



**STANDARD DESIGN GUIDE**  
**FOR**  
**PUBLIC INFRASTRUCTURE**  
**IMPROVEMENTS**

CITY COMMISSION

RICHARD CORTEZ  
SCOTT C. CRANE  
MARCUS BARRERA  
HILDA SALINAS  
AIDA RAMIREZ  
JOHN INGRAM  
JIM DARLING

MAYOR  
COMMISSIONER DISTRICT 1  
COMMISSIONER DISTRICT 2  
MAYOR PRO-TEM/COMMISSIONER DISTRICT 3  
MAYOR PRO-TEM/COMMISSIONER DISTRICT 4  
COMMISSIONER DISTRICT 5  
COMMISSIONER DISTRICT 6

MIKE R. PEREZ  
YVETTE BARRERA, P.E., CFM

CITY MANAGER  
CITY ENGINEER

PUBLIC UTILITY BOARD

CHARLES AMOS  
TONY AGUIRRE  
TREY PEBLEY  
ROGER GARZA  
SCOTT C. CRANE

ROY RODRIGUEZ, P.E.

CHAIRMAN  
VICE-CHAIRMAN  
TRUSTEE  
TRUSTEE  
EX-OFFICIO MEMBER / CITY  
COMMISSIONER  
GENERAL MANAGER

October 2009



## **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 at the office of the:

City of McAllen  
Engineering Department  
1300 Houston Avenue  
McAllen, Texas 78501

and via the City of McAllen Website at  
[http://www.mcallen.net/files/docs/engineering/Standard\\_Design\\_Guide\\_September\\_2009.pdf](http://www.mcallen.net/files/docs/engineering/Standard_Design_Guide_September_2009.pdf)



## Table of Contents

<u>Introduction</u> .....	1
Pavement Design	
<u>Flexible Pavement</u> .....	2
<u>Concrete Pavement</u> .....	3
<u>Alley Design</u> .....	3
<u>Sidewalk Design</u> .....	4
<u>Residential Driveway Apron Design</u> .....	5
<u>Commercial Driveway Apron Design</u> .....	6
<u>Drainage Design</u> .....	7
<u>Water Design</u> .....	8-9
<u>Sanitary Sewer Design</u> .....	10-11
<u>Traffic Control Policy</u> .....	12
<u>Drainage Policy</u> .....	13-40
<u>Traffic Impact Analysis Policy</u> .....	41-44
<u>Pretreatment / Grease Trap Facilities Policy</u> .....	45-59
<u>Cross Connection and Backflow Prevention Policy</u> .....	60-72

### **Standard Details**

#### **100 Standard Drainage Details**

101 Typical Storm Sewer Bedding Detail

102 Typical Concrete Storm Manhole



103 Storm Sewer Manhole

104 Typical Concrete Storm Sewer Conflict Manhole

105 Type A Inlet

106 Type A Inlet with Extension

107 Type CC Inlet

108 Type F Inlet

109 Type F Inlet with Extension

110 Concrete Slope End Treatment

111 Concrete Pipe Collar

112 Concrete Seepage Collar

## **200 Standard Pavement Details**

201 Typical Local Street Intersection

202 Principal Arterial / Minor Arterial Street Section with Median

203 Principal Arterial / Minor Arterial Street Section Without Median

204 Collector Street Section

205 Local Street Section

206 Typical Concrete Joint Details

207 Concrete Curb & Gutter

208 Concrete Valley Gutter

209 Typical Knuckle Detail

210 Cul-de-sac Detail

211 Temporary Hammerhead Turn-around

212 Typical Alley Section and Driveway Detail





213 Typical Alley Section

214 Concrete Apron Typical Joint Layout

215 Concrete Driveway Apron

216 Curb & Gutter Sawcut for Driveway

217 Residential Gated Driveway

218 Gated Entrance Detail

219 Typical Locations of Sidewalks and Ramps

220 Typical Sidewalk Details

221 Handicap Ramp Options

222 Handicap Ramp Details

223 Stationary and Removable Bollard Detail

### **300 Standard Details for Erosion Control**

301 Construction Exit Sediment Control – Type 1

302 Construction Exit Sediment Control – Type 2

303 Construction Exit Sediment Control - Type 3

### **400 Standard Detail For Solid Waste**

401 Solid Waste / Recycle Container Enclosure, Large

402 Solid Waste / Recycle Container Enclosure, Small

403 Solid Waste / Recycle Container Enclosure, Front Loader Service Configuration

404 Solid Waste / Recycle Container Enclosure, Side Loader Service Configuration

### **500 Standard Water Details**

501 Water Utilities General Notes

502 Water Line and Sewer Forcemain Bedding Detail



503 Typical Fire Hydrant Installation

504 Typical Fire Hydrant Locations

505 Water Tapping Sleeve & Valve Installation

506 Typical Valve & Valve Box

507 Utility Line Bore Detail

508 X

509 Water Line Crossing Detail

510 Water Line Adjustment Detail

511 Water Line and Sanitary Sewer Ditch Crossing

512 Typical Service Connection With Meter Box

513 Typical Meter Box Installations

514 X

515 Typical Service Connection

516 Typical 1" Air Release Valve

517 Blow-Off Valve Installation

518 Typical 2" Blow Off Valve

519 Butterfly Valve Detail

520 Concrete Thrust Blocks

## **600 Standard Sanitary Sewer Details**

601 Sanitary Sewer (Non-Forcemain) Pipe Bedding

602 Typical Fiberglass Manhole

603 Manhole Cover Adjustment Details

604 Manhole and Valve Box Regrading



605 Standard Service Connection

606 Go-No-Go Deflection Testing Mandrel Detail

607 Utility Separation

608 Typical Lift Station Detail

609 Grease Trap Detail, 3000 Gallon

610 X

611 X

612 X

613 X

614 X

615 X

616 X

617 X

618 X

619 X

620 X

## **700 Standard Traffic Control Device Details**

701 Sign Material Standard

702 Sign Location Standards

703 Type III Permanent Barricade

704 Solid Double Yellow Centerline

705 Left-Turn Median Lane Channelization

706 Skipped White Line Detail



707 Skipped Yellow Centerline

708 Solid White Lane Line Detail

709 Solid White Edge Lane

710 Two-Way Left-Turn Detail

711 Street Lighting-Arterial Road

712 Intersection Sight Distance for Intersections





## **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:

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

[Back to Table of Contents](#)



## Pavement Design

[Back to Table of Contents](#)

### 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 <sup>4</sup>	40' B-B <sup>4</sup> to 44' B-B	52' B-B to 65' B-B	65' B-B and Greater
Minimum Structural Section				
Subgrade <sup>1</sup>	6 inches	6 inches	12 inches	12 inches
Flexible Base <sup>2</sup>	8 inches	10 inches	12 inches	12 inches
Hot Mix Asphaltic Concrete <sup>3</sup> (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 should 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 Pavements**

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

- Thickness designs for Concrete Highways and Street Pavement, Portland Cement Association, EB109P, Reprinted 1995
- Concrete Streets: Typical Pavement Sections and Jointing Details, Portland Cement Association, IS211P, 1980
- Design and Construction of Joints for Concrete Streets, Portland Cement Association, IS061P, 1992
- Construction Specification Guideline for Concrete Streets and Local Roads, Portland Cement Association, IS119P, 1998
- Guide Specifications for Concrete Curbs and Combined Curbs and Gutters, Portland Cement Association, IS110P, 1983
- 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.

[Back to Table of Contents](#)

above



## Sidewalk Design

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

- Sidewalk alignment must match existing alignment in area or be set a minimum of five-foot from the back of curb. Any deviation shall require approval by the City Engineer
- Sidewalk shall slope toward the street with a maximum transverse slope of  $\frac{1}{4}$  inch per foot (2%), 1-inch above the top of curb, and a maximum longitudinal slope of  $\frac{1}{2}$  inch per foot (5%).
- Sidewalk shall be 4-foot minimum width when placed at an offset behind the curb, and 5-foot minimum width when placed adjacent to the curb.
- 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.
- Bar-lift Plastic Chairs, or approved equal, shall be used to secure steel at center of concrete thickness
- Subgrade shall be compacted to 90% standard proctor.
- Contraction joints shall be scored every 6 feet and expansion joints every 30 feet.
- Sidewalk shall have a broom finish transverse to the walkway. Exposed aggregate, pavers, tile and stained or painted concrete are not permitted within the right of way.
- All concrete shall be 5-sack concrete and shall have a minimum compressive strength of 3000 psi.
- Membrane curing compound shall be applied at a minimum of 1 gallon per 180 square feet of area.
- Ramps shall be placed at all intersection with roadways or where required by law / City. Curb and Gutter must be saw cut.
- Flatwork is required to meet Texas Accessibility Standards (Texas Civil Statutes, Article 9102).

Any admixtures to the concrete mix (i.e. fiber mesh, plasticizers, etc.) shall require approval. Additionally, decorative concrete shall require approval of the pattern and finish from the City Engineer, or designee, prior to construction.

[Back to Table of Contents](#)





### **Residential Driveway Apron Design**

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

- Minimum driveway width allowed is 12 ft. and maximum is 25 ft.
- Curb cut must be a minimum of 6-feet from a side property line.
- Flow line of new gutter shall match existing flow line.
- Curb and gutter must be saw cut.
- 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.
- Bar-lift Plastic Chairs, or approved equal, shall be used to secure steel at center of concrete thickness.
- Concrete shall have a broom finish. Exposed aggregate, pavers, tile and stained or painted concrete are not permitted within the right of way.
- All concrete shall be 5-sack concrete and shall have a minimum compressive strength of 3000 psi.
- Membrane curing compound shall be applied at a minimum of 1 gallon per 180 square feet of area.
- Subgrade shall be compacted to 90% standard proctor.
- 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.
- If a manhole falls within a driveway pad, the manhole lid shall be placed flush with the elevation of the driveway.
- Any driveway placed where a drainage bar ditch exists, shall maintain the flow line of the ditch with the placement of a concrete culvert.
- Driveway wings shall not exceed a 12:1 slope.

Any admixtures to the concrete mix (i.e. fiber mesh, plasticizers, etc.) shall require approval. Additionally, decorative concrete shall require approval of the pattern and finish from the City Engineer, or designee, prior to construction.

[Back to Table of Contents](#)



### **Commercial Driveway Apron Design**

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

- Minimum width allowed is 25 ft and maximum is 45 ft.
- Curb cut must be a minimum of 6-feet inside the property line.
- Flow line of new gutter shall match existing flow line.
- Curb and gutter must be saw cut.
- Driveway aprons shall be constructed of concrete with a minimum of 6 inches in thickness, reinforced with No. 3 bars @ 12" O.C.E.W. or No. 4 bars @ 18" O.C.E.W.
- Driveways exceeding HS-20 loads to be reviewed and approved by City Engineer.
- Bar-lift Plastic Chairs, or approved equal, shall be used to secure steel at center of concrete thickness.
- Concrete shall have a broom finish. Exposed aggregate, pavers, tile and stained or painted concrete are not permitted within the right of way.
- All concrete shall be 5-sack concrete and shall have a minimum compressive strength of 3000 psi.
- Membrane curing compound shall be applied at a minimum of 1 gallon per 180 square feet of area.
- Subgrade shall be compacted to 95% standard proctor.
- Expansion joint required at property line and intersection with sidewalks. Longitudinal sawed contraction joint required at 15 ft minimum. See commercial concrete driveway & typical joint layout for details.
- If a manhole falls within a driveway pad, the manhole lid shall be placed flush with the elevation of the driveway.
- Any driveway placed where a drainage bar ditch exists, shall maintain the flow line of the ditch with the placement of a concrete culvert.
- Driveway wings shall not exceed a 12:1 slope.

Any admixtures to the concrete mix (i.e. fiber mesh, plasticizers, etc.) shall require approval. Additionally, decorative concrete shall require approval of the pattern and finish from the City Engineer, or designee, prior to construction.

[Back to Table of Contents](#)



## Water Design

All domestic water systems shall be designed in conformance with the most current revision of TCEQ's Drinking Water Rules (30 TAC Chapter 290) and the City of McAllen Standard Details and Specifications. The most stringent requirements shall apply where the standards conflict. Following is a general summary of the design requirements:

- Water line design shall be consistent with the most current MPU Water Master Plan.
- Water mains shall be a minimum of 8 inches in diameter. Fire Hydrant lead line shall be no less than 6 inches in diameter.
- Pipe shall conform to AWWA C900, C905, or C909 requirements and have a minimum Pressure Class or Pressure Rating of no less than 150 psi. Pipe diameters 12 inches or smaller shall be AWWA C900 PVC DR18. Pipe diameters 14 inches and larger shall conform to AWWA C905.
- Fire Hydrants shall be located with a maximum spacing of 500 feet between fire hydrants in areas with a residential land use and a maximum 300 feet spacing between fire hydrants in areas with a non-residential land use.
- The design of a water line distribution system shall incorporate means to achieve a two-source water line loop. This may require extensions or off-site utility improvements. Exceptions to the looped water line requirement will be evaluated on a case by case basis.
- A single water service connection and meter shall be provided for each single family residential lot/unit. For land use other than single family residential, an individual water service and meter shall be provided for each unit or suite. In the case of a shell building, the engineer shall provide a reasonable assumption as to the number of potential suites that a shell building may enclose.
- Embedment for water lines shall be sand from six (6) inches minimum below the pipe to six (6) inches above the pipe. The remaining trench depth shall be mechanically compacted in one (1) foot lifts to 95% maximum dry density, as defined by the standard proctor. Trenches may be compacted to minimum density of 90% maximum dry density, as defined by the standard proctor, when the trenches are located further than 5 feet from any existing or proposed structure or pavement.
- Water jetting is not allowed under any circumstance for utilities crossing or within a roadway. An exception may be granted for utilities outside the proposed roadway, upon formal concurrence by a geo-technical engineer that soil is suitable

[Back to Table of Contents](#)



- for jetting AND approval by the Utility Engineer for work outside road right of way, and the City Engineer for work within the road right of way.
- Construction Plans for water lines greater than 12 inches in diameter shall include Plan and Profile Sheets of the entire water line.
- McAllen Public Utility may request other means for Joint Restraints to replace and/or supplement Concrete Thrust Block Protection.
- Project Close-out documents shall include an electronic and hard copy of Final Record Drawings. Electronic drawings shall be in both AutoCad and PDF Formats.
- All water system users shall be required to comply with the latest McAllen Public Utility Cross Connection and Backflow Prevention Policy document.

[Back to Table of Contents](#)







**Texas Department of Transportation**

RESEARCH AND TECHNOLOGY IMPLEMENTATION OFFICE  
P.O. BOX 5080 • AUSTIN, TEXAS 78763-5080 • (512) 416-4730

September 9, 2011

Mr. Ruben De Leon  
Bar Lift Inc.  
6900 N. 10<sup>th</sup>, Suite #3  
McAllen, Texas 78704

Re: Product Evaluation 12-2756  
"Bar-Lift Rebar Chair"

Dear Mr. De Leon:

The product information you submitted has been reviewed by engineers in our Construction Division. They have determined that your product, the Bar-Lift Rebar Chair, may be used on TxDOT work. The supervising TxDOT Engineer's concurrence will be required before the use of your product on a specific job. This letter may be used in the request for the Engineer's job or site specific approval.

The reviewer's comments follow:

Standard Specification 360 only requires the following:

B. Reinforcing Steel. Provide Grade 60 deformed steel for bar reinforcement in accordance with Item 440, "Reinforcing Steel." Provide approved positioning and supporting devices (baskets and chairs) capable of securing and holding the reinforcing steel in proper position before and during paving. Provide corrosion protection when shown on the plans.

There are no specific materials specification requirements for the chairs and TxDOT has no approved list. The project engineer approves on a project by project basis.

If you have questions, please contact me at 512-416-4739.

Sincerely,

*(original signature on file)*

Duncan Stewart, P.E., Ph.D.

Research and Technology  
Implementation Office

cc: Darren Hazlett, PE, CST

