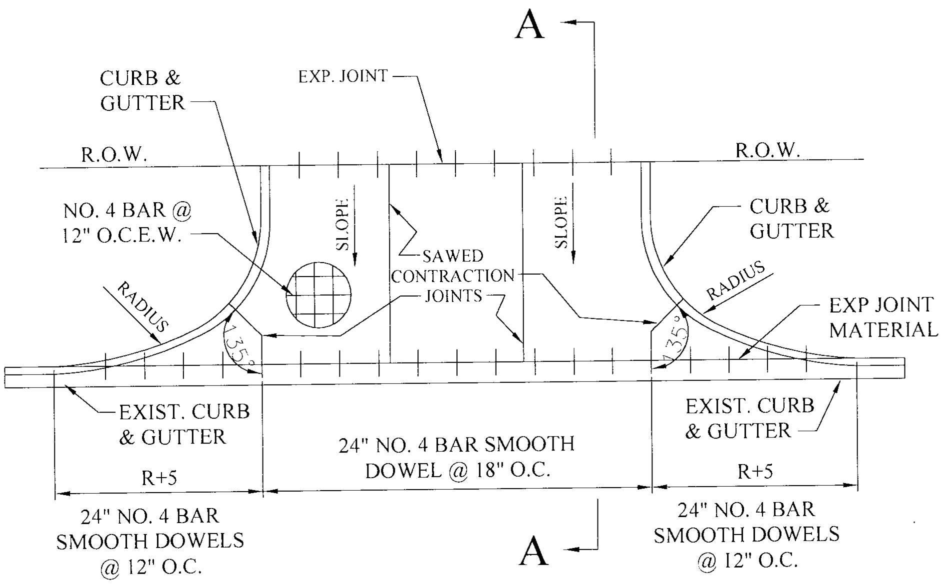

INDUSTRIAL DRIVEWAY TO BE APPROVED BY CITY ENGINEER.

City of McAllen
ENGINEERING DEPARTMENT

CONCRETE APRON TYPICAL
JOINT LAYOUT

DETAIL 214
02/2009

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NOTES:

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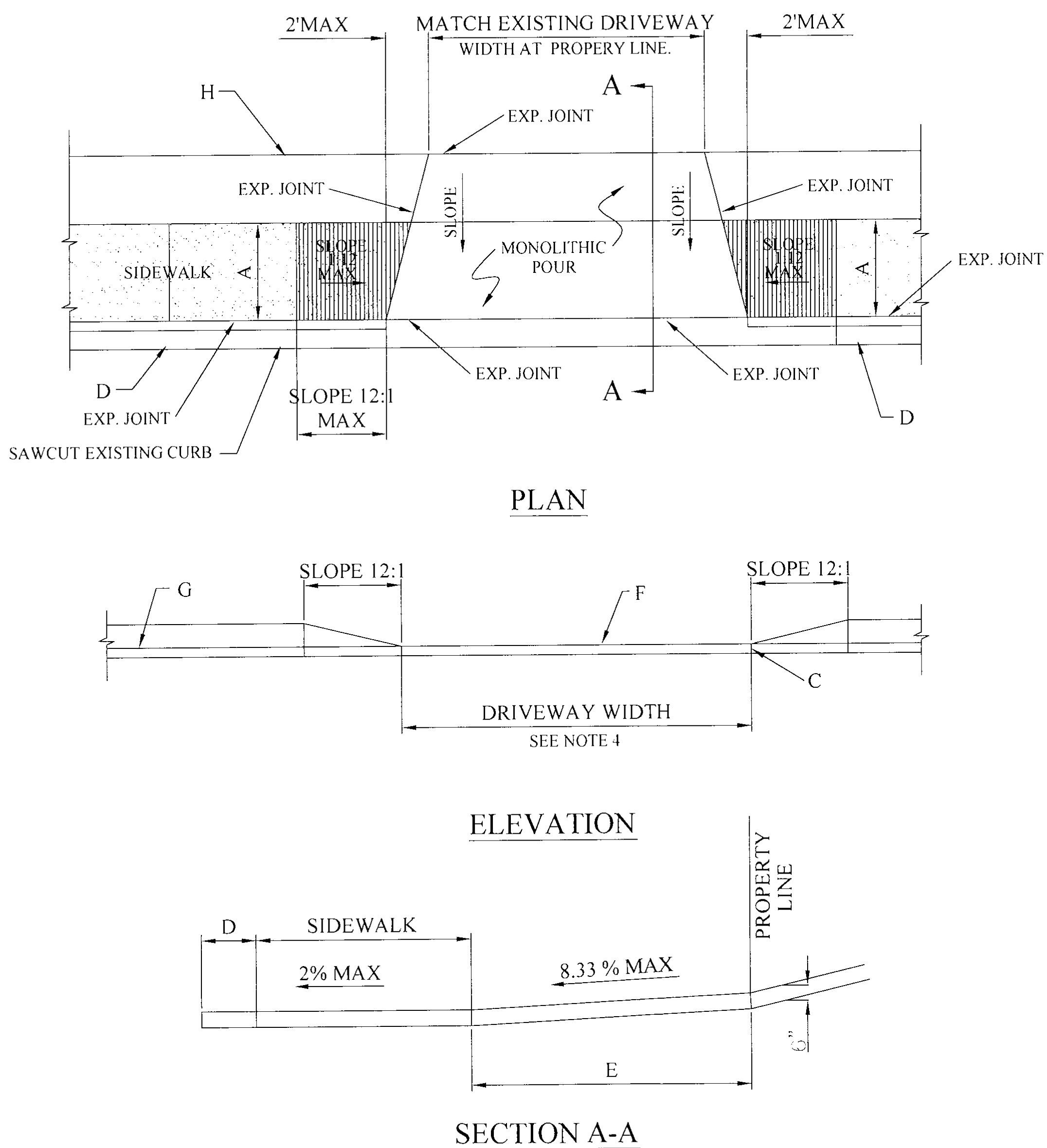

City of McAllen
ENGINEERING DEPARTMENT

CONCRETE DRIVEWAY APRON (SIDEWALK ADJACENT TO CURB)

SHEET 1 OF 3

DETAIL 215.1
02/2009

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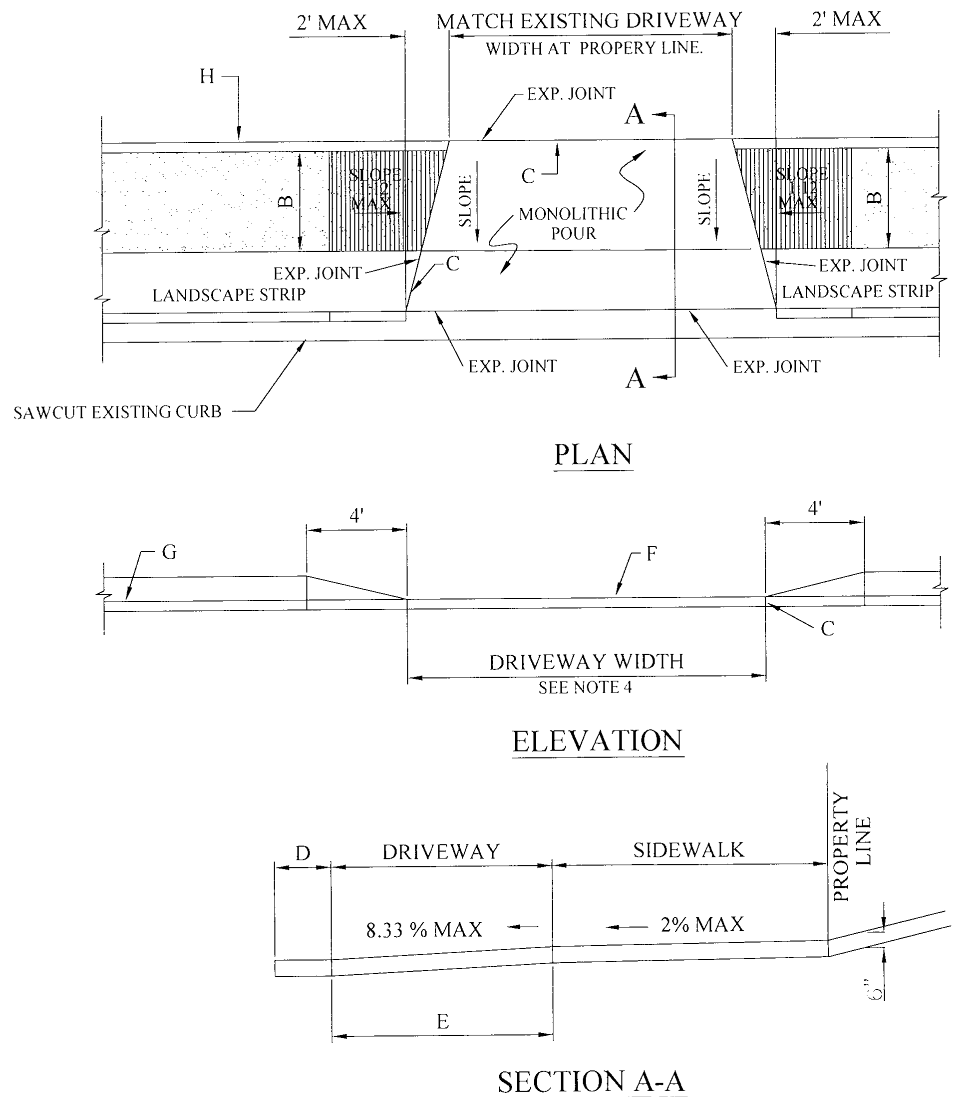

City of McAllen *ENGINEERING DEPARTMENT*	CONCRETE DRIVEWAY APRON (SIDEWALK OFFSET FROM CURB) SHEET 2 OF 3	DETAIL 215.2 02/2009

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GENERAL NOTES

1. DEVIATIONS FROM THESE STANDARDS SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.
2. USE 1/2" EXPANSION JOINT WHERE SIDEWALK OR DRIVEWAY APRON ABUTS BUILDING, FENCES,WALLS OR OTHER IMMOVABLE OBJECTS.
3. DRIVEWAY APRON WIDER THAN 18 FT (NOMINAL) SHALL HAVE A SAWED CONSTRUCTION JOINT AT MIDPOINT. DRIVEWAY APRON WIDER THAN 36 FT. SHALL HAVE AN EXPANSION JOINT EQUALLY SPACED AT MID-POINT OF DRIVEWAY.
4. MAXIMUM DRIVEWAY APRON WIDTHS SHALL BE:
   RESIDENTIAL: 24 FT MAX.
   COMMERCIAL: 45 FT MAX.
5. SUBGRADE UNDER DRIVEWAY APRON SHALL BE COMPACTED TO 90% MIN. DENSITY TO A DEPTH OF 6".
6. DRIVEWAY APRON SHALL HAVE A MINIMUM THICKNESS OF 6" AND BE PLACED USING 3000 P.S.I. CONCRETE WITH 6"X6" WELDED WIRE MESH, NO. 3 BARS @ 12" O.C.E.W. OR NO. 4 @ 18" O.C.E.W.
7. CURB CUT MUST BE A MINIMUM OF 6 FT FROM SIDE YARD PROPERTY LINE.
8. CURB CUT MUST BE A MINIMUM OF 25 FT FROM THE PROJECTION OF THE CLOSEST THROUGHLANE AT A STREET INTERSECTION.
9. CONCRETE SHALL HAVE A BROOM FINISH. BRICK PAVERS, EXPOSED AGGREGATE, RIVER-BRICK FINISH, TILE ARE NOT PERMITTED WITHIN THE R.O.W.
10. MEMBRANE CURING COMPOUND SHALL BE APPLIED AT A MINIMUM OF 1 GALLON PER 180 SQUARE FEET OF AREA AFTER SURFACE FINISH HAS BEEN COMPLETED.

CONSTRUCTION NOTES

A. CURB TYPE SIDEWALK.
B. OFFSET SIDEWALK.
C. 1/2" EXPANSION JOINT AT PROPERTY LINE ADJACENT SIDEWALK AND ALONG BACK OF CURB.
D. CURB & GUTTER.
E. SLOPE TO BE ADJUSTED TO PROVIDE A UNIFORM TRANSITION BETWEEN SIDEWALK & DRIVEWAY APRON 12:1 SLOPE MAX.
F. TOP OF DRIVEWAY APRON.
G. TOP OF CURB.
H. PROPERTY LINE.

City of McAllen *ENGINEERING DEPARTMENT*	CONCRETE DRIVEWAY APRON (SIDEWALK ADJACENT TO OR OFFSET FROM CURB) SHEET 3 OF 3	DETAIL 215.3 02/2009

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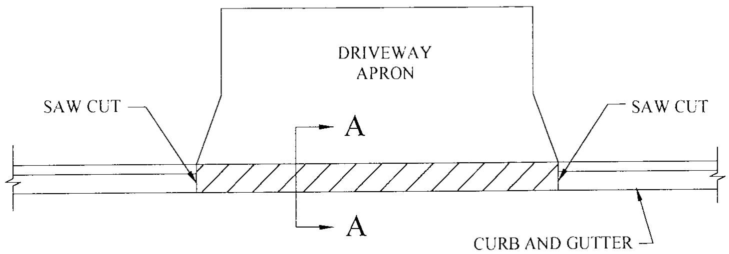
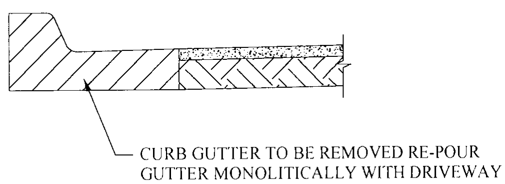
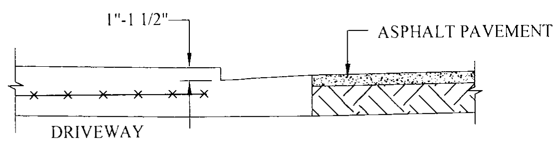


PLAN VIEW





SECTION A-A

ANY PAVEMENT DAMAGE WILL REQUIRE A ASPHALT CUT AND RESTORE

City of McAllen ENGINEERING DEPARTMENT	CURB AND GUTTER SAWCUT FOR DRIVEWAY DETAIL OPTION 1 SHEET 1 OF 3	DETAIL 216.1 02/2009

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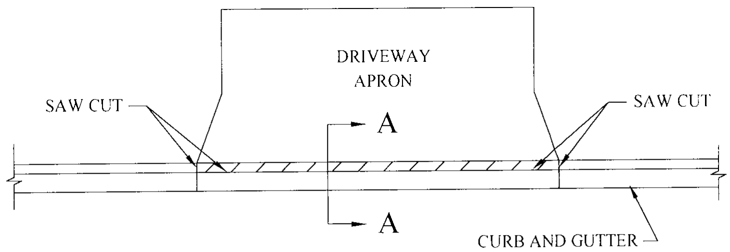
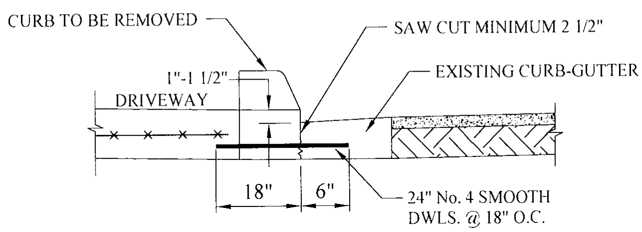


PLAN VIEW



SECTION A-A

City of McAllen
ENGINEERING DEPARTMENT

CURB AND GUTTER SAWCUT
FOR DRIVEWAY DETAIL
OPTION 2

SHEET 2 OF 3

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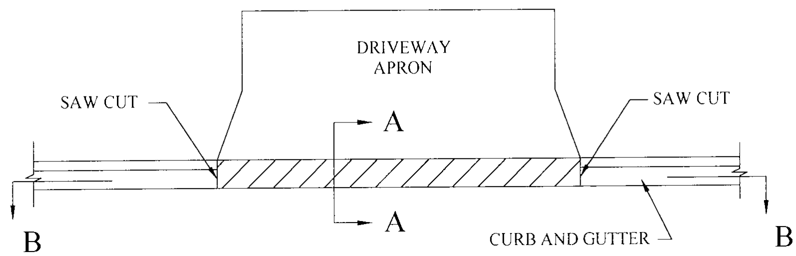

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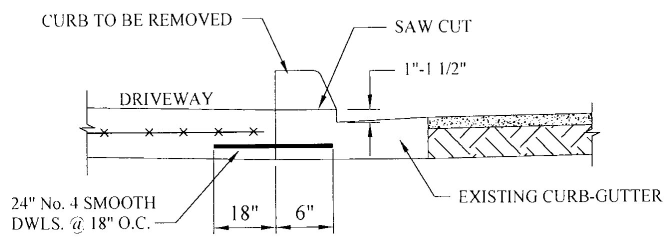
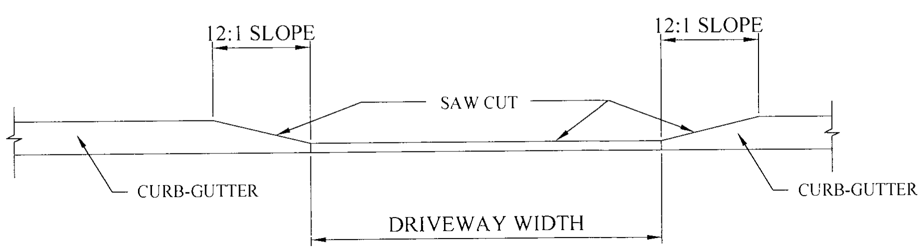


SECTION A-A



SECTION B-B

City of McAllen
ENGINEERING DEPARTMENT

CURB AND GUTTER SAWCUT
FOR DRIVEWAY DETAIL
OPTION 3

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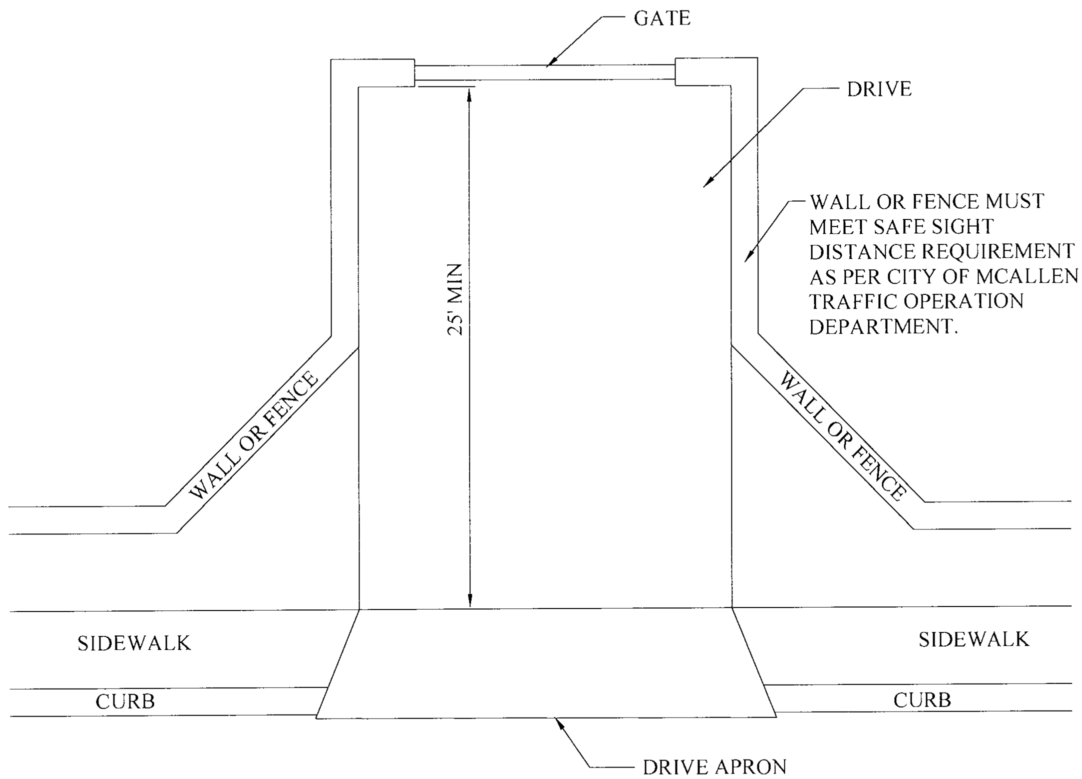

City of McAllen
ENGINEERING DEPARTMENT

RESIDENTIAL GATED
DRIVEWAY

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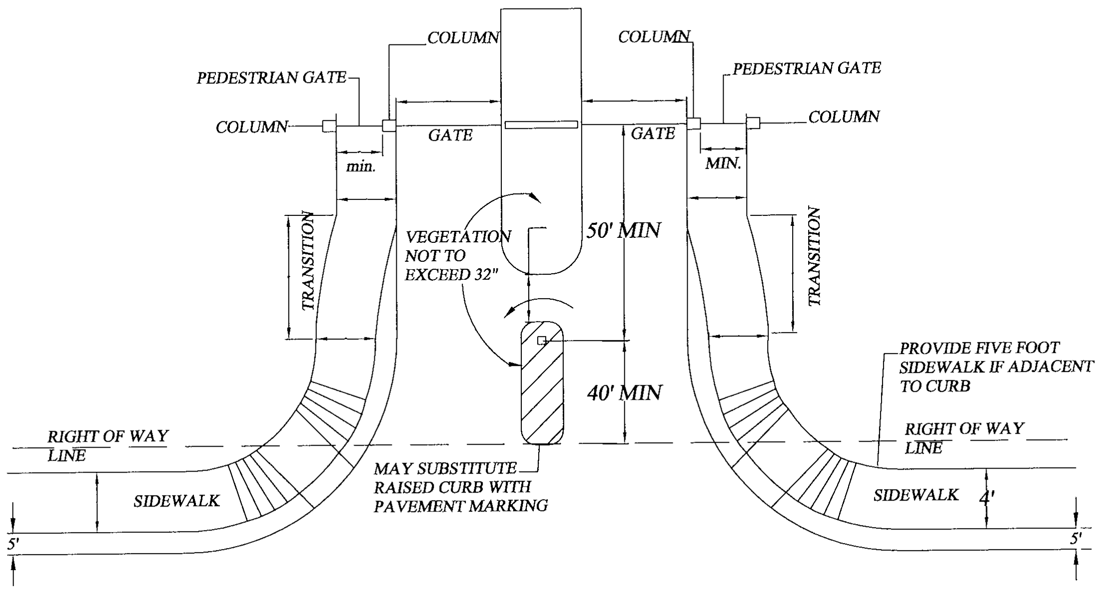

GENERAL NOTES:

1. THE MINIMUM GATE WIDTH SHALL BE 20' FEET (6096MM) FOR NEW SUBDIVISIONS. FOR EXISTING SUBDIVISIONS,PROPOSED WIDTH MUST BE APPROVED BY FIRE DEPARTMENT.
2. GATES SHALL BE OF THE SWINGING TYPE.
3. CONTRUCTION OF GATES SHALL BE OF MATERIALS THAT ALLOW MANUAL OPERATION BY ONE PERSON.
4. GATE COMPONENTS SHALL BE MAINTAINED IN AN OPERATIVE CONDITION AT ALL TIMES AND REPLACED OR REPAIRED WHEN DEFECTIVE.
5. ELECTRIC GATES SHALL BE EQUIPPED WITH A MEANS OF OPENING THE GATE BY FIRE DEPARTMENT PERSONNEL FOR EMERGENCY ACCESS. EMERGENCY OPENING DEVICES SHALL BE APPROVED BY THE CODE OFFICIAL
6. MANUAL OPENING GATES SHALL NOT BE LOCKED WITH A PADLOCK OR CHAIN AND PADLOCK UNLESS THEY ARE CAPABLE OF BEING OPENED BY MEANS OF FORCIBLE ENTRY TOOLS MENU.
7. LOCKING DEVICE SPECIFICATIONS SHALL BE SUBMITTED FOR APPROVAL BY THE CODE OFFICIAL.

City of McAllen ENGINEERING DEPARTMENT	GATED ENTRANCE DETAIL	DETAIL 218 02/2009

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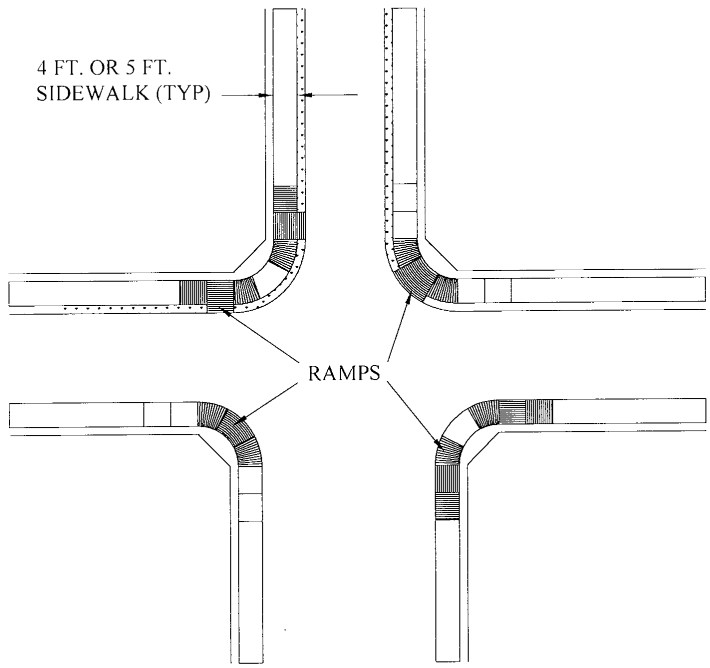

GENERAL NOTES:

1. WHERE AN INADEQUATE AREA FOR A WHEELCHAIR RAMP EXISTS, THE CITY ENGINEER WILL SPECIFY LOCATION OF RAMP(S).
2. ALL CURB RADII ARE 25 FEET UNLESS OTHERWISE SPECIFIED.
3. WHEELCHAIR RAMPS SHALL BE PROVIDED AT ALL CORNERS OF STREET INTERSECTION WHERE THERE IS AN EXISTING OR PROPOSED SIDEWALK AND CURB AND GUTTER. RAMPS SHALL ALSO BE PROVIDED AT LOCATIONS AT MID BLOCK IN THE VICINITY OF HOSPITALS, MEDICAL CENTERS AND ATHLETIC STADIUMS.
4. SLOPE SIDEWALK FROM P.C. OR P.T. OF CURB RETURN TO MID POINT OF CURB RETURN.

City of McAllen *ENGINEERING DEPARTMENT*	TYPICAL LOCATIONS OF SIDEWALK AND RAMPS FOR LOCAL COLLECTORS	DETAIL 219 02/2009

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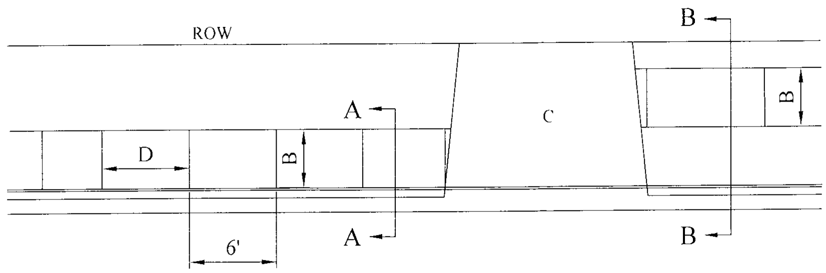
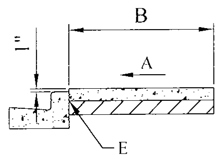
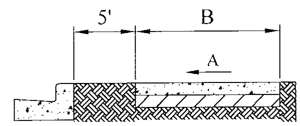
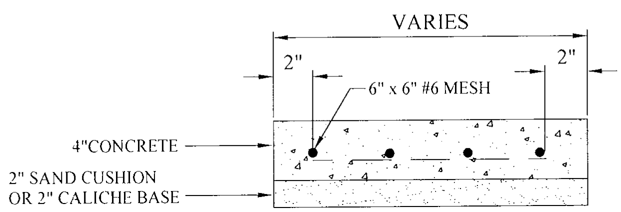




SECTION A-A
SIDEWALK ADJACENT TO CURB



SECTION B-B
SIDEWALK OFFSET 5 FT FROM CURB



NOTE

1. CONCRETE SHALL HAVE 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.
2. SUBGRADE SHALL BE COMPACTED TO 90% MAX DENSITY.

GENERAL NOTES:

1. DEVIATIONS FROM THESE STANDARDS SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.
2. SIDEWALK SHALL BE CONSTRUCTED WITHIN STREET R.O.W.
3. PROVIDE 5' X 5' PASSING SPACE AT A MAXIMUM 200' INTERVALS, IF SIDEWALK IS LESS THAN 5' ON WIDTH (DRIVEWAY IS CONSIDERED A PASSING SPACE)

CONSTRUCTION NOTES:

A. CROSS-SLOPE AT 1.5% USUAL AND 2.0% MAX.

B. SIDEWALK, WIDTH VARIES. 4 FT MINIMUM WHEN SETBACK 5 FT FROM THE CURB. 5 FT. MINIMUM WHEN ADJACENT TO THE CURB.

C. SEE DRIVEWAY APRON DETAIL.

D. CONTRACTION JOINTS EVERY 6 FT.; EXPANSION JOINT EVERY 30 FT. AND ALONG CURB AND GUTTER WHEN SIDEWALK ADJACENT TO CURB AND ALONG ANY STRUCTURE EXISTING.

E. 1/2" EXPANSION JOINT.

City of McAllen ENGINEERING DEPARTMENT	TYPICAL SIDEWALK DETAILS SHEET 1 OF 3	DETAIL 220.1 02/2009

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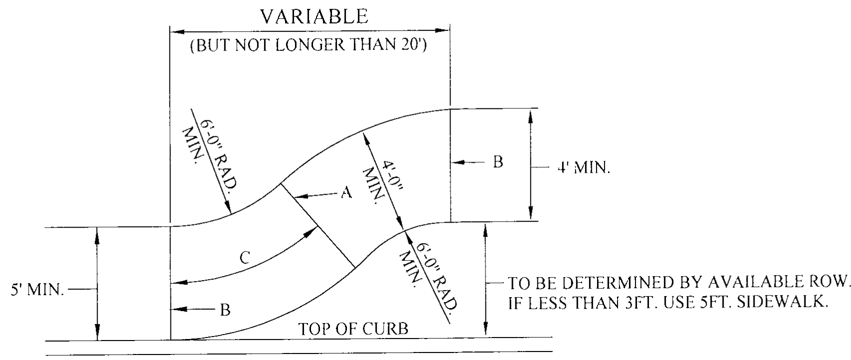
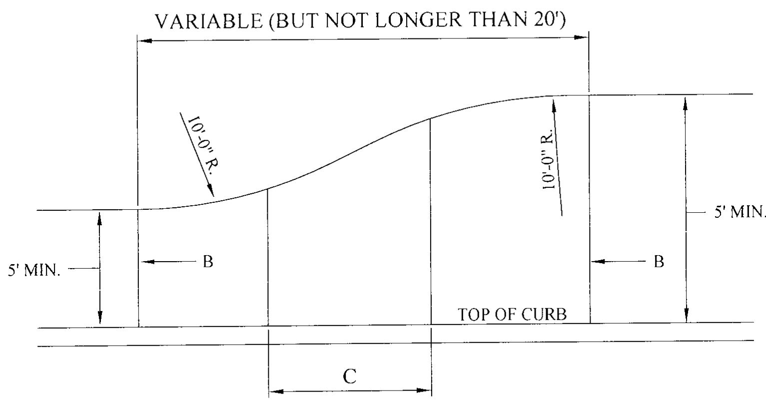


CURB TYPE TO OFFSET TYPE



CURB TYPE WITH VARYING WIDTHS

CONSTRUCTION NOTES:

A. WEAKENED PLAN JOINT ALIGNMENT TO BE RADIAL.
B. 1/2" EXPANSION JOINT.
C. CONSTRUCTION JOINTS SHALL NOT BE GREATER THAN 6 FEET ON CENTER BETWEEN EXPANSION JOINTS, MEASURED ALONG SIDEWALK.

City of McAllen
ENGINEERING DEPARTMENT

TYPICAL SIDEWALK DETAILS
TRANSITION

SHEET 2 OF 3

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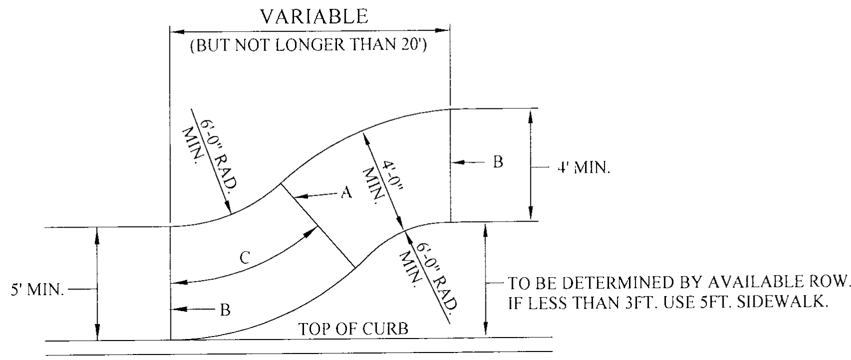
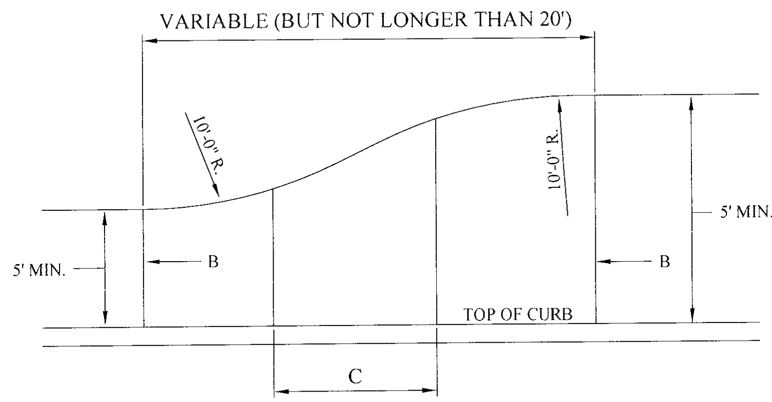


CURB TYPE TO OFFSET TYPE



CURB TYPE WITH VARYING WIDTHS

CONSTRUCTION NOTES:

A. WEAKENED PLAN JOINT ALIGNMENT TO BE RADIAL.
B. 1/2" EXPANSION JOINT.
C. CONSTRUCTION JOINTS SHALL NOT BE GREATER THAN 6 FEET ON CENTER BETWEEN EXPANSION JOINTS, MEASURED ALONG SIDEWALK.

City of McAllen
ENGINEERING DEPARTMENT

TYPICAL SIDEWALK DETAILS
TRANSITION

SHEET 2 OF 3

DETAIL 220.2
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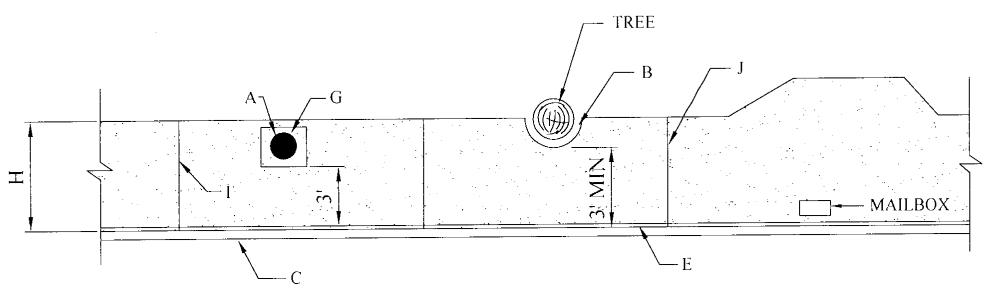
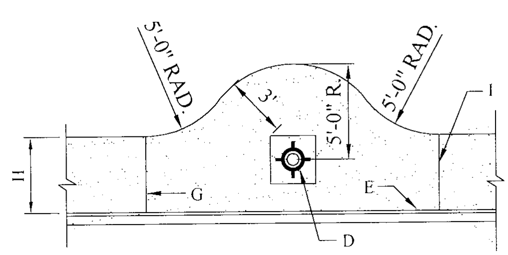
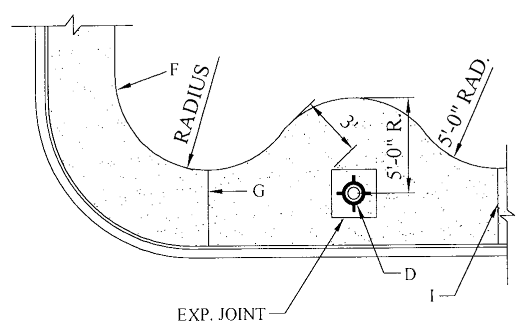
CONSTRUCTION NOTES:

A. POWER POLE OR OTHER OBSTRUCTION.
B. LEAVE 6" CLEARANCE AROUND TREE TRUNKS.
C. TOP OF CURB.
D. FIRE HYDRANT.
E. BACK OF CURB.
F. EXTERIOR EDGE OF SIDEWALK TO BE TANGENT TO ARCS.
G. PROVIDE 1/2" PREFORMED EXPANSION JOINT MATERIAL WHERE SIDEWALK ABUTS POWER POLES, FIRE HYDRANTS, MAILBOXES OR OTHER IMMOVABLE OBJECTS.
H. SIDEWALK WIDTH.
I. CONTRACTION JOINT.
J. EXPANSION JOINT.





ON STRAIGHT STRETCH



AT CURB RETURN

City of McAllen
ENGINEERING DEPARTMENT

TYPICAL SIDEWALK DETAILS
OBSTRUCTIONS

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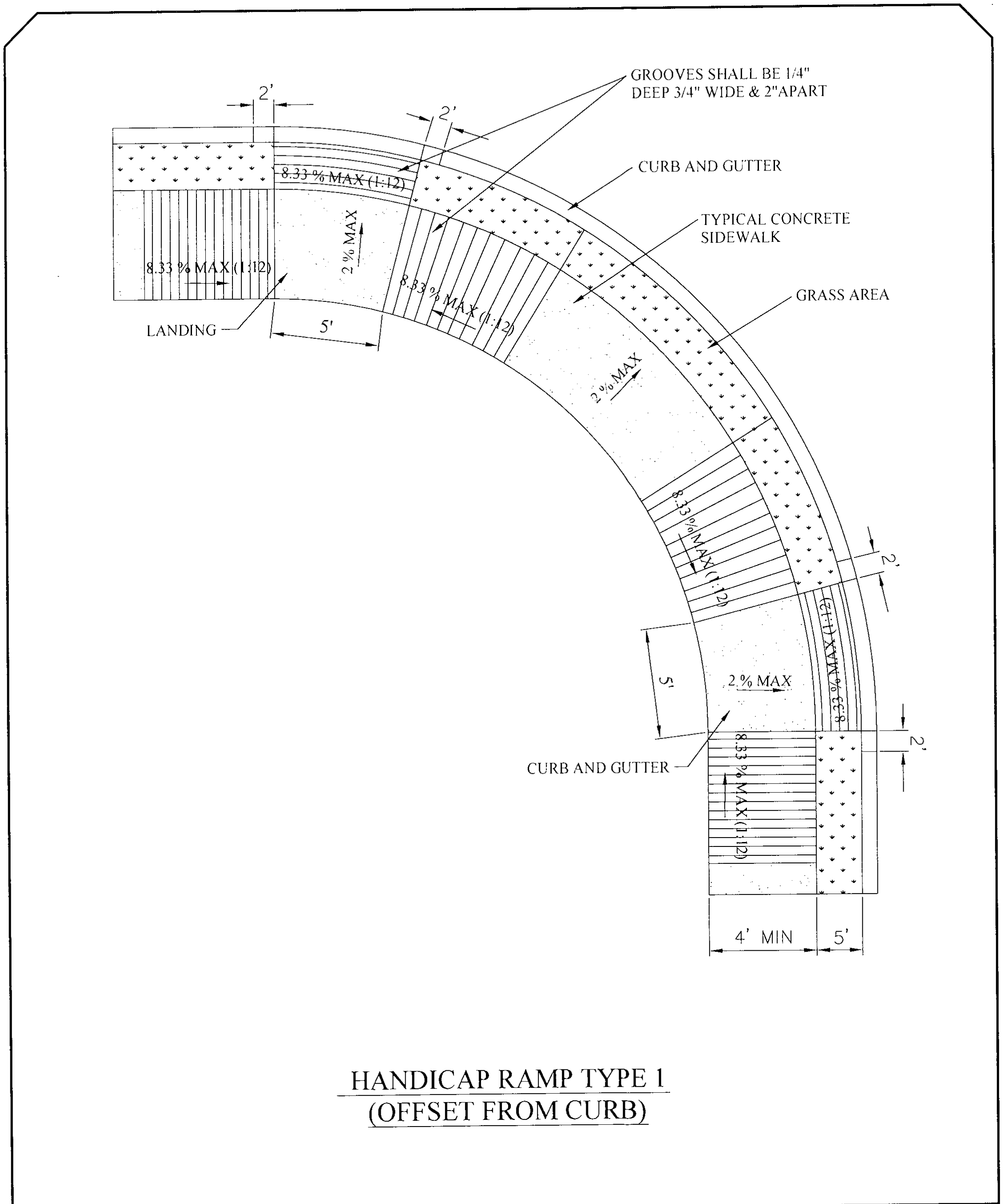

City of McAllen *ENGINEERING DEPARTMENT*	HANDICAP RAMP DETAIL SHEET 1 OF 10	DETAIL 221.1 02/2009

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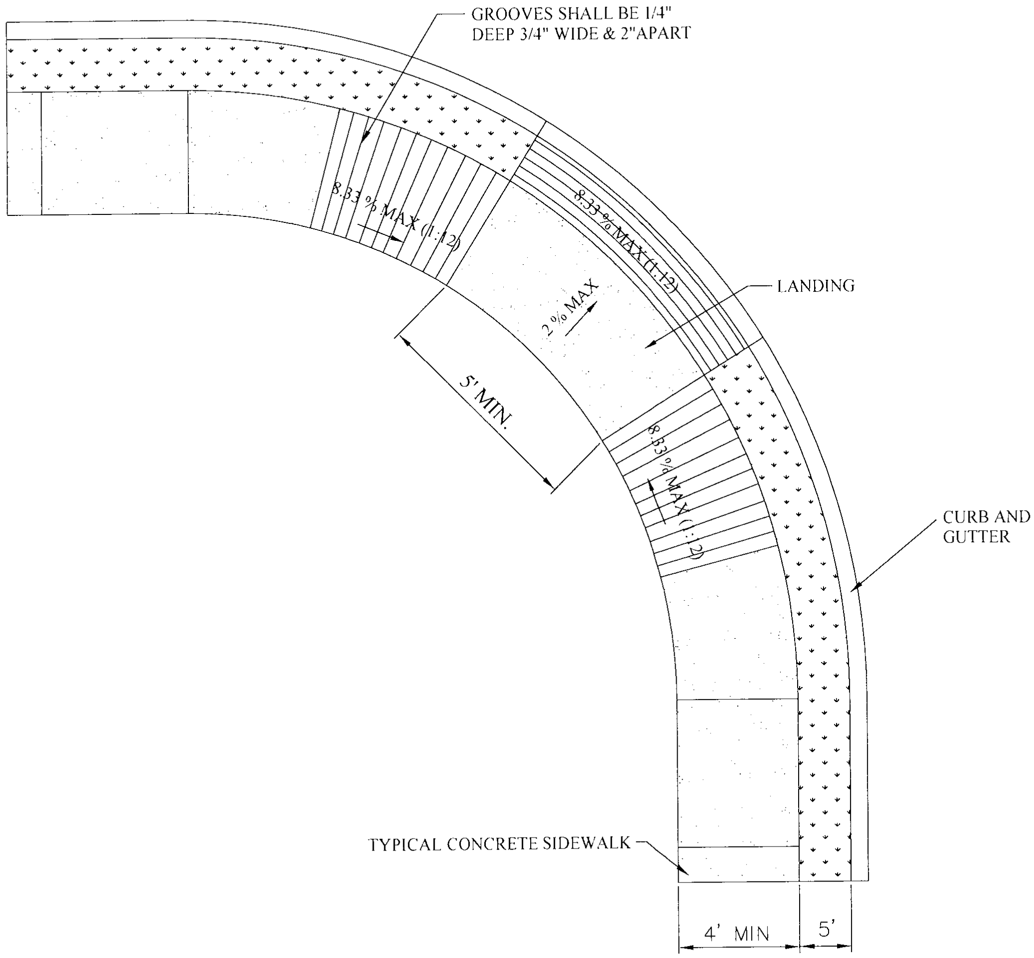

HANDICAP RAMP TYPE 2
OFFSET FROM CURB

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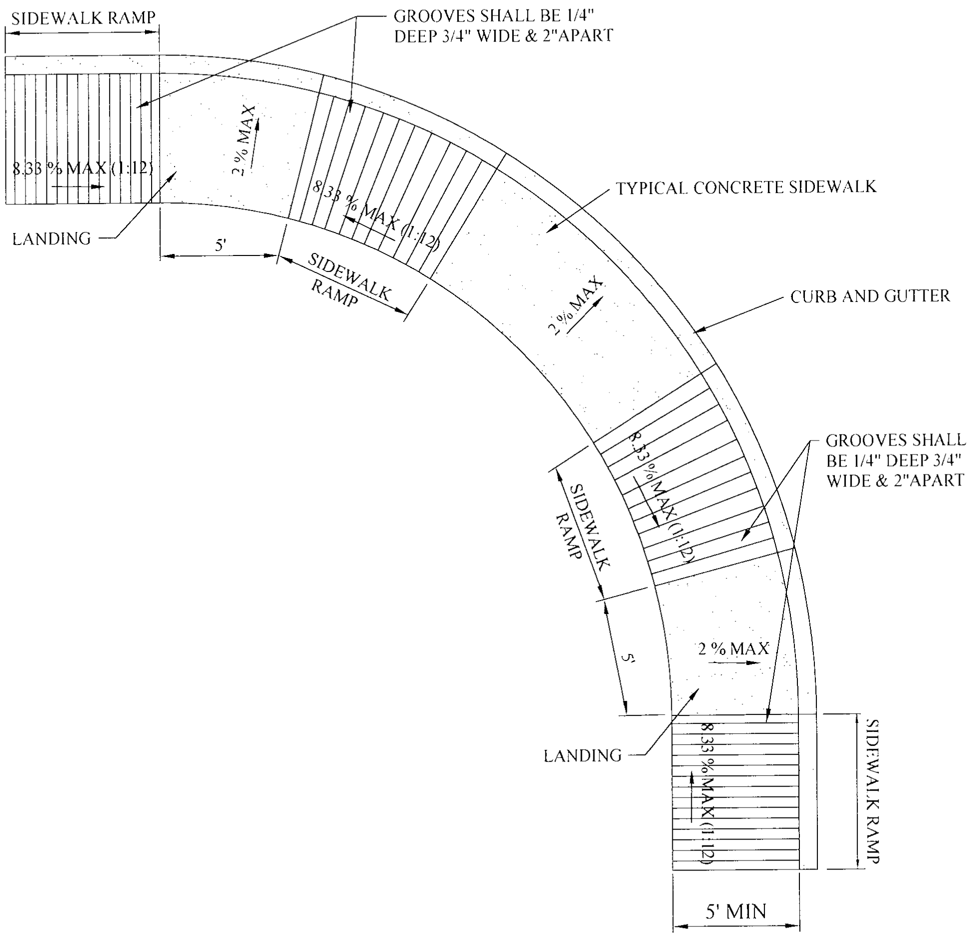

HANDICAP RAMP TYPE 3
(ADJACENT TO CURB)

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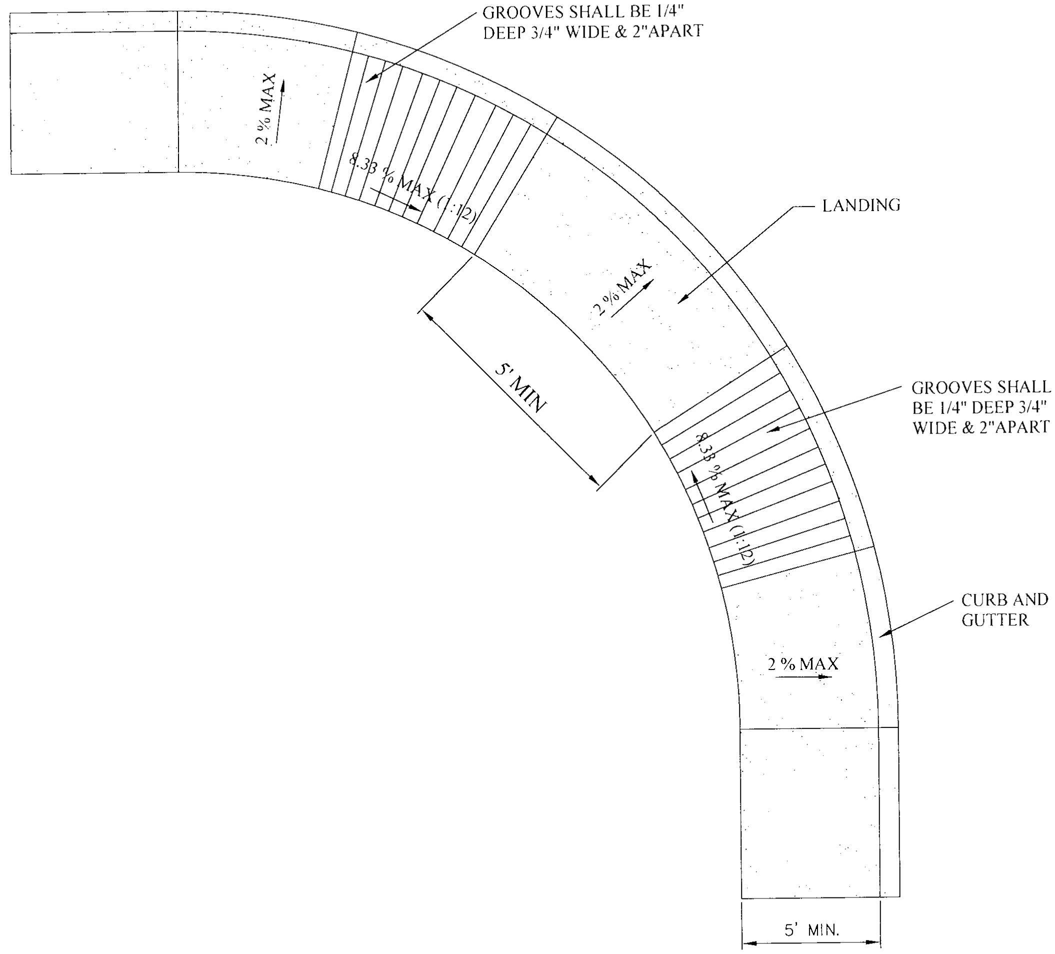

HANDICAP RAMP TYPE 4
(ADJACENT TO CURB)

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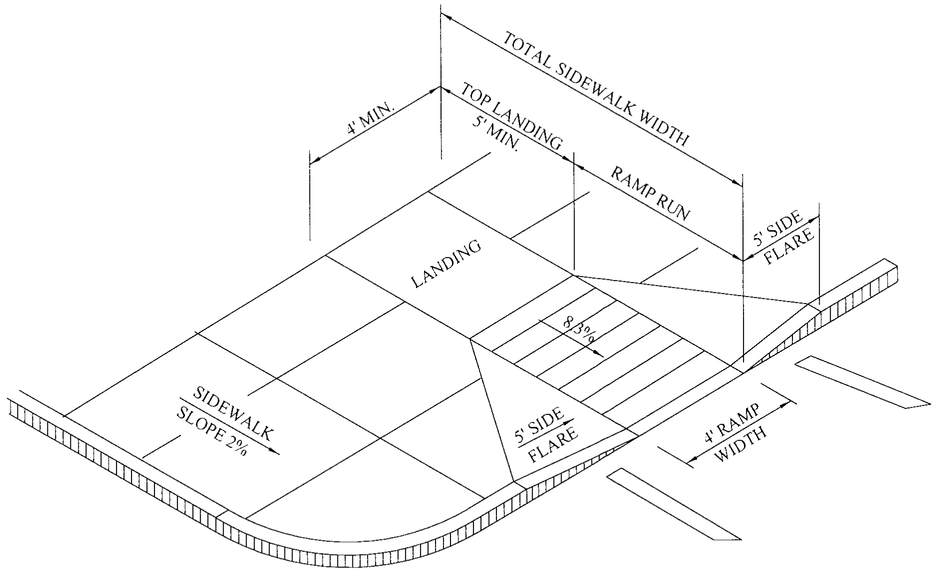
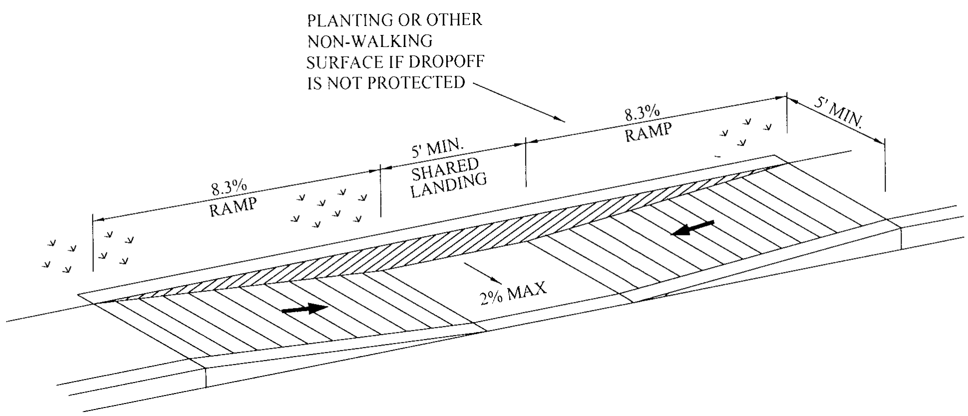
Standard Details



PERPENDICULAR CURB RAMP-TYPE 5



PARALLEL CURB RAMP-TYPE 6

(USE ONLY WHERE WATER WILL NOT POND IN THE LANDING.)

City of McAllen *ENGINEERING DEPARTMENT*	HANDICAP RAMP DETAIL SHEET 5 OF 10	DETAIL 221.5 02/2009

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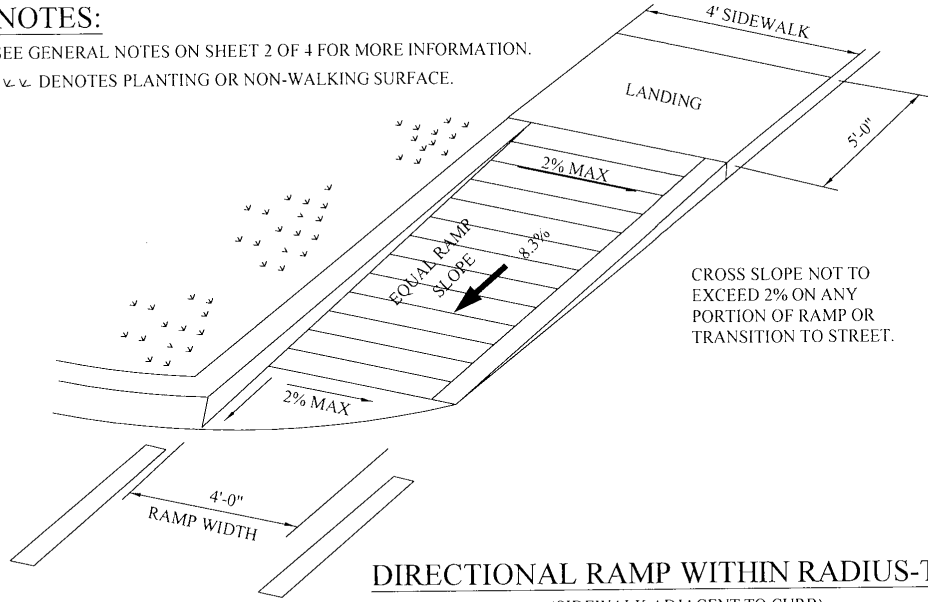
NOTES:

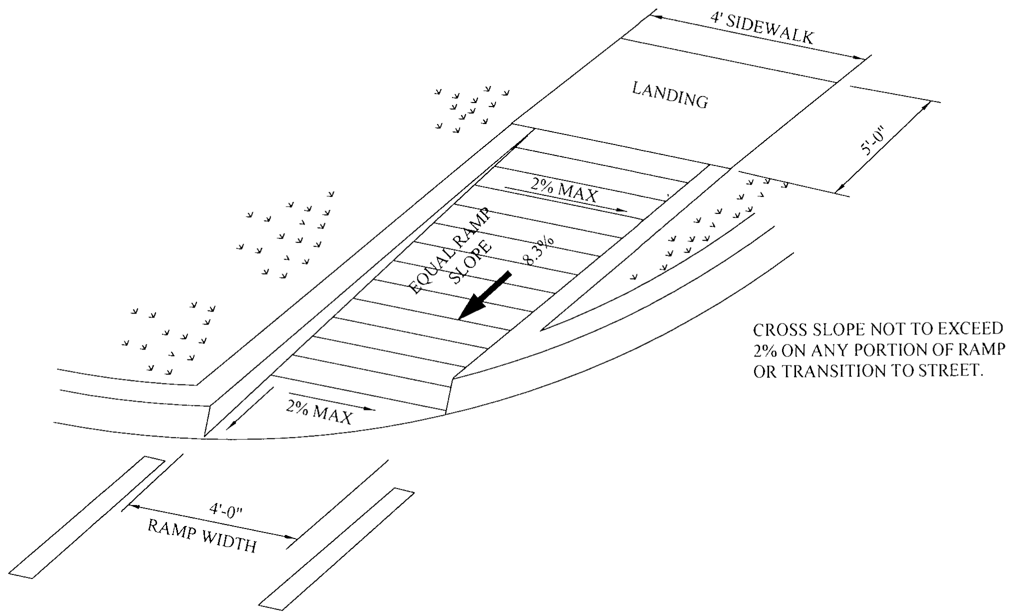
SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

⅄⅄⅄ DENOTES PLANTING OR NON-WALKING SURFACE.



DIRECTIONAL RAMP WITHIN RADIUS-TYPE 7

(SIDEWALK ADJACENT TO CURB)



DIRECTIONAL RAMP WITHIN RADIUS-TYPE 8

(SIDEWALK SET BACK FROM CURB)

City of McAllen *ENGINEERING DEPARTMENT*	HANDICAP RAMP DETAIL SHEET 6 OF 10	DETAIL 221.6 02/2009

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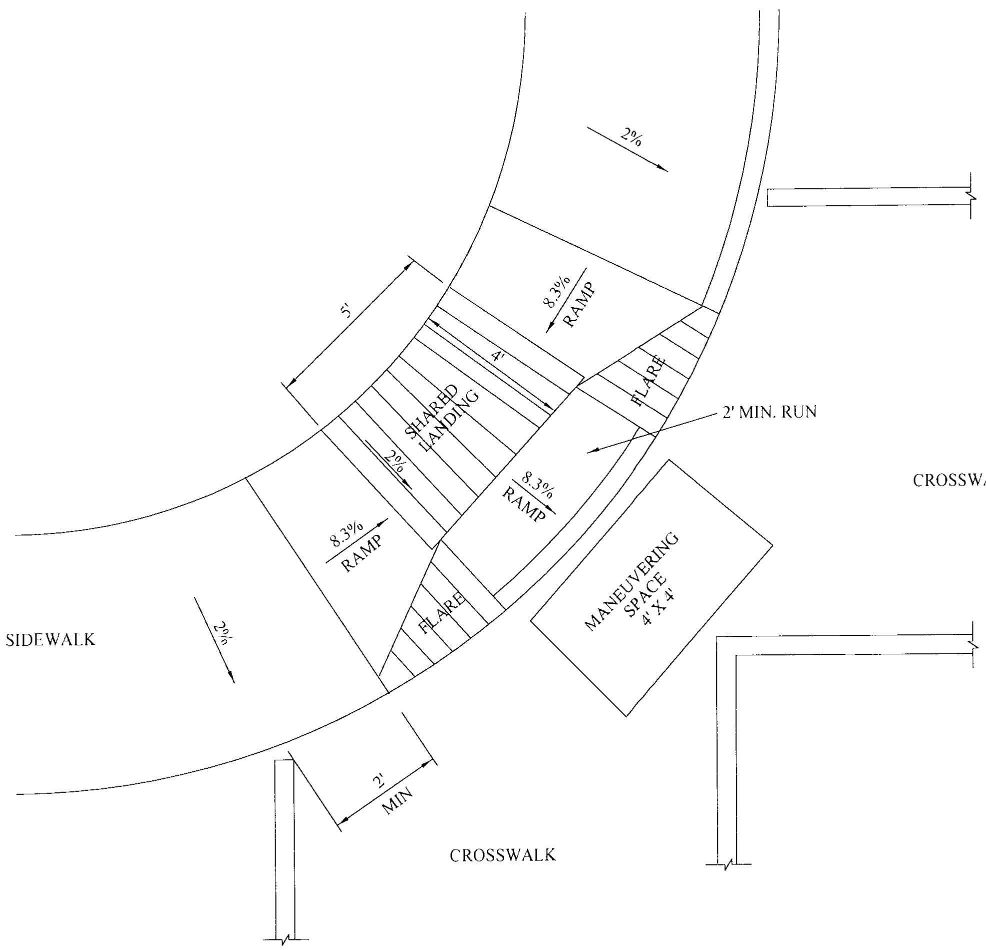

DIAGONAL COMBINATION CURB RAMP-TYPE 9

PERPENDICULAR TO THE TANGENT OF THE CURB RADIUS AND CONTAINED IN CROSSWALK

City of McAllen *ENGINEERING DEPARTMENT*	HANDICAP RAMP DETAIL SHEET 7 OF 10	DETAIL 221.7 02/2009

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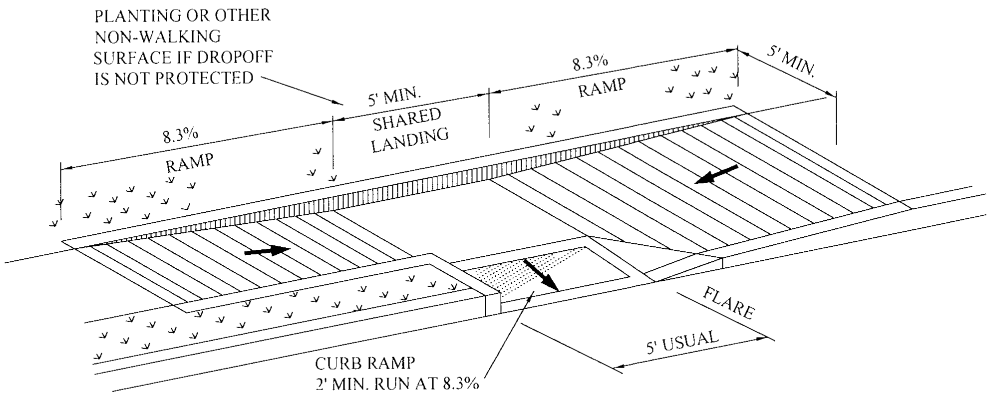
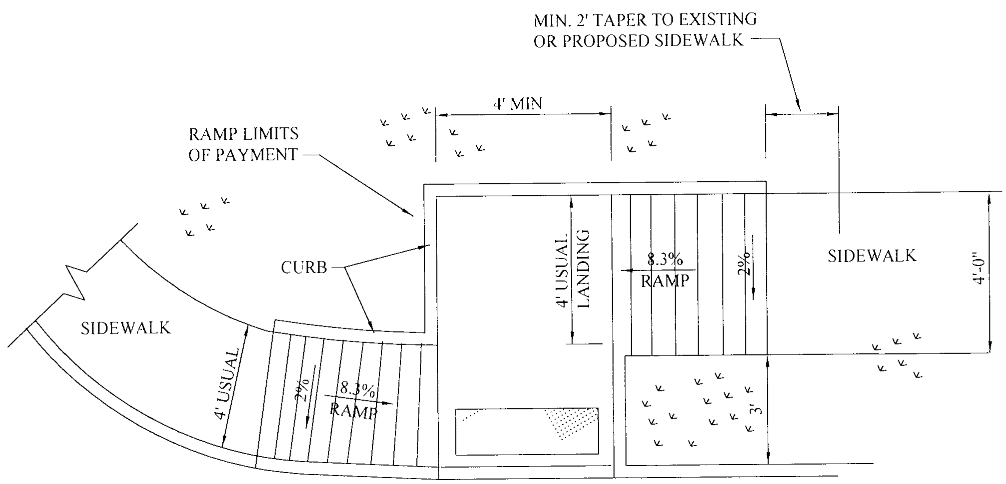


PARALLEL CURB RAMP-TYPE 10



OFFSET PARALLEL CURB RAMP-TYPE 11

City of McAllen
ENGINEERING DEPARTMENT

HANDICAP RAMP DETAIL

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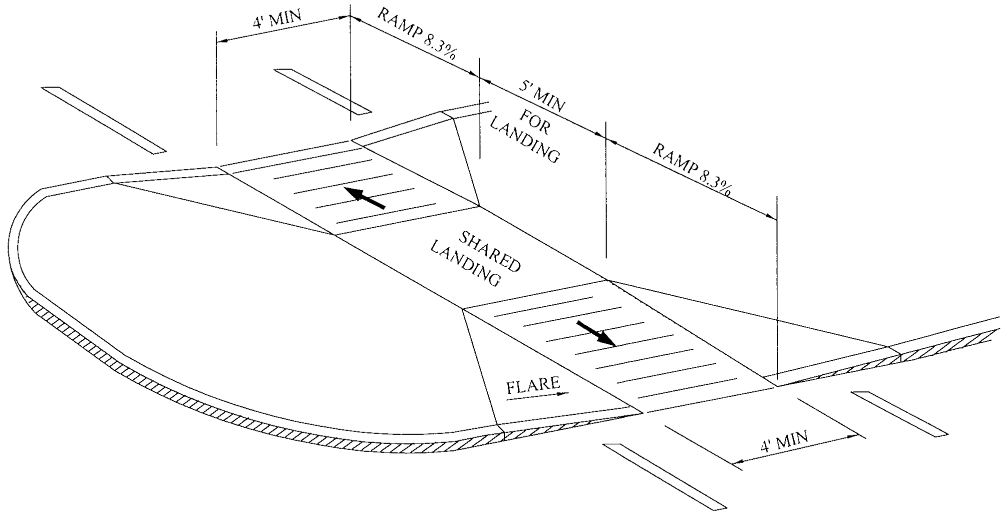
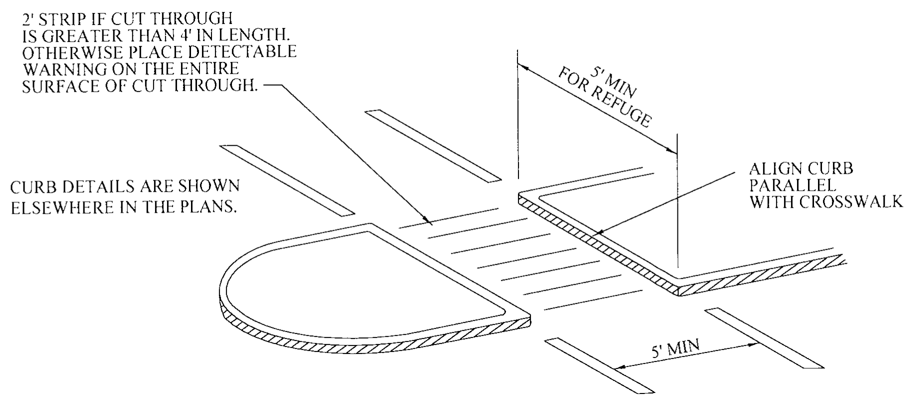
Standard Details



CURB RAMP AT MEDIAN ISLANDS-TYPE 12



CURB RAMP AT MEDIAN ISLANDS-TYPE 13

City of McAllen
ENGINEERING DEPARTMENT

HANDICAP RAMP DETAIL

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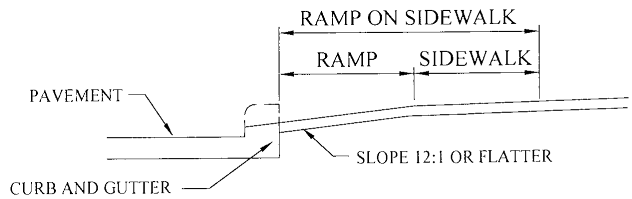
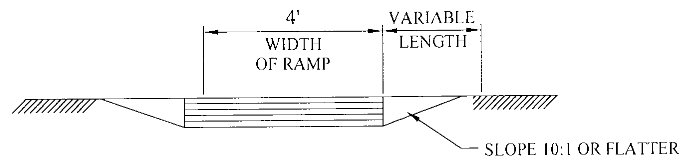
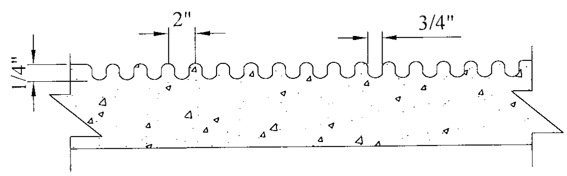
Standard Details



SECTION A-A



SECTION B-B



SURFACE TEXTURE

GENERAL NOTES:

1. WHEELCHAIR RAMPS ARE TO BE LOCATED AT CROSSWALK AREAS AS DESIGNATED ON THE PLAN. ENGINEER CAN ADJUST LOCATIONS FOR SAFETY OR UTILITY CLEARANCE.
2. SURFACE TEXTURE OF WHEELCHAIR RAMP SHALL BE OBTAINED BY TOOL FINISH TRANSVERSE TO THE SLOPE OF THE RAMP.
3. SLOPES SHALL BE UNIFORM WITH NO ABRUPT CHANGES IN GRADES, NORMAL GUTTER LINE PROFILE SHOULD BE MAINTAINED THROUGH THE AREA OF THE RAMP.
4. WHEELCHAIR RAMPS SHALL BE MEASURED AND PAID AS CONCRETE SIDEWALK AND CONCRETE CURB AND GUTTER, AS APPLICABLE.
5. CONCRETE RAMP SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 P.S.I. ALL CONCRETE WORK SHALL BE TREATED WITH MEMBRANE CURING COMPUND AFTER SURFACE TEXTURE HAS BEEN COMPLETED.
7. 6" X 6" No. 6 WIRE MESH SHALL BE USED FOR REINFORCING.
8. ALL RAMPS SHALL CONTRAST VISUALLY WITH ADJOINING SURFACES, DARK VERSUS LIGHT. THE MATERIAL USED TO PROVIDE THE CONTRAST SHALL BE AN INTEGRAL PART OF THE RAMP.

City of McAllen *ENGINEERING DEPARTMENT*	HANDICAP RAMP DETAIL SHEET 10 OF 10	DETAIL 221.10 02/2009

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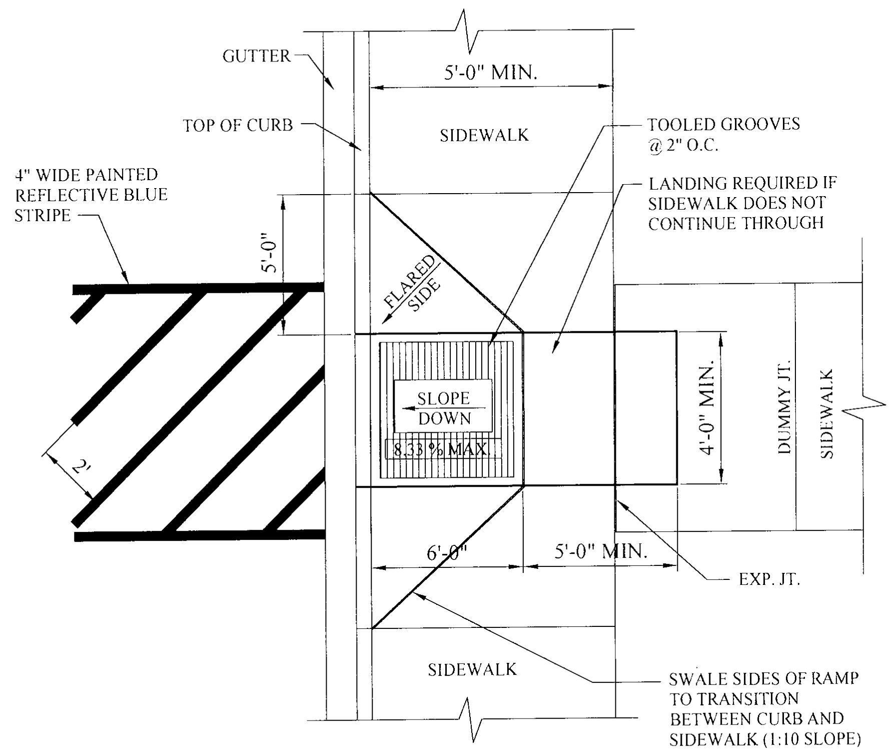

TYPICAL HANDICAP RAMP BUILT INTO SIDEWALK

City of McAllen
ENGINEERING DEPARTMENT

HANDICAP RAMP DETAIL

SHEET 1 OF 2

DETAIL 222.1
02/2009

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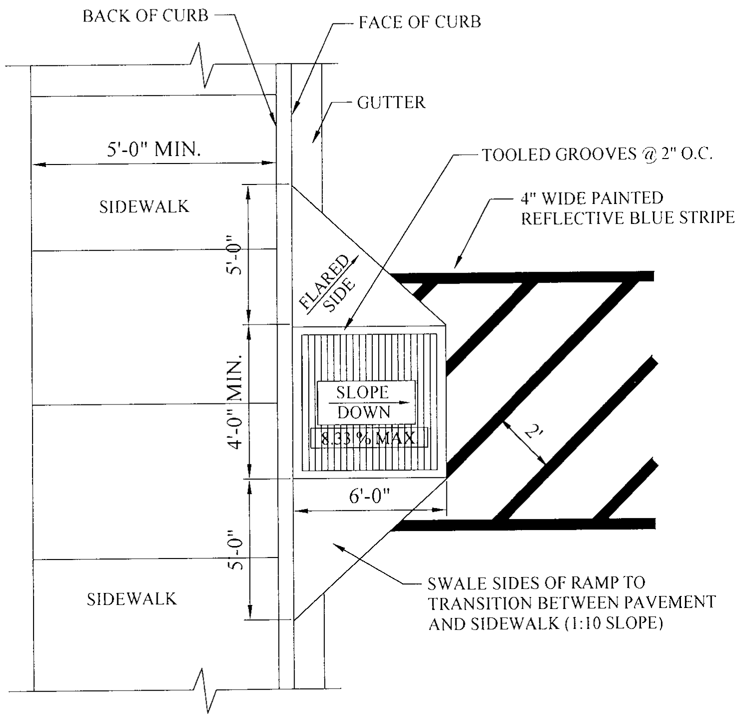

TYPICAL HANDICAP RAMP BUILT ON TOP OF PARKING LOT

City of McAllen ENGINEERING DEPARTMENT	HANDICAP RAMP DETAIL SHEET 2 OF 2	DETAIL 222.2 02/2009

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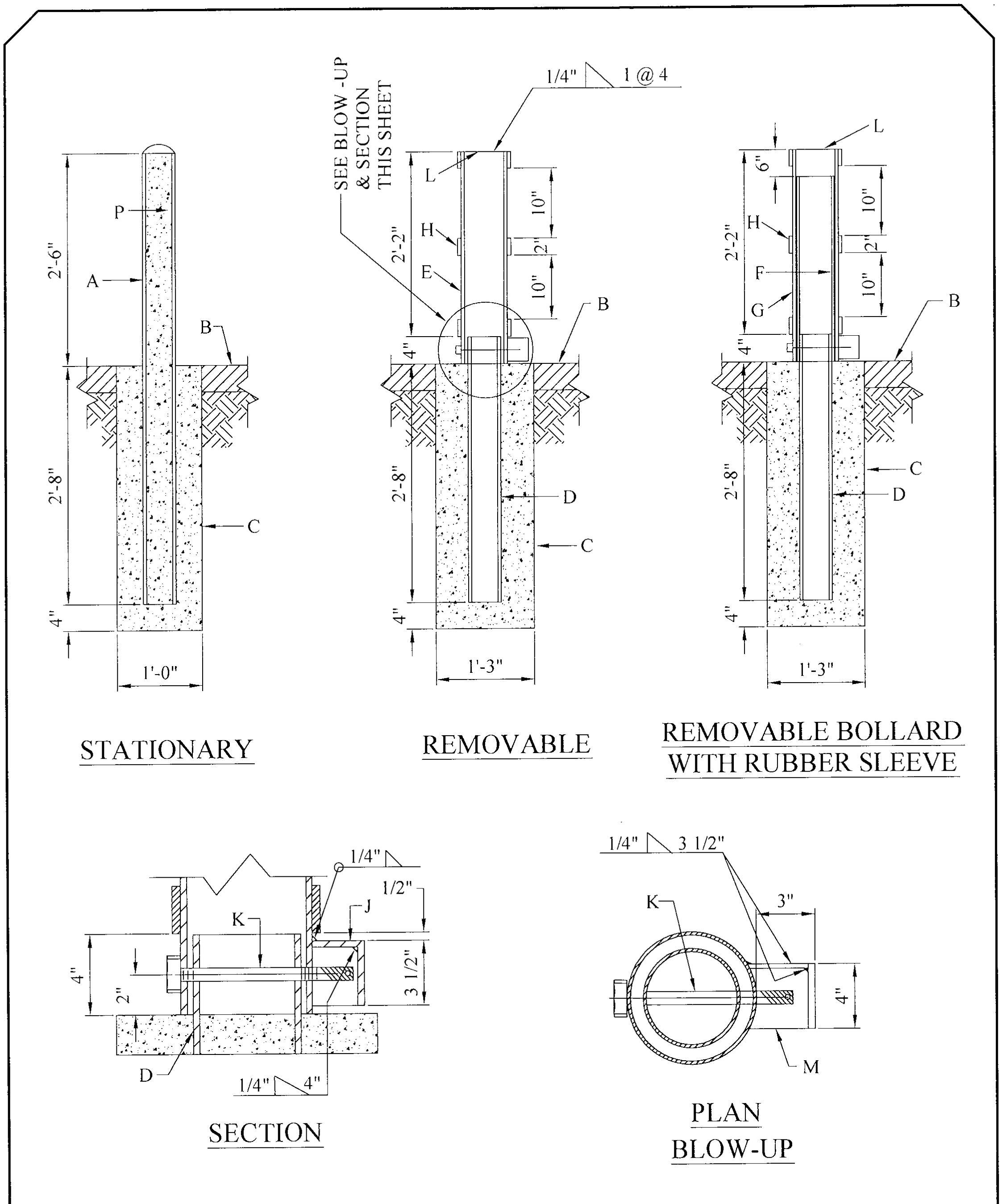

City of McAllen
ENGINEERING DEPARTMENT

STATIONARY AND
REMOVABLE BOLLARD DETAIL

SHEET 1 OF 2

DETAIL 223.1
02/2009

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GENERAL NOTES:

1. FOR SLEEVE, USE GATES NO. 37 WATER HOSE, DISCHARGE HOSE OR EQUIVALENT WITH 6.625" I.D., 7.29" O.D, 6 PLY WITH A BLACK NEOPRENE COVER.
2. WELDS ARE TO BE GROUND SMOOTH.
3. EXPOSED STEEL AND SLEEVE TO BE PAINTED WITH OIL BASE ALKYD PRIMER AND OIL BASE ALKYD ENAMEL. TOP COAT COLOR TO BE BRIGHT YELLOW.
4. OF BOLLARD SHOULD BE WELL AWAY FROM TRAFFIC ON MAJOR ROADWAYS & PREFERABLY AT THE R-O-W LINE. TRAFFIC ENGINEER SHOULD BE CONSULTED ON LOCATION WHEN NEAR TRAFFIC.
5. PIPES ARE NOT TO BE FILLED WITH CONCRETE WHEN PIPES ARE LOCATED WITHIN 15' OF STREET FLOWLINE. USE WELDED STEEL CAP INSTEAD.

CONSTRUCTION NOTES

A. 4" NOMINAL DIA. SCHEDULE 40 GALVANIZED STEEL PIPE, 5'-2" LONG. TO BE FILLED WITH CONCRETE PAINT PIPE BRIGHT YELLOW ABOVE FINISHED GRADE.
B. PAVEMENT OR FINISHED GRADE.
C. CONCRETE COLLAR 3000 P.S.I. AT 28 DAYS, WITH SMOOTH OR BROOM FINISH WHERE PAVEMENT IS ADJACENT.
D. 5" NOMINAL DIA. SCHEDULE 40 GALVANIZED STEEL PIPE, 3'-0" LONG. TO BE FILLED WITH CONCRETE TO LEVEL SHOWN.
E. 6" NOMINAL DIA. SCHEDULE 40 GALVANIZED STEEL PIPE, 2'-2" LONG. PAINT PIPE BRIGHT YELLOW. (REMOVABLE)
F. 6" NOMINAL DIA. SCHEDULE 40 GALVANIZED 2'-0" LONG STEEL PIPE. (REMOVABLE)
G. SLEEVE, 2'-2" LONG. PAINT BRIGHT YELLOW, SEE NOTE 1, THIS SHEET.
H. 2" WIDE REFLECTIVE TAPE, AS APPROVED BY ENGINEER. LOCATE AROUND PIPE AS SHOWN.
I. 1/4" THICK STEEL SAFETY GUARD BOX, OPEN ON ONE SIDE & BOTTOM. WELD ALL SEAMS.
J. 3/4" X 8" GALVANIZED HEX. BOLT WITH A 3/8" DIA. HOLE FOR PADLOCK. (PADLOCK FURNISHED BY CITY).
K. 1/4" X 6-5/8" DIA. GALVANIZED STEEL PLATE COVER, WELD TO PIPE.
L. ALIGN WITH TRAFFIC FLOW IN EASEMENT OR BIKE PATH TO AVOID TRIPPING HAZARDS WITH BOX.

City of McAllen *ENGINEERING DEPARTMENT*	STATIONARY AND REMOVABLE BOLLARD DETAIL SHEET 2 OF 2	DETAIL 223.2 02/2009

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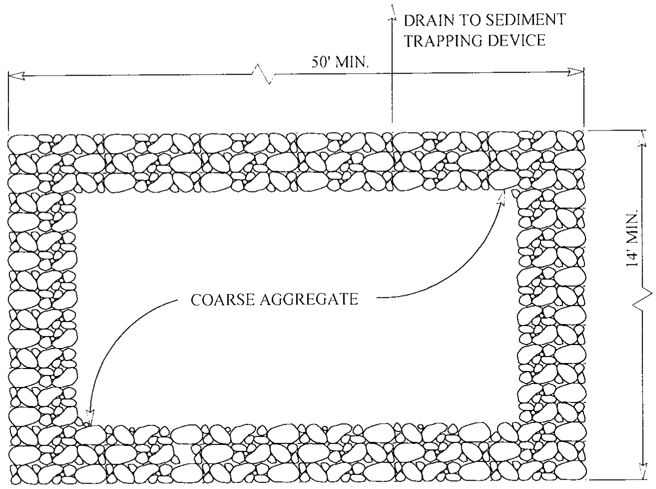
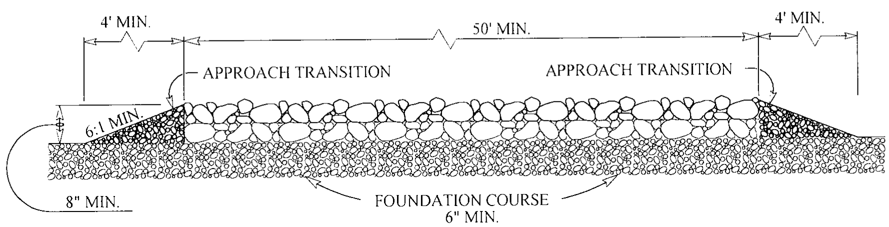


PLAN



PROFILE

CONSTRUCTION EXIT (TYPE 1)

GENERAL NOTES

1. THE LENGTH OF THE TYPE 1 CONSTRUCTION EXIT SHALL BE AS INDICATED ON THE PLANS, BUT NOT LESS THAN 50'.
2. THE COARSE AGGREGATE SHOULD BE OPEN GRADED WITH A SIZE OF 4" TO 8".
3. THE APPROACH TRANSITIONS SHOULD BE NO STEEPER THAN 6:1 AND CONSTRUCTED AS DIRECTED BY THE ENGINEER.
4. THE CONSTRUCTION EXIT FOUNDATION COURSE SHALL BE FLEXIBLE BASE, BITUMINOUS CONCRETE, PORTLAND CEMENT CONCRETE OR OTHER MATERIAL AS APPROVED BY THE ENGINEER.
5. THE CONSTRUCTION EXIT SHALL BE GRADED TO ALLOW DRAINAGE TO A SEDIMENT TRAPPING DEVICE.
6. THE GUIDELINES SHOWN HEREON ARE SUGGESTIONS ONLY AND MAY BE MODIFIED BY THE ENGINEER.

City of McAllen ENGINEERING DEPARTMENT	CONSTRUCTION EXIT SEDIMENT CONTROL TYPE 1	DETAIL 301 02/2009

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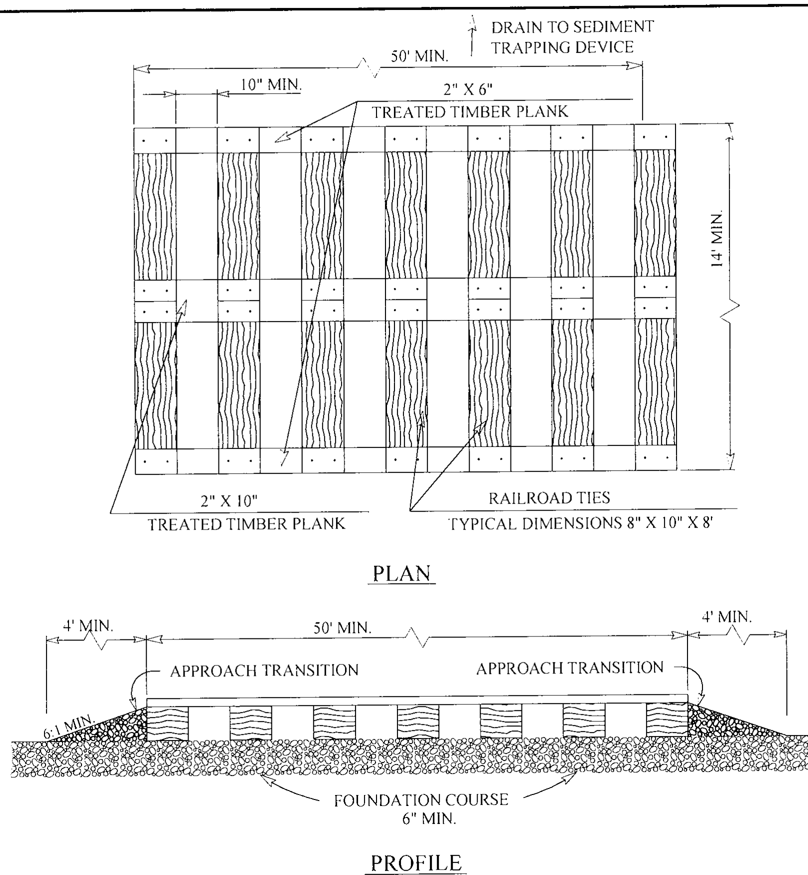

CONSTRUCTION EXIT (TYPE 2)

GENERAL NOTES

1. THE LENGTH OF THE TYPE 2 CONSTRUCTION EXIT SHALL BE AS INDICATED ON THE PLANS, BUT NOT LESS THAN 50'.
2. THE TREATED TIMBER PLANKS SHALL BE ATTACHED TO THE RAILROAD TIES WITH "X 6" MIN. LAG BOLTS. OTHER FASTENERS MAY BE USED AS APPROVED BY THE ENGINEER.
3. THE TREATED TIMBER PLANKS SHALL BE #2 GRADE MIN., AND SHOULD BE FREE FROM LARGE AND LOOSE KNOTS.
4. THE APPROACH TRANSITIONS SHALL BE NO STEEPER THAN 6:1 AND CONSTRUCTED AS DIRECTED BY THE ENGINEER.
5. THE CONSTRUCTION EXIT FOUNDATION COURSE SHALL BE FLEXIBLE BASE, BITUMINOUS CONCRETE, PORTLAND CEMENT CONCRETE OR OTHERMATERIAL AS APPROVED BY THE ENGINEER.
6. THE CONSTRUCTION EXIT SHOULD BE GRADED TO ALLOW DRAINAGE TO A SEDIMENT TRAPPING DEVICE.
7. THE GUIDELINES SHOWN HEREON ARE SUGGESTIONS ONLY AND MAY BE MODIFIED BY THE ENGINEER.

City of McAllen *ENGINEERING DEPARTMENT*	CONSTRUCTION EXIT SEDIMENT CONTROL TYPE 2	DETAIL 302 02/2009

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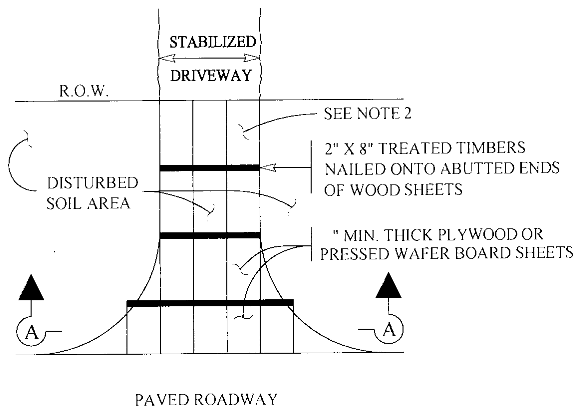
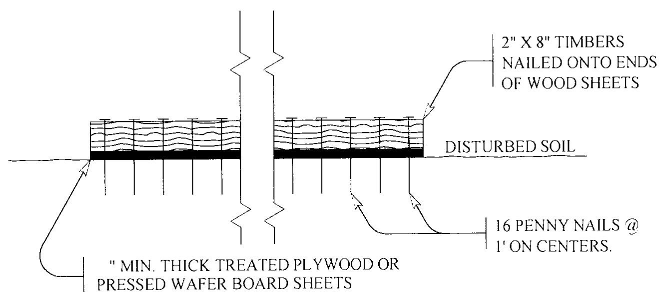


PLAN



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

GENERAL NOTES

1. THE LENGTH OF THE TYPE 3 CONSTRUCTION EXIT SHALL BE AS SHOWN ON THE PLANS, OR AS DIRECTED BY THE ENGINEER.
2. THE TYPE 3 CONSTRUCTION EXIT MAY BE CONSTRUCTED FROM OPEN GRADED CRUSHED STONE WITH A SIZE OF TWO TO FOUR INCHES SPREAD A MIN. OF 4" THICK TO THE LIMITS SHOWN ON THE PLANS.
3. THE TREATED TIMBER PLANKS SHALL BE #2 GRADE MIN., AND SHOULD BE FREE FROM LARGE AND LOOSE KNOTS.
4. THE GUIDELINES SHOWN HEREON ARE SUGGESTIONS ONLY AND MAY BE MODIFIED BY THE ENGINEER.

City of McAllen *ENGINEERING DEPARTMENT*	CONSTRUCTION EXIT SEDIMENT CONTROL TYPE 3	DETAIL 303 02/2009

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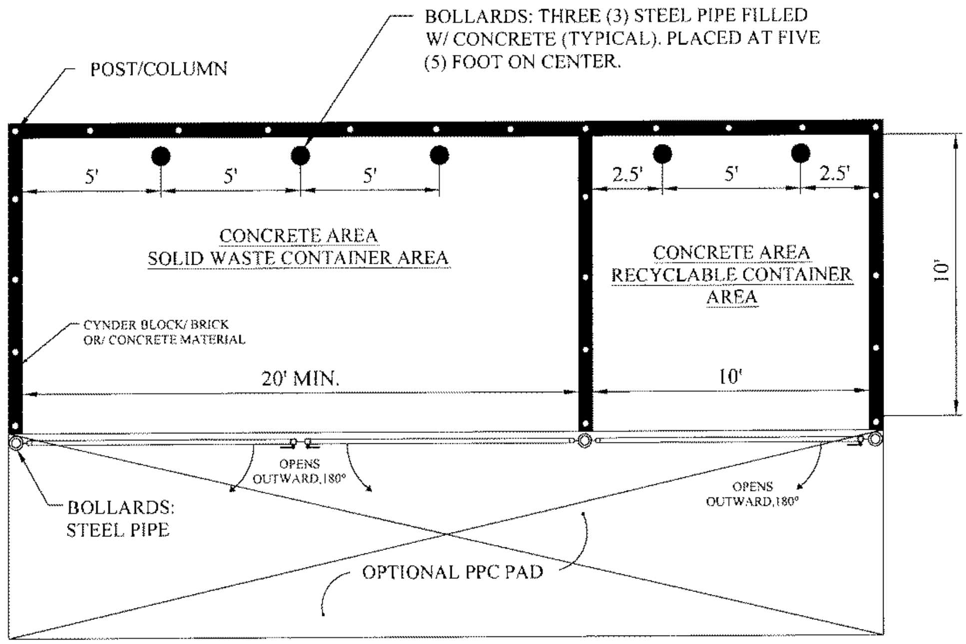
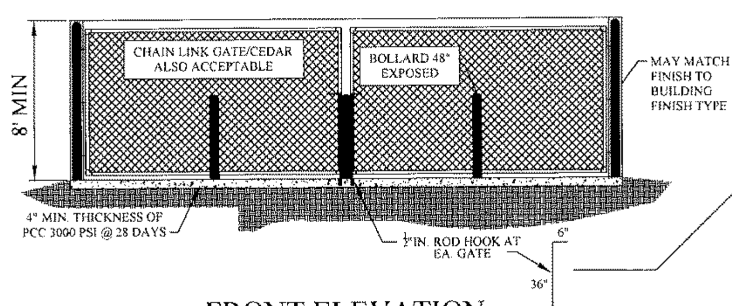
Standard Details



PLAN VIEW

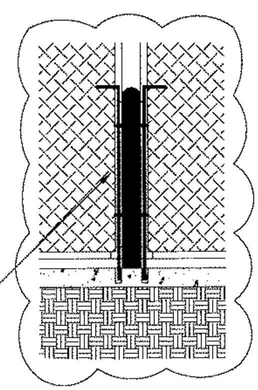
NOTES:

1. WIDTH OF SOLID WASTE ENCLOSURE TO BE DETERMINED BASED ON THE NUMBER OF DUMPSTERS NEED TO SERVICE THE BUILDING.
2. SPACE SHALL BE ALLOCATED FOR RECYCLABLE DUMPSTER.
3. ENCLOSURE WALLS SHALL BE REINFORCED; COLUMN SPACE EVERY 5 FEET.
4. FOR CLARIFICATION OF ORIENTATION OF ENCLOSURE, AND WIDTH CONTACT SOLID WASTE MANAGER.



FRONT ELEVATION

3/16" = 1'



GATE HOOK DETAIL

City of McAllen

ENGINEERING DEPARTMENT

SOLID WASTE / RECYCLE CONTAINER ENCLOSURE, LARGE

DETAIL 401

02/24/2009

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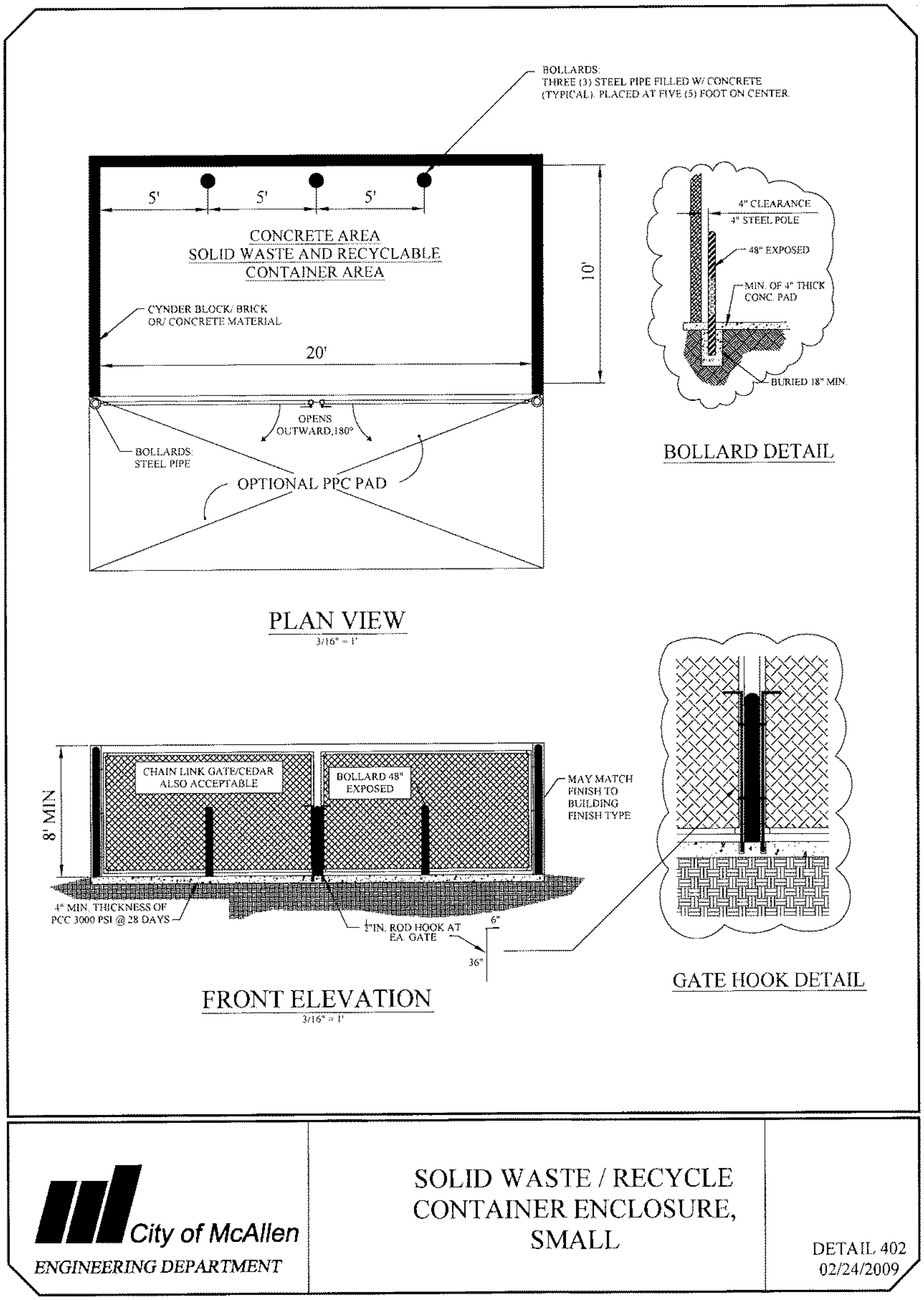

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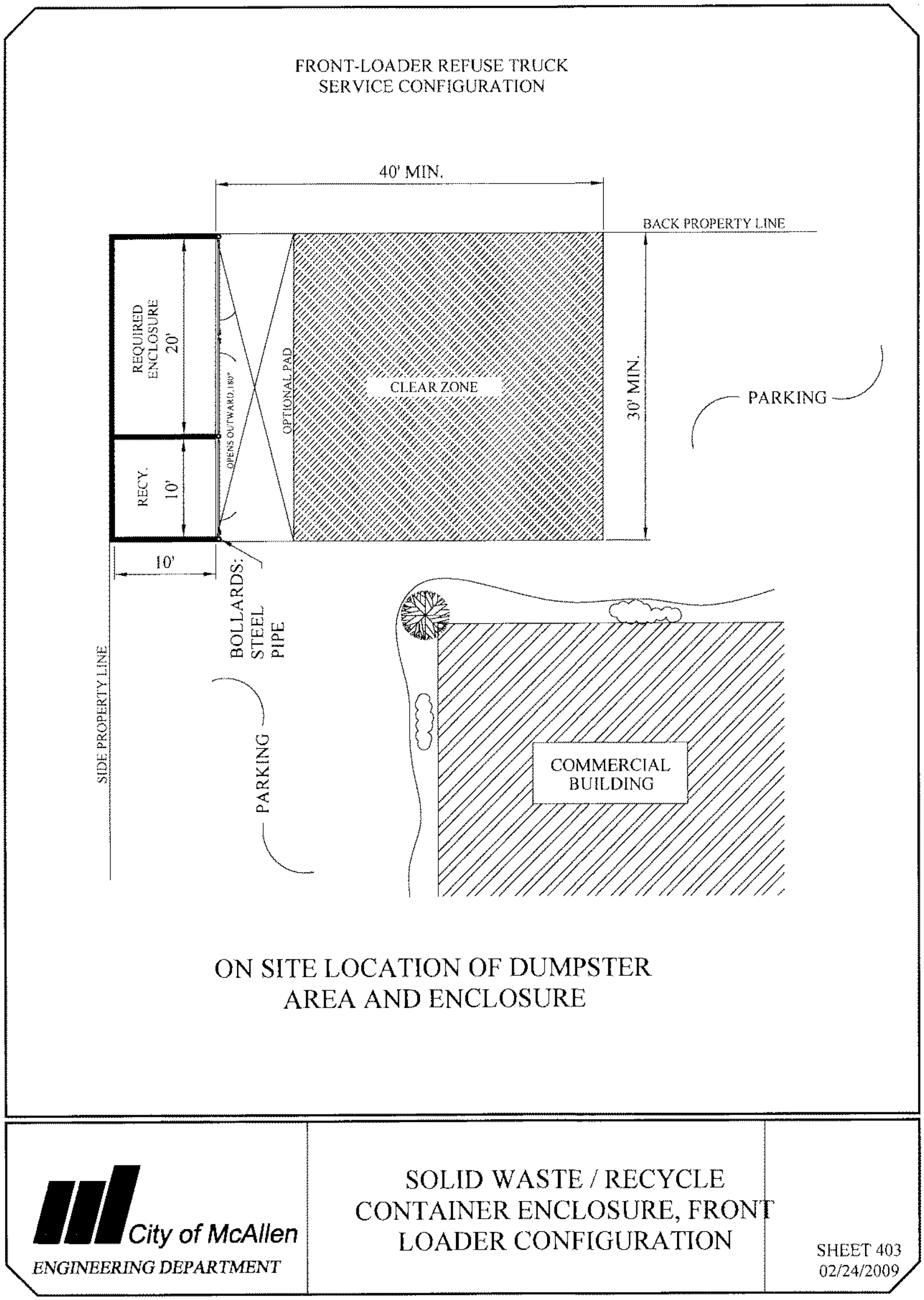

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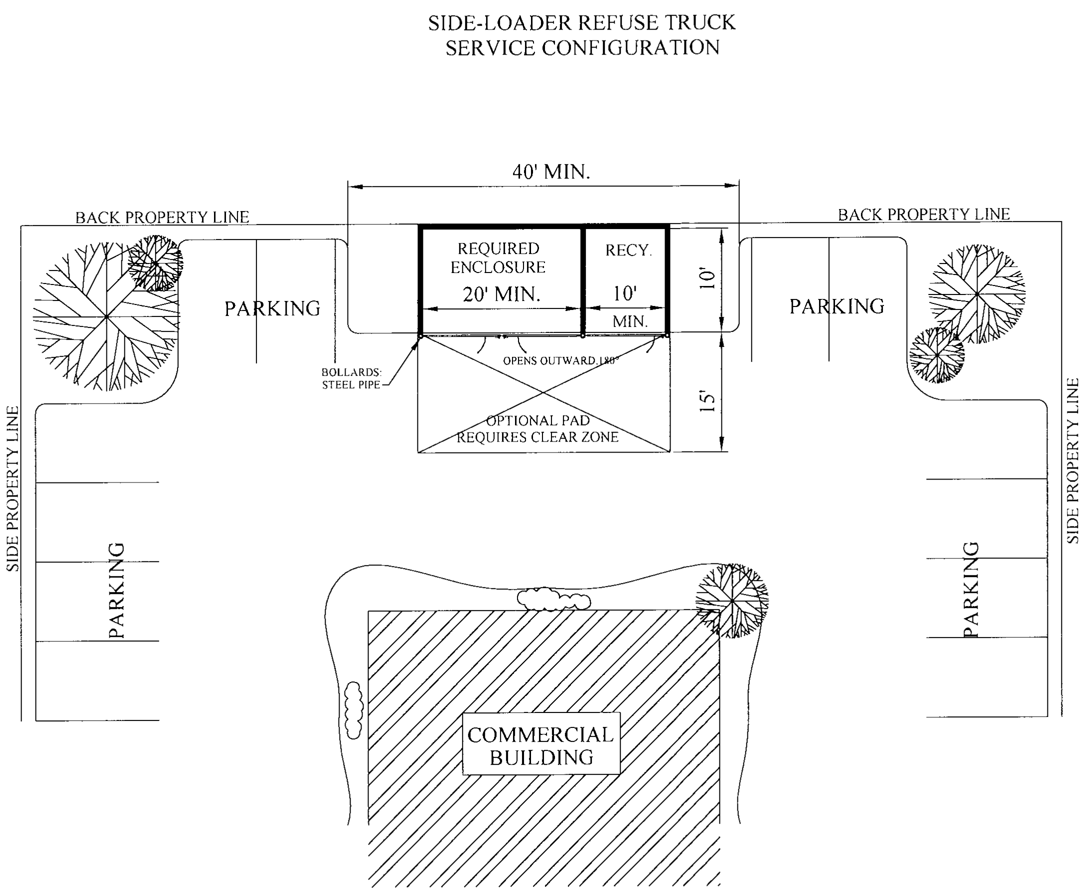


ON SITE LOCATION OF DUMPSTER
AREA AND ENCLOSURE

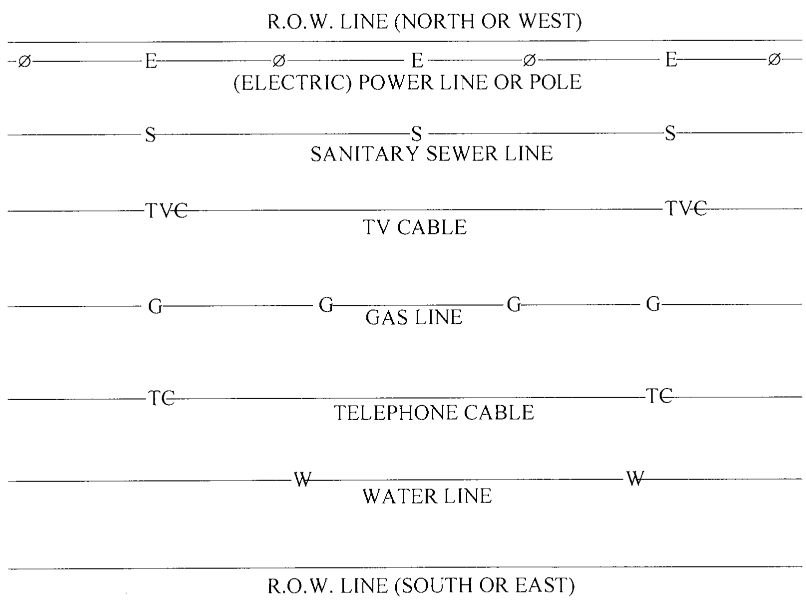
City of McAllen
ENGINEERING DEPARTMENT

SOLID WASTE / RECYCLE
CONTAINER ENCLOSURE, SIDE
LOADER CONFIGURATION

SHEET 404
02/24/2009

GENERAL NOTES:

1. THE EXACT LOCATION OF THE EXISTING UTILITIES IS UNKNOWN. UTILITIES SHOULD BE LOCATED 48 HOURS PRIOR TO THE BEGINNING OF CONSTRUCTION, BY NOTIFYING THE UTILITY COMPANIES.
2. THE CONTRACTOR MAY PROCEED WITH CONSTRUCTION AFTER NOTIFICATIONS AND TAKING THE NECESSARY PRECAUTIONS AND IN ACCORDANCE WITH THE FOLLOWING DIAGRAM.
3. FIELD CONDITIONS MAY VARY, IN WHICH CASE IT WILL BE NECESSARY FOR THE PROJECT INSPECTOR TO DETERMINE ALIGNMENT OF UTILITY LINES.



ORDER OF UTILITY INSTALLATION	TYPICAL DEPTHS TO TOP UTILITY LINES BELOW STREET OR ALLEY GRADE
SANITARY SEWER	VARIABLE
WATER	36" 24"
GAS	48" 24"
ELECTRICAL	19"-24"
TELEPHONE	
TVC	

City of McAllen
ENGINEERING DEPARTMENT

UTILITY SEPARATION

DETAIL 607
02/23/2009

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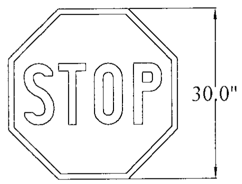
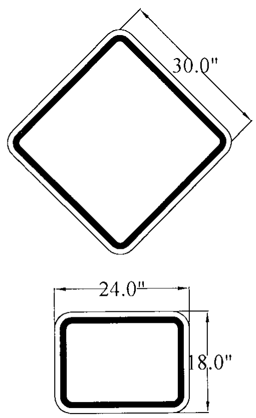


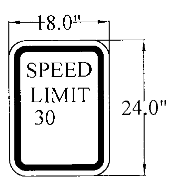
1. 30" FLAT ALUMINUM, WITH A 0.080 THICKNESS
2. BACKGROUND TO BE HI-INTENSITY PRISMATIC GRADE SHEETING (WHITE)
3. LEGEND TO BE ELECTROCUT FILM (EC FILM)(RED) OR SCREENED TRANSPARENT COLOR (RED)
4. SIGN TO BE SHEETED WITH A PROTECTIVE ANTIGRAFFITI OVERLAY FILM

STOP SIGN DETAIL



1. WARNING SIGNS TO BE A 30" DIAMOND FLAT ALUMINUM RECTANGLE, WITH A 0.080 THICKNESS, ADVISORY PLAQUES TO BE 18" X 24", WITH A 0.080 THICKNESS
2. BACKGROUND TO BE FLUORESENT DIAMOND GRADE SHEETING (YELLOW)
3. LEGEND TO BE COMMERCIAL GRADE SHEETING (BLACK)

WARNING SIGN DETAIL



1. 30" X 24" FLAT ALUMINUM, WITH A 0.080 THICKNESS
2. BACKGROUND TO BE HI-INTENSITY PRISMATIC GRADE SHEETING (WHITE)
3. LEGEND TO BE COMMERCIAL GRADE SHEETING (BLACK)
4. SIGN TO BE SHEETED WITH A PROTECTIVE ANTIGRAFFITI OVERLAY FLIM

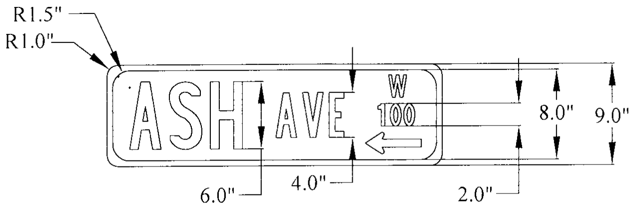
SPEED LIMIT SIGN DETAIL

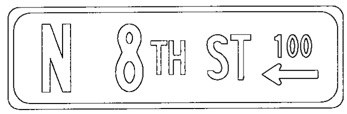
GENERAL NOTES

1. ALL MATERIALS TO BE NEW AND FREE FROM DEFECTS
2. SIGN LEGENDS SHALL MEET TMUTCD STANDARDS
3. ADVISORY SPEEDS TO BE BASED ON INCLINOMETER TEST AND APPROVED BY THE TRAFFIC OPERATIONS STAFF PRIOR TO INSTALLATION
4. SHEETING GRADE TO CONFORM WITH ASTM D 4956-01

City of McAllen *ENGINEERING DEPARTMENT*	**SIGN MATERIAL STANDARDS**	DETAIL 701.1 02/2009

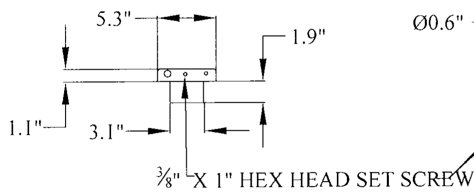
Standard Details





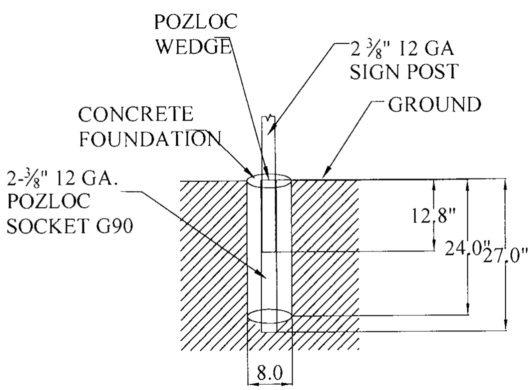
1. BE A 9" FLAT ALUMINUM RECTANGLE, WITH A 0.125 THICKNESS
2. BACKGROUND TO BE HI-INTENSITY PRISMATIC SHEETING (WHITE)
3. LEGEND TO BE ELECTROCUT FILM (EC FILM) GREEN UNLESS OTHERWISE SPECIFIED BY THE CITY OF McALLEN
4. CENTERED VERTICALLY
5. FONT SHALL BE CLEAR VIEW TEXT STYLE

STREET NAME SIGN DETAIL



POST CAP AND CROSS BRACKET DETAIL

1. GALVANIZED STEEL
2. 0.20 THICKNESS



1. SIGN POST EXTENDS 12.8" BELOW GRADE
2. CONCRETE FOUNDATION EXTENDS 24" BELOW GRADE
3. POZLOC SOCKET EXTENDS 27" BELOW GRADE

BREAKAWAY SIGN INSTALLATION DETAIL

GENERAL NOTES

1. ALL MATERIALS TO BE NEW AND FREE FROM DEFECTS
2. SHEETING GRADE TO CONFORM WITH ASTM D 4956-01

City of McAllen
ENGINEERING DEPARTMENT

SIGN MATERIAL STANDARDS

DETAIL 701.2
02/2009

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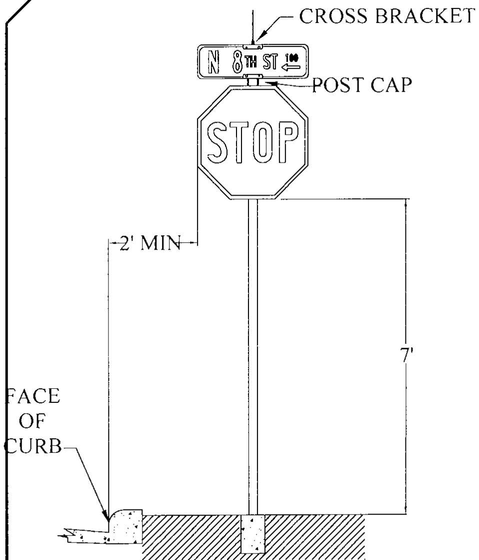
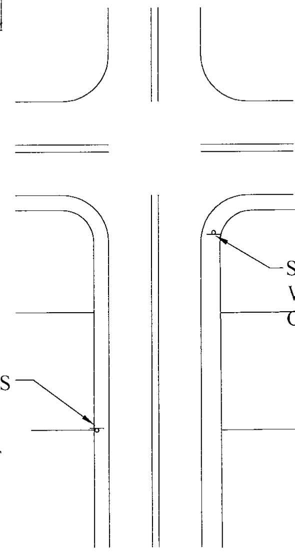
Standard Details



SIGN CLEARANCE DETAIL

1. 2-3/8" OD 12 GA. GALVANIZED STEEL SIGN POST
2. STREET NAME SIGNS TO HAVE 3/8" X 1" HEX HEAD SET SCREW THROUGH BRACKET ON SIGN CAP AND CROSS
3. MAINTAIN 32" ADA CLEARANCE ON ALL SIDEWALKS
4. INSTALL AT LEAST FIVE FEET AWAY FROM WOOD POWER POLES
5. INSTALL POST AT LEAST THREE FEET AWAY FROM ALL FIRE HYDRANTS

SIGN LOCATION DETAIL



GENERAL NOTES

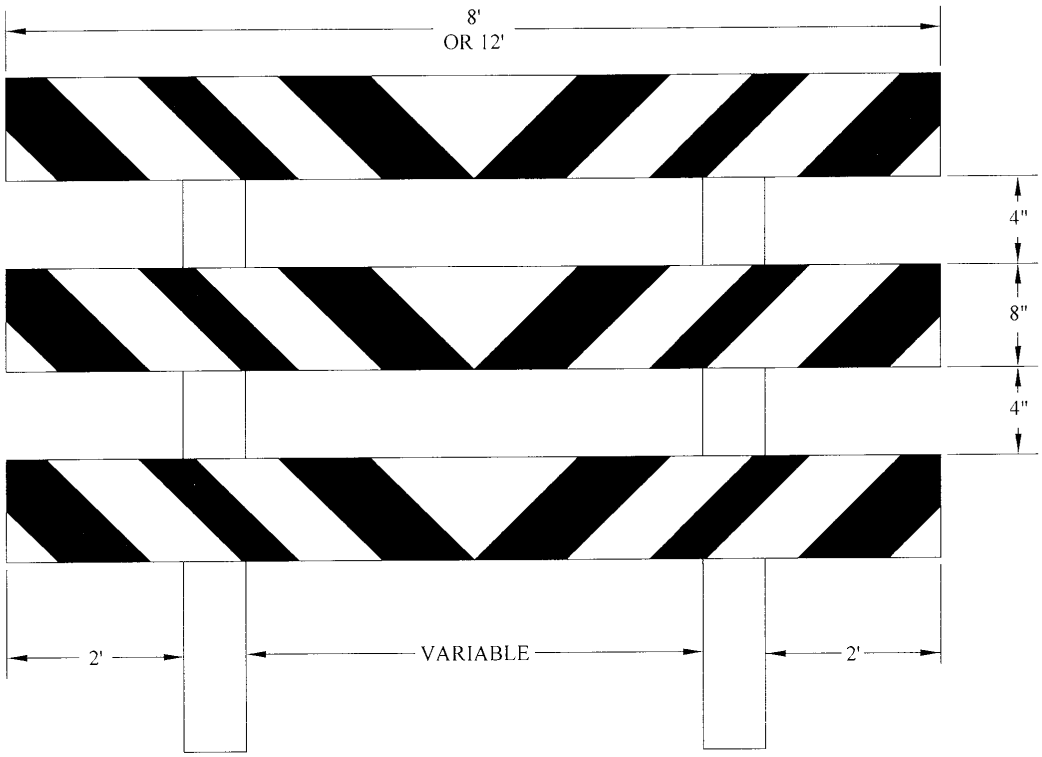
CONTRACTOR IS RESPONSIBLE FOR LOCATING SPRINKLERS AND UTILITIES PRIOR TO INSTALLATION
SIGN SHALL BE INSTALLED ACCORDING TO APPROVED PLAN SHEETS
ANY DAMAGE TO EXISTING FENCES, WALLS, OR PRIVATE PROPERTY SHALL BE REPAIRED BY AND AT THE EXPENSE OF THE CONTRACTOR
THE CONTRACTOR IS RESPONSIBLE FOR SCHEDULING PREINSTALLATION AND POST INSTALLTION INSPECTS THROUGH THE CITY'S DESIGNATED INSPECTOR 24 HOURS PRIOR TO INSPECTION DURING NORMAL WORKING HOURS, MONDAY THROUGH FRIDAY

City of McAllen
ENGINEERING DEPARTMENT

SIGN LOCATION STANDARDS

DETAIL 702
02/2009

Standard Details



GENERAL NOTES

1. 8"X12" or 8"X8' PANEL MADE OF HPPL PLASTIC MATERIAL.
2. SHEETING TO BE HI-PRISMATIC GRADE RED/WHITE.
3. 2-3/8 OD 12 GA. GALVANIZED STEEL POST.
4. SHOULD BE INSTALLED USING BREAKAWAY SIGN INSTALLATION SYSTEM (REFER TO BREAKAWAY SIGN INSTALLATION DETAIL).
5. SIGN TO BE SHEETED A PROTECTIVE ANTIGRAFFITI OVERLAY FILM.

City of McAllen ENGINEERING DEPARTMENT	**TYPE III PERMANENT BARRACADE**	DETAIL 703 02/2009

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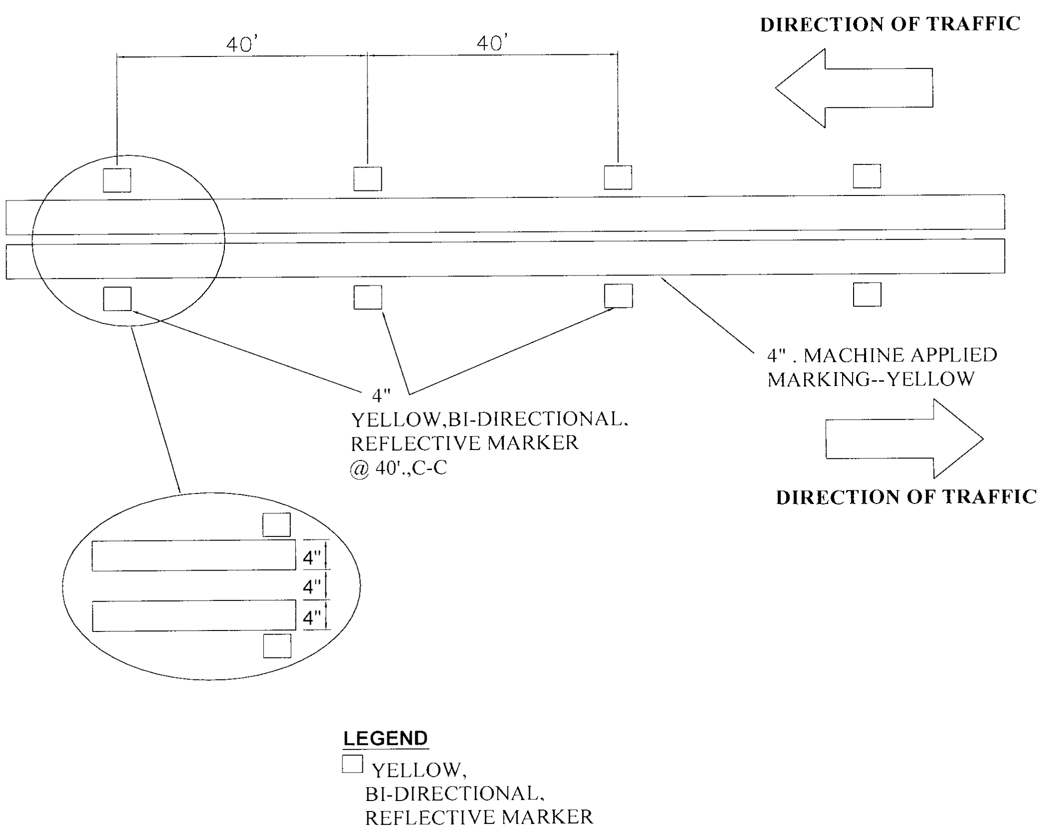
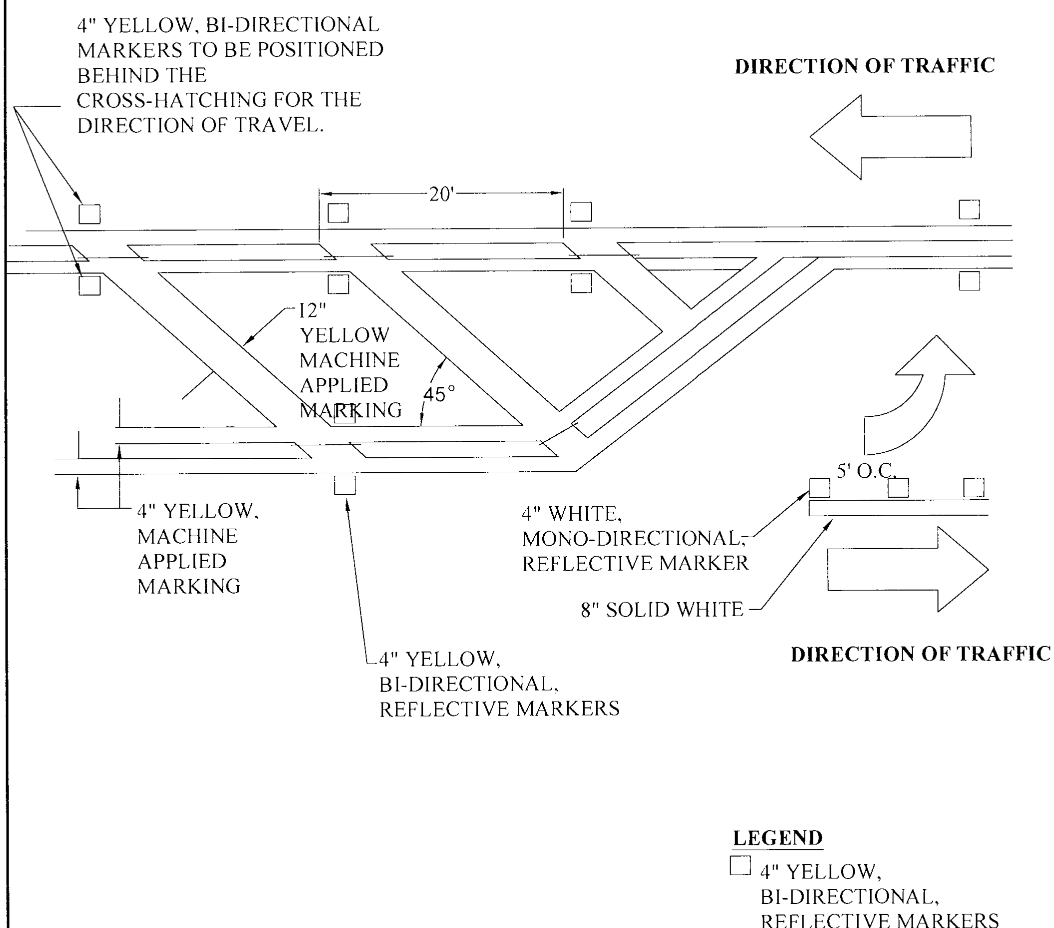


City of McAllen ENGINEERING DEPARTMENT	SOLID DOUBLE YELLOW CENTERLINE	DETAIL 704 02/2009

Standard Details



City of McAllen
ENGINEERING DEPARTMENT

LEFT-TURN LANE CHANNELIZATION

DETAIL 705
02/2009

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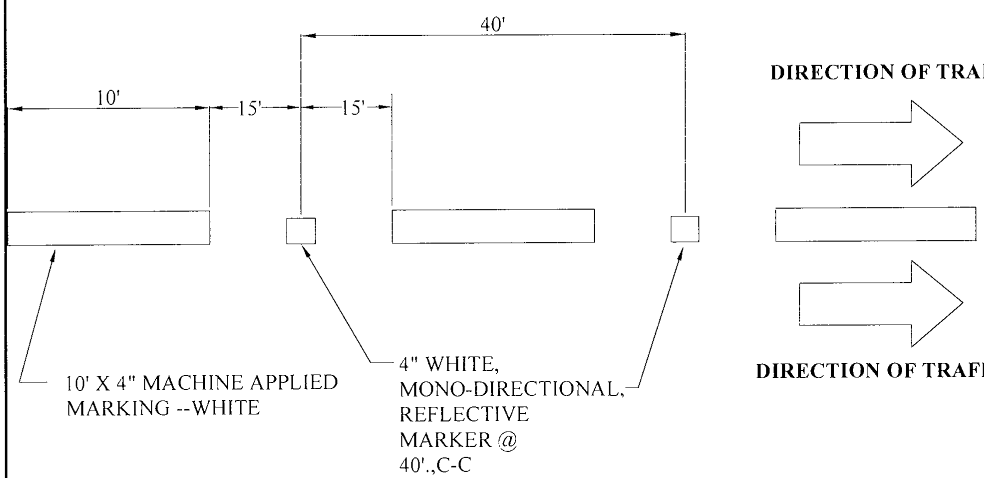
Standard Details



LEGEND

☐ **WHITE, MONO-DIRECTIONAL, REFLECTIVE MARKER**

GENERAL NOTES:

1. BREAK LANE LINE AT INTERSECTING STREETS:
   --- TEE INTERSECTION, BREAK AT NEAR-SIDE ONLY
   --- FOUR-WAY INTERSECTION, BREAK AT BOTH INTERSECTING STREETS

City of McAllen

ENGINEERING DEPARTMENT

SKIP WHITE LANE LINE

DETAIL 706
02/2009

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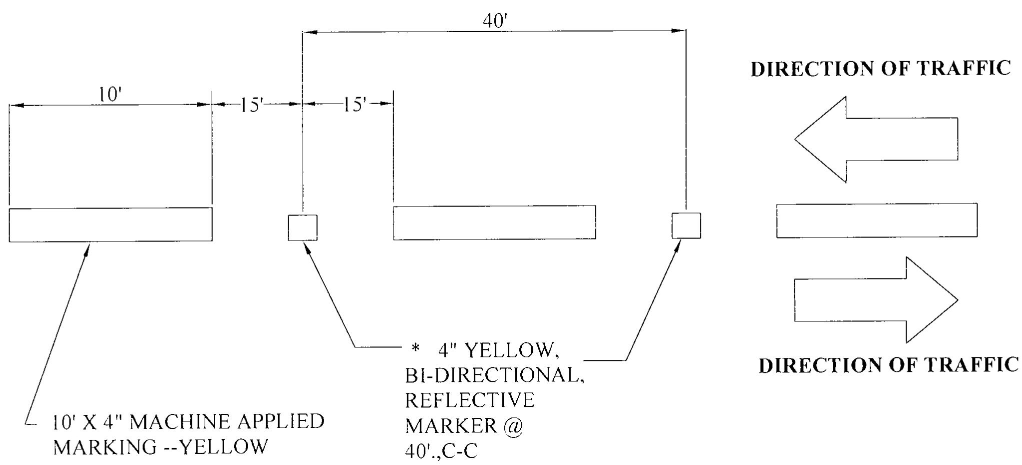
Standard Details



LEGEND

☐ 4" YELLOW,
BI-DIRECTIONAL,
REFLECTIVE MARKER

GENERAL NOTES:

1. BREAK CENTERLINE AT INTERSECTING STREETS. TYPICAL 15 FT. BACK OF INTERSECTING STREET CURBLINE.

City of McAllen
ENGINEERING DEPARTMENT

SKIP YELLOW CENTERLINE

DETAIL 707
02/2009

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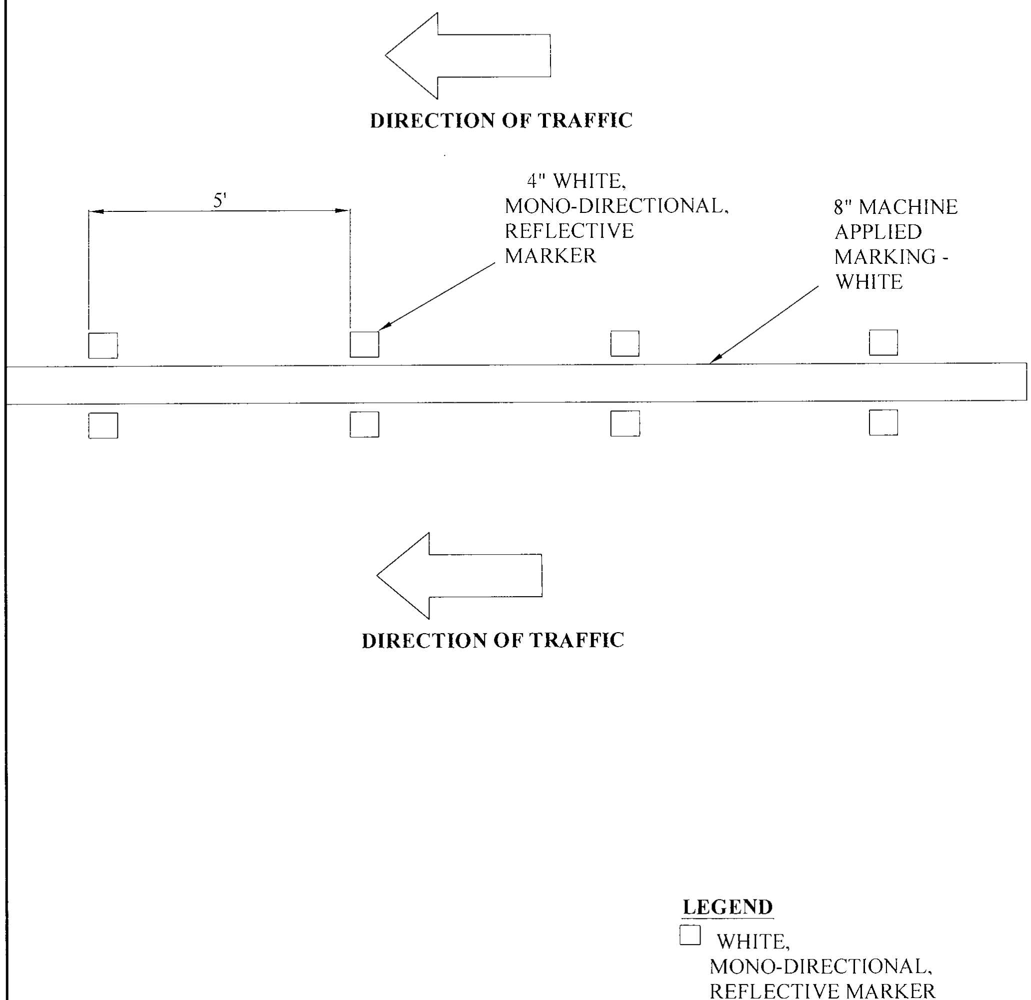
Standard Details



City of McAllen
ENGINEERING DEPARTMENT

SOLID WHITE LANE LINE

DETAIL 708
02/2009

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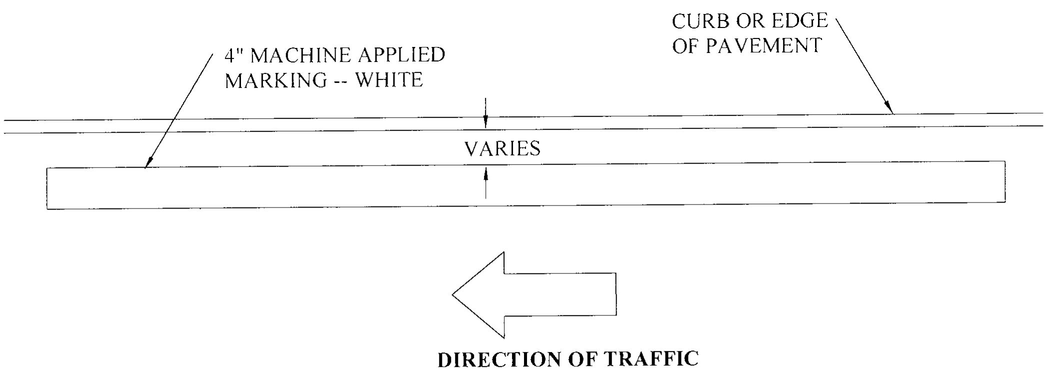

City of McAllen
ENGINEERING DEPARTMENT

SOLID WHITE EDGE LANE LINE

DETAIL 709
02/2009

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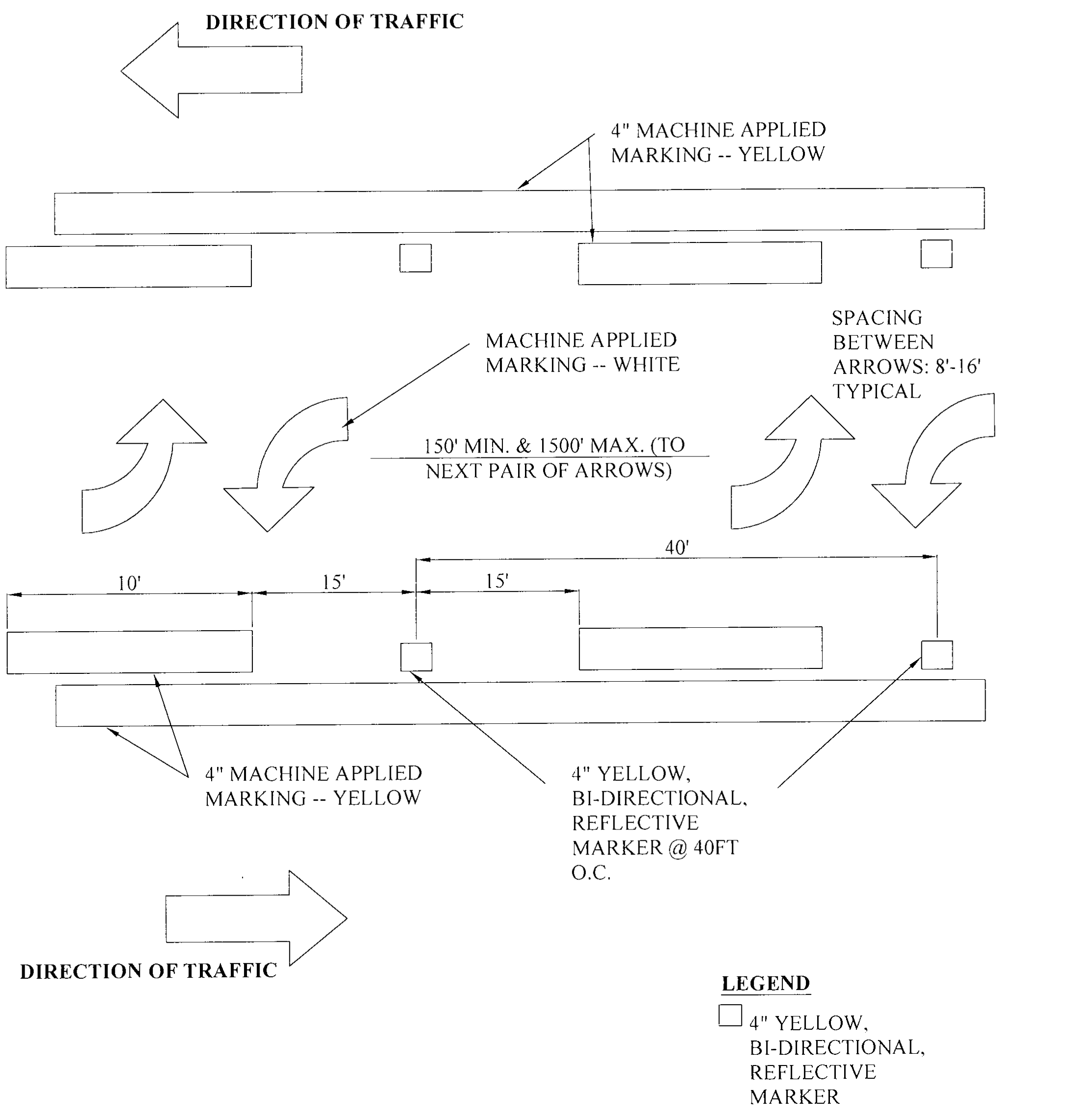
Standard Details



City of McAllen
ENGINEERING DEPARTMENT

TWO-WAY LEFT-TURN

DETAIL 710
02/2009

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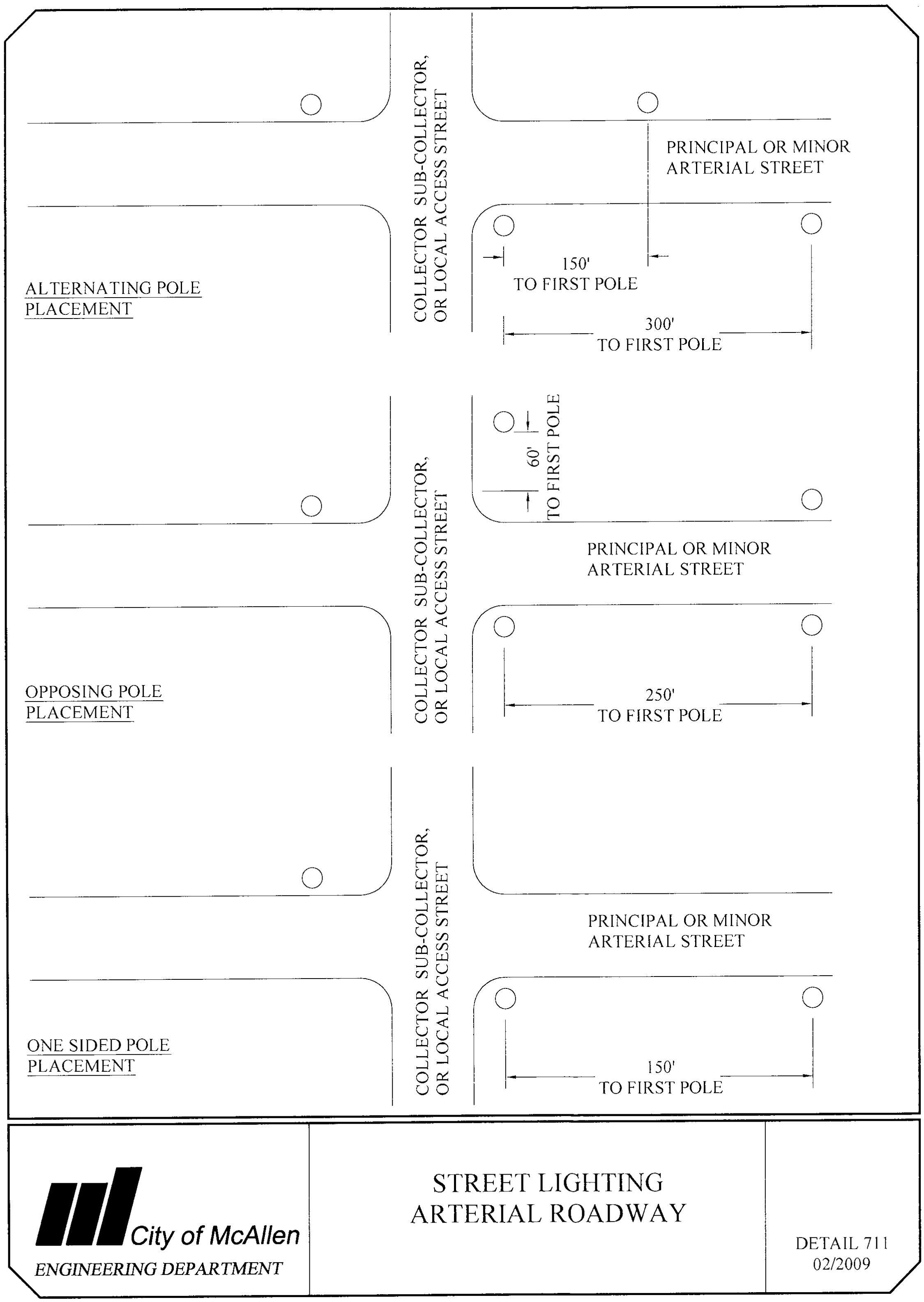
Standard Details



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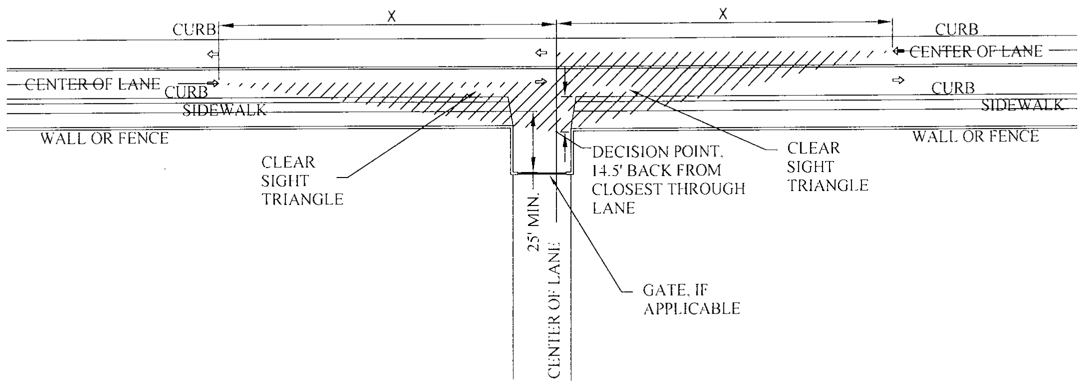

RIGHT TURN FROM STOP

DESIGN SPEED (MPH)	STOPPING SIGHT DISTANCE (FT)	INTERSECTION SIGHT DISTANCE FOR PASSENGER CARS	
		CALCULATED (FT)	DESIGN "X" (FT)
15	80	143.3	145
20	115	191.1	195
25	155	238.9	240
30	200	286.7	290
35	250	334.4	335
40	305	382.2	385
45	360	430.0	430
50	425	477.8	480
55	495	525.5	530
60	570	573.3	575
65	645	621.1	625
70	730	668.9	670
75	820	716.6	720
80	910	764.4	765

LEFT TURN FROM STOP

DESIGN SPEED (MPH)	STOPPING SIGHT DISTANCE (FT)	INTERSECTION SIGHT DISTANCE FOR PASSENGER CARS	
		CALCULATED (FT)	DESIGN "X" (FT)
15	80	165.4	170
20	115	220.5	225
25	155	275.6	280
30	200	330.8	335
35	250	385.9	390
40	305	441.0	445
45	360	496.1	500
50	425	551.3	555
55	495	606.4	610
60	570	661.5	665
65	645	716.6	720
70	730	771.8	775
75	820	826.9	830
80	910	882.0	885

GENERAL NOTES:

1. REFERENCE: AASHTO - GEOMETRIC DESIGN OF HIGHWAYS AND STREETS (GREEN BOOK).

City of McAllen
ENGINEERING DEPARTMENT

INTERSECTION SIGHT DISTANCE
FOR TYPICAL INTERSECTION

DETAIL 712.1
02/2009

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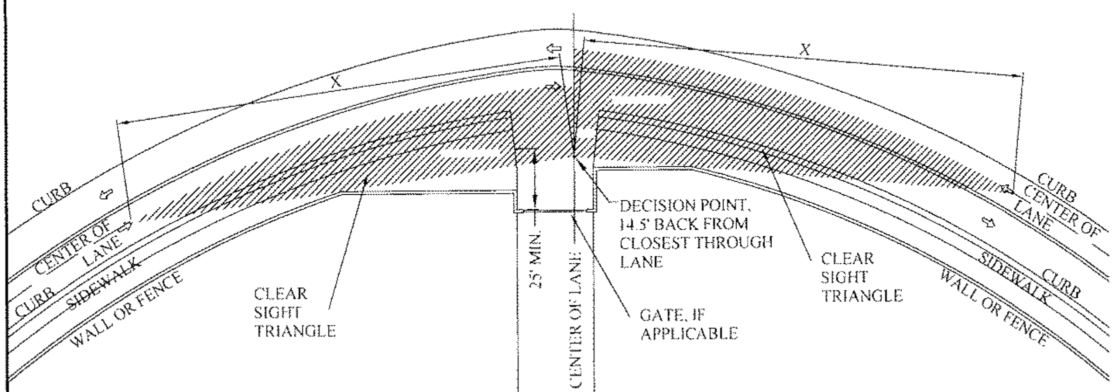

RIGHT TURN FROM STOP

DESIGN SPEED (MPH)	STOPPING SIGHT DISTANCE (FT)	INTERSECTION SIGHT DISTANCE FOR PASSENGER CARS CALCULATED (FT)	INTERSECTION SIGHT DISTANCE FOR PASSENGER CARS DESIGN "X" (FT)
15	80	143.3	145
20	115	191.1	195
25	155	238.9	240
30	200	286.7	290
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40	305	382.2	385
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55	495	525.5	530
60	570	573.3	575
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70	730	668.9	670
75	820	716.6	720
80	910	764.4	765

LEFT TURN FROM STOP

DESIGN SPEED (MPH)	STOPPING SIGHT DISTANCE (FT)	INTERSECTION SIGHT DISTANCE FOR PASSENGER CARS CALCULATED (FT)	INTERSECTION SIGHT DISTANCE FOR PASSENGER CARS DESIGN "X" (FT)
15	80	165.4	170
20	115	220.5	225
25	155	275.6	280
30	200	330.8	335
35	250	385.9	390
40	305	441.0	445
45	360	496.1	500
50	425	551.3	555
55	495	606.4	610
60	570	661.5	665
65	645	716.6	720
70	730	771.8	775
75	820	826.9	830
80	910	882.0	885

GENERAL NOTES:

1. REFERENCE: AASHTO - GEOMETRIC DESIGN OF HIGHWAYS AND STREETS (GREEN BOOK).

City of McAllen
ENGINEERING DEPARTMENT

INTERSECTION SIGHT DISTANCE FOR APPROACH ON A CURVE

DETAIL 712.2
02/2009

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APPENDIX VIII – SPECIFICATIONS

DIVISION 2 – SITE WORK

02100 CLEARING
02101 Preparation of Right of Way
02102 Clearing and Grubbing
02238 Concrete Removal
02821 Building Demolition

02200 EARTHWORK
02221 Trench Excavation, Backfill, Compaction
02223 Trench Protection
02224 Pipe Boring Drilling & Jacking
02225 Unclassified Street Excavation
02226 Loading & Hauling
02227 Drilling for Electrical Conduit
02230 Excavation
02234 Borrow
02240 Lime Stabilization

02500 DRAINAGE AND UTILITIES
02556 Water Transmission Lines and/or Pressure Sewer Lines
02558 Water Valves
02570 Sanitary Sewers
02572 Manhole Adjust
02580 Storm Sewer Appurtenances
02585 Irrigation Reinforced Concrete Pipe
02590 Reinforced Concrete Pipe
02595 Concrete Box Culverts and Sewers

02600 PAVING AND SURFACING
02601 Flexible Base
02605 Salvaging and Replacing Existing Base
02610 Prime Coat
02612 HMAC Pavement
02616 Asphalt Recycling
02617 Asphalt Surface Treatment
02620 Concrete Curb and Gutter
02670 Milling
02680 Flat Wheel Rolling
02682 Pneumatic Tire Rolling

02700 SITE IMPROVEMENTS
02712 Wire Fences
02720 Chain Link Fences

03300 CONCRETE
03300 Cast-in-Place Concrete
03310 Supplied Concrete

09100 MISCELLANEOUS
09101 Construction Traffic Control
09102 Filter Fabric

Standard Details

02686 Proof Rolling