



**CITY OF WILLIAMSBURG, IOWA**

**MUNICIPAL  
DESIGN  
STANDARDS**

**September 2005**

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# 1 – GENERAL

## 1.01 ABOUT THESE STANDARDS:

These Design Standards are based on a standard developed for use in the design and most common public improvements, most development activities and utility work within the public right-of-way. The intent of the joint effort was to set a standard of design for the City of Williamsburg that is consistent, effective, and efficient, and protects public safety. The standards in this document have been modified to meet the needs of this community.

These standards are updated on a regular basis, so it important to have the current edition.

## 1.02 HOW TO USE THESE STANDARDS:

The standards contained in this document are organized into sections covering specific areas of design. It will often be necessary to use a number of sections for the design of a single project. For instance, the design of a street may require the use of standards on streets, sidewalks, storm sewers, traffic control signals and erosion control.

These standards are a guide for design, but not a substitute for good engineering. It is the obligation of the designer to use these standards responsibly and professionally to produce designs conforming with commonly accepted engineering practices and the Code of Professional Conduct. It will at times be desirable and/or necessary to vary from the standards in this document to produce a good product. When the need arises, please refer to the following section on variances.

## 1.03 VARIANCE

When it becomes necessary or desirable to vary from the standards presented in this document, a variance may be requested from the City Engineer. Such a request shall be made in writing and will include:

1. The standard to be varied.
2. The proposed variation.
3. Justification for the variance.

## 1.04 AMENDMENTS:

Amendments to these standards may be requested by writing the City Engineer with details and justification for an amendment. The Engineer representing the municipality will meet periodically to discuss proposed amendments and make recommendations to the City Council.

## 1.05 WHOM DO I CONTACT?

Jim Jacob, P.E.  
City Engineer  
VJ Engineering, Inc.  
2570 Holiday Road, Suite 10  
Coralville, IA 52241  
Phone (319) 338-4939  
Fax (319) 338-9457

## 2 - SIDEWALKS AND TRAILS

2.01 APPROVALS AND PERMITS:

- A. A sidewalk construction permit must be obtained from the Public Works Director for all sidewalk construction not associated with the construction of a new house or business for which a building permit has been obtained. However, the standards set forth in this document apply to all sidewalk construction.
- B. The Engineer of Record is responsible to submit "Record of Construction" drawings to the City Engineer and to City Hall on reproducible vellum or mylar and in an AutoCAD based digital format.
- C. A two-year maintenance bond covering defective materials and workmanship is required for sidewalk and trail improvements constructed which are not associated with a building permit.

2.02 TRAFFIC CONTROL:

- A. The contractor shall provide lighted barricades to protect pedestrians and vehicles during sidewalk construction, as required.

2.03 WIDTH AND LOCATION:

- A. Sidewalk width shall be as defined in the following table, except as noted in Section 2.05.

Local	4'
Collector	4'8'*
Arterial	4'8'*
Commercial	As directed by the City Engineer
Industrial	As directed by the City Engineer
Major Bridges	8'

\* A 4' walk will be required on one side and an 8' walk on the other. The City Engineer will designate which side the 8' walk will be on.

- B. Sidewalks shall be located 1 foot from the property line, except in areas in which a different offset is required to match existing walks.
- C. No sidewalks shall extend to the street perpendicular to the curb except at intersections and designed mid-block crossings. Such existing sidewalks removed for construction or maintenance activities shall not be replaced.
- D. Sidewalks are generally required on both sides of all streets.
- E. The landowner of record at the time the sidewalk construction is required shall be responsible for the initial construction of the entire width of the sidewalk as required by the Public Works Director.
  - 1. Trails required in back lot or out of right-of-way locations in lieu of sidewalk being required along street frontages shall be installed at the developer's expense.

2. Trail/park/open space access ways between platted lots shall be constructed to trail standards at the developer's expense and constructed at the time of the public improvements. The minimum easement width allowed for access ways between platted lots shall be 16 feet.

2.04 SLOPE:

- A. All sidewalks shall slope to the street at a rate of  $\frac{1}{4}$  inch per foot (2%), regardless of location.
- B. The street edge of the sidewalk shall be located above the curb  $\frac{1}{2}$  inch (4%) for every foot horizontally from the curb.
- C. The minimum and maximum longitudinal slopes for sidewalks shall be 0.5% and 12%, respectively.

2.05 MATCHING EXISTING WALKS:

- A. The width and location of a new sidewalk shall be varied to match the width and location of existing sidewalks in the area. However, the sidewalk width shall not be reduced to less than 4 feet.
- B. Sidewalk cross slope may be varied through a gradual transition to match existing adjoining walks. Contact the Public Works Director if existing adjoining walks vary significantly from existing standards.

2.06 MATERIAL AND THICKNESS:

- A. Sidewalks shall be constructed of Portland cement concrete conforming to the Iowa Department of Transportation C-3 mix. Maximum slump shall be 3 inches.
- B. Sidewalks 4 to 6 feet wide shall have a minimum thickness of 4 inches. Sidewalks greater than 6 feet wide shall have a minimum thickness of 5 inches with fiber mesh reinforcement or 6 inches of non-reinforced concrete. Sidewalks crossing driveways shall be a minimum of 6 inches thick.

2.07 JOINTS AND FINISH:

- A. Sidewalks shall have a uniform texture with a broom finish.
- B. Tooled joints are permissible on sidewalks less than 6 feet in width. Framing is permissible on sidewalks with tooled joints and should match existing adjoining sidewalk. The maximum depth of framing shall be  $\frac{1}{16}$  inch. The joint depth shall be  $\frac{1}{4}$  the sidewalk thickness. The joint width shall be minimized.
- C. Sawed joints are permissible for all widths of sidewalks. The joint depth shall be  $\frac{1}{4}$  the sidewalk thickness.
- D. Sidewalk joints shall be delineated through driveways.
- E. Sidewalk joints shall be spaced to form square panels.
- F. Preformed expansion joints,  $\frac{1}{2}$  inch in width, shall be installed at approximately 100-foot intervals or at property lines in new residential or commercial construction. Preformed expansion joints,  $\frac{1}{2}$  inch in width, shall be installed adjacent to all curb ramps. See Figure 2.1.
- G. Stamped imprints indicating the contractor and date of construction are permissible. The size of the imprint shall be limited to less than 4"x6" and the depth to less than  $\frac{1}{4}$ ".
- H. Apply curing compound immediately following finishing operations or cure with moist burlap for not less than 24 hours.

2.08 CURB RAMPS:

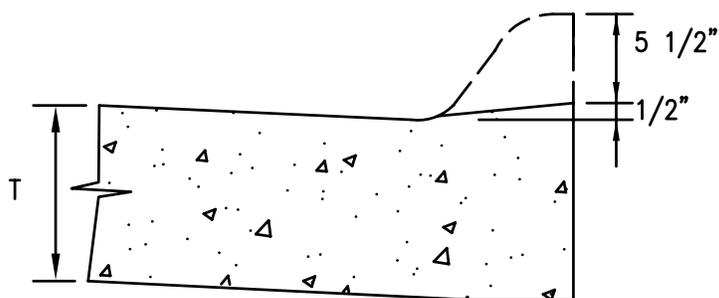
- A. Sidewalks shall provide a curb ramp for accommodation of the handicapped at all intersections and designated crossings.
- B. Curb ramps shall be located in line with the public sidewalk as shown in Figure 2.1.
- C. Curb ramps shall be at least 48 inches wide between the curbs and should have a longitudinal slope of not greater than one inch of rise per twelve inches linear distance (8%). A longitudinal slope no greater than one inch of rise per eight inches linear distance (12.5%) may be used where necessary. The cross slope of curb ramps shall not exceed 2%.
- D. The truncated dome section of concrete adjacent to the curb drop shall be dyed full-depth to provide a visual delineation of the curb ramp as shown in Figure 2.1. The dye shall be red or brick in color and shall be integral with the concrete. Painting of the surface is not permitted. Fiberglass or pre-fabricated concrete truncated dome sections may be hand placed in wet concrete.
- E. The current standards of the Americans with Disabilities Act (ADA) will govern in all cases.

2.09 BACKFILL:

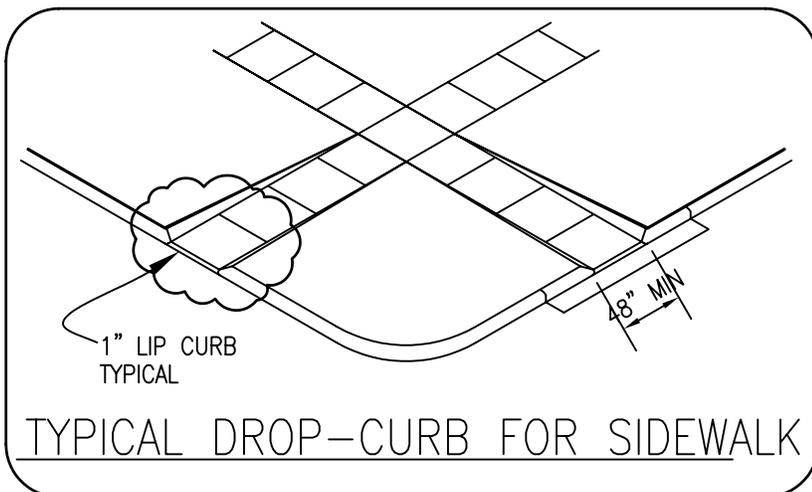
- A. Whoever constructs the sidewalk shall be responsible for the prompt backfill of the sidewalk. The backfill shall be finished to a reasonable grade, which matches the surrounding ground as best as possible. The maximum slope of the backfill shall be 1 foot vertical to 8 foot horizontal.
- B. Whoever constructs the sidewalk and backfill shall be responsible for the revegetation of the backfill area.

2.10 TRAILS:

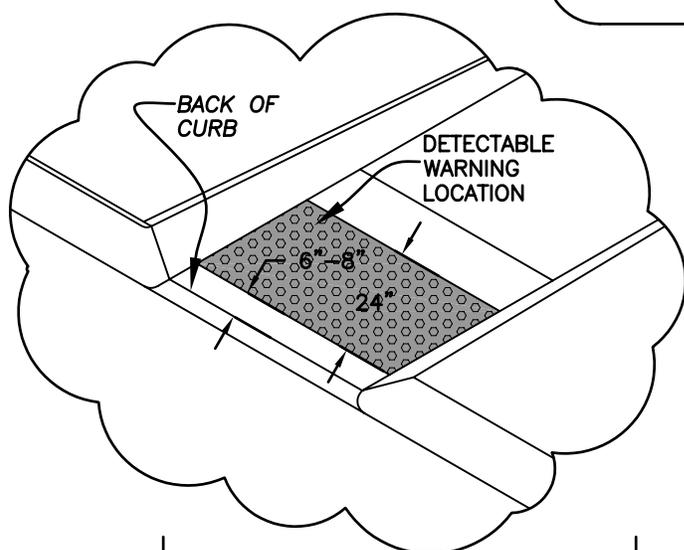
- A. In general, trails shall be designed to the same standard as sidewalks.
- B. Trails designed for public use shall be a minimum of eight feet wide.
- C. To the extent practicable, trails shall comply with the provisions of the Americans with Disabilities Act (ADA).
- D. The trail shall be constructed of 5 inch thick PCC with Fibermesh or 6 inch thick non-reinforced PCC on a 6 inch compacted base. The cross slope or crown shall be 2%. (Figure 2.2)
- E. Trails designed for the use of bicycles shall be designed to the standards of the American Association of State Highway and Transportation Officials' "Guide for the Development of Bicycle Facilities."
- F. Trails that also serve as vehicular access for utility maintenance activities shall be constructed of Portland cement concrete and have appropriately designed radii.
- G. Trails shall have ¼ inch wide, saw cut joints only.



SIDEWALK CURB PROFILE



TYPICAL DROP-CURB FOR SIDEWALK



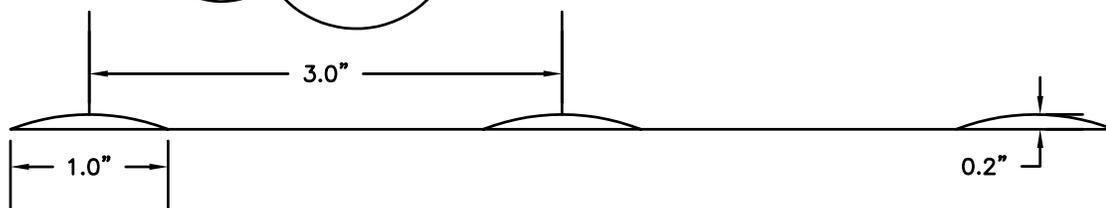
TRUNCATED DOME SPECIFICATIONS:

DIAMETER: 1"

SPACING: 3" EACH WAY

HEIGHT: 0.2"

ADJACENT DOMES SHALL BE IN LINE WITH ONE ANOTHER (NO STAGGERING OR OFFSETS).

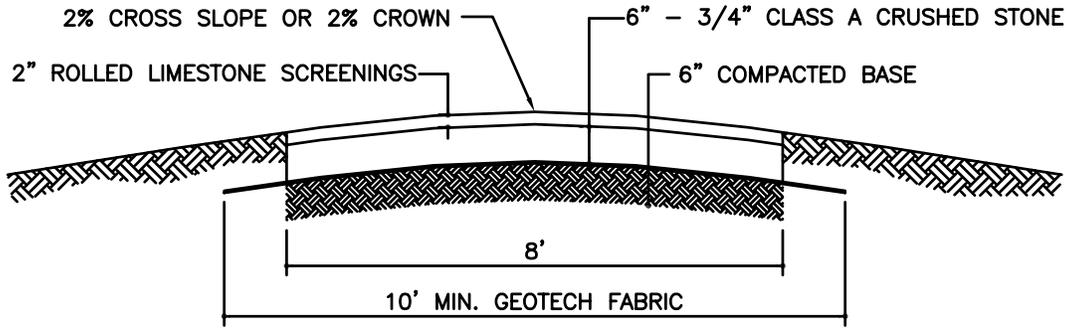


NOTES:

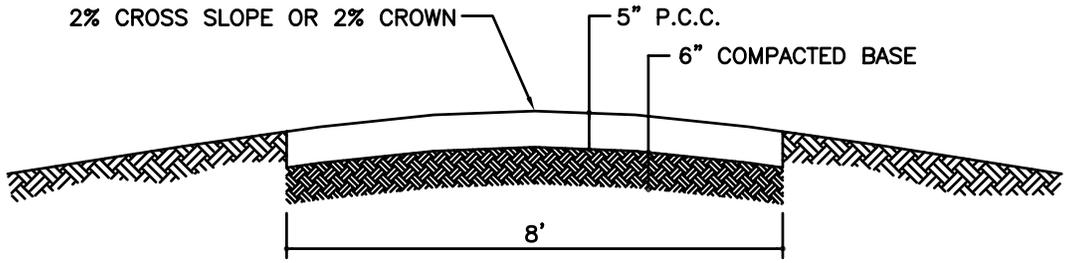
1. DESIGN OF DETECTABLE WARNINGS SHALL COMPLY WITH MOST RECENT EDITION OF THE ADA STANDARDS FOR ACCESSIBLE DESIGN.
2. DETECTABLE WARNINGS SHALL BE PROVIDED WHERE A SIDEWALK CROSSES A VEHICULAR WAY (EXCLUDING UNSIGNALIZED DRIVEWAYS), AND AT ISLANDS AND MEDIANS THAT ARE CUT THROUGH LEVEL WITH THE ROADWAY.
3. DETECTABLE WARNINGS SHALL BE 24 INCHES IN THE DIRECTION OF TRAVEL AND EXTEND THE FULL WIDTH OF THE CURB RAMP OR FLUSH SURFACE.
4. THE DETECTABLE WARNING SHALL BE LOCATED SO THAT THE EDGE NEAREST THE CURB LINE OR OTHER POTENTIAL HAZARD IS 6 TO 8 INCHES FROM THE CURB LINE OR OTHER POTENTIAL HAZARD.
5. DOMES SHALL BE ALIGNED ON A SQUARE GRID IN THE PREDOMINANT DIRECTION OF TRAVEL TO PERMIT WHEELS TO ROLL BETWEEN DOMES.
6. THERE SHALL BE A 70 PERCENT CONTRAST IN LIGHT REFLECTANCE BETWEEN THE DETECTABLE WARNING AND AN ADJOINING SURFACE, OR THE DETECTABLE WARNING SHALL BE "SAFETY YELLOW". THE MATERIAL USED TO PROVIDE VISUAL CONTRAST SHALL BE AN INTEGRAL PART OF THE DETECTABLE WARNING SURFACE. COLORED CONCRETE MUST BE COLORED TO FULL DEPTH.

DETECTABLE WARNING DETAIL

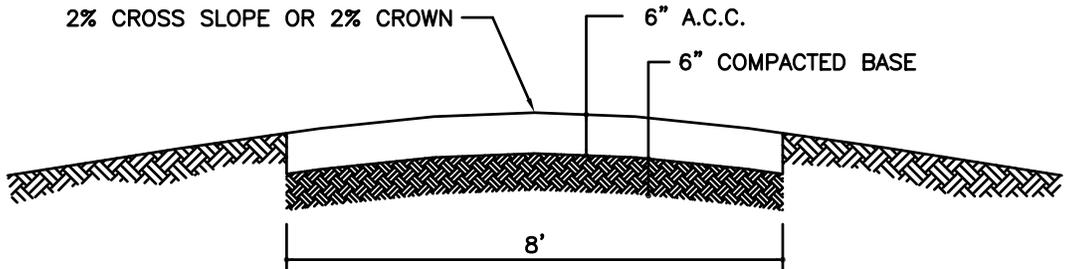
FIGURE 2.1



AGGREGATE SURFACE



PORTLAND CEMENT CONCRETE



ASPHALT CEMENT CONCRETE

TYPICAL TRAIL SURFACES

FIGURE 2.2

## 3 - DRIVEWAYS

### 3.01 APPROVALS AND PERMITS:

- A. An access permit must be obtained before driveway construction or reconstruction not associated with the construction of a new house or business for which a building permit has been obtained. However, the standards set forth in this document apply to all driveway construction. A sketch with dimensions shall be submitted showing the driveway in relation to intersections, side lot lines and other driveways.
- B. A permit must be obtained from the Iowa Department of Transportation before placing a driveway within any state highway right-of-way.

### 3.02 TRAFFIC CONTROL:

- A. The contractor doing the work is responsible for all traffic control and work site safety. If construction activities extend onto the street, traffic control shall meet the standards for Work Zone Traffic Control defined in the current edition of the "Manual on Uniform Traffic Control Devices." Traffic control plans may be required.
- B. The contractor shall provide adequate lighted barricades and/or fencing to protect pedestrians.

### 3.03 DRIVEWAY MATERIAL, THICKNESS AND FINISH:

- A. The driveway slab extending from the street to private property shall be constructed of Portland cement concrete conforming to the specifications of the Iowa Department of Transportation C-3 or M-3 mixes. Maximum slump shall be 3 inches. The concrete driveway slab shall be a minimum of 6 inches thick PCC on 6 inches of compacted roadstone.
- B. Driveways shall have ½-inch preformed expansion joint material at the front and back of sidewalk. Driveways across from "T" intersections shall have one-inch pre-formed expansion joint material at the front and back of the sidewalk.
- C. The finish shall be a broom finish or astroturf drag.
- D. Apply curing compound immediately following finishing operations or cure with moist burlap for not less than 24 hours.

### 3.04 CURB REMOVAL AND JOINT AT PAVEMENT:

- A. The creation of curb drops in existing integral curbs by angle sawing (leaving the existing gutter intact) is highly encouraged.
- B. The creation of curb drops in existing integral curbs by grinding is allowed. The grinding method utilized must have prior approval by the City Engineer.
- C. Curb drops created by removing the existing curb and gutter shall be constructed as detailed in Figure 3.1.

### 3.05 GENERAL CONDITIONS FOR ALL CLASSIFICATIONS OF DRIVEWAYS

- A. There shall be a minimum of twenty (20) feet between the end of the radius of the street intersection and the beginning of a driveway curb cut as measured at the curb line in all instances. Additional distance between the radius of a street intersection and the beginning of a driveway curb cut may be required by the City Engineer where deemed necessary because of high traffic volumes or other safety concerns.

- B. A six (6) foot minimum distance between curb cuts at the curb line will be required.
- C. The curb return shall not be constructed closer than three (3) feet to the side property line extended.
- D. Drive approaches between the sidewalk or property line if no sidewalk exists and the street, are intended to flare equally on both sides.
- E. Drive approaches on collector and arterial streets shall have radius returns only.
- F. The city's policy is to reduce the number of conflict points to promote public safety by minimizing driveway connections to all state highways, arterial, collector and industrial streets. This shall be accomplished by requiring shared driveways, limiting access to corner lots to the lower classification street only, requiring frontage or backage roads or by any other lawful means established by the City Engineer. The desired driveway separation distance is 300 feet on state highways and existing arterial streets.

3.06 SINGLE FAMILY (Figure 3.2):

- A. One driveway with maximum dimensions of twenty-four (24) feet measured at the street side of the sidewalk and thirty (30) feet at the curb line will be allowed.
- B. A maximum of two driveways per property will be allowed, regardless of single or double frontage (regular or corner lot).
- C. If two driveways are desired on a single frontage lot, two driveways with maximum dimensions of twelve (12) feet measured at the street side of the sidewalk and eighteen (18) feet at the curb line will be allowed.
- D. If two driveways are desired on a double frontage (corner) lot, one on each frontage, one driveway with maximum dimensions of twenty-four (24) feet measured at the street side of the sidewalk and thirty (30) feet at the curb line and one driveway with maximum dimensions of twelve (12) feet measured at the street side of the sidewalk and eighteen (18) feet at the curb line will be allowed. The major driveway is required to be located on the lower classified street.
- E. Shared driveways for adjacent single-family residences are encouraged and in some instances may be required. To promote this goal, shared driveway maximum widths of thirty (30) feet at the street side of the sidewalk and thirty-six (36) feet at the curb line will be allowed.
- F. Sections 3.05 B and 3.05 C may be varied by the City Engineer in certain instances in the existing developed areas of the City, as necessary.

3.07 TWO-FAMILY RESIDENCES (Figure 3.3):

- A. A maximum of one driveway per dwelling unit will be allowed, regardless of single or double frontage (regular or corner lot).
- B. One driveway per dwelling unit with maximum dimensions of twenty-four (24) feet measured at the street side of the sidewalk and thirty (30) feet at the curb line will be allowed, except as noted in 3.06 F.
- C. If garages are constructed on the common lot line, a single driveway with maximum widths of thirty (30) feet at the street side of the sidewalk and thirty-six (36) feet at the curb line will be allowed.
- D. Secs. 3.05 B and 3.05 C may be varied by the City Engineer in certain instances in the existing developed areas of the city, as necessary.

### 3.08 COMMERCIAL, INDUSTRIAL AND MULTIFAMILY DEVELOPMENTS

#### A. Single Frontage (Figure 3.4)

1. One driveway with maximum dimensions of thirty-four (34) feet measured at the street side of the sidewalk and forty-two (42) feet at the curb line will be allowed.
2. If two driveways are desired, two driveways with maximum dimension of twenty-four (24) feet measured at the street side of the sidewalk and thirty-two (32) feet at the curb line will be allowed.
3. If the single frontage length is greater than or equal to one hundred and fifty (150) feet, two driveways with maximum dimensions of thirty-four (34) feet measured at the street side of the sidewalk and forty-two (42) feet at the curb line will be allowed.

#### B. Corner Lots (Figure 3.5)

1. On corner lots, driveways shall be constructed as far away from the intersection as possible and still remain upon the property.
2. A maximum of two driveways per property will be allowed, regardless of single or double frontage (regular or corner lot). Consideration will be given for one additional driveway if a unified development exceeds 10 acres in size and all other considerations of this standard are satisfied.
3. One driveway per frontage with maximum dimensions of thirty-four (34) feet measured at the street side of the sidewalk and forty-two (42) feet at the curb line will be allowed.

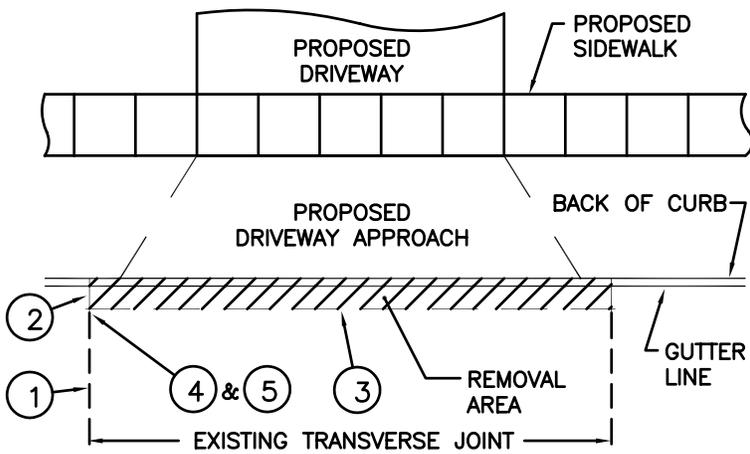
### 3.09 STATE HIGHWAY AND INDUSTRIAL AREAS (NON-RESIDENTIAL) (Figure 3.6):

- A. Type A drives are for high traffic volume, joint or common property driveways requiring protection for left turn movements. Type A drives shall be 45 feet wide from back of curb to back of curb at the property or sidewalk line. This width contains one 16-foot lane in a 4-foot painted or raised median and two 12-foot lanes out.
- B. Type B drives are for high traffic volume, joint or common property driveways. Type B drives shall be 41 feet wide from back of curb to back of curb at the property or sidewalk line. This width contains one 16-foot lane in and two 12-foot lanes out.
- C. Type C drives are for lower volume, single property driveways. Type C drives shall be 28 feet wide from back of curb to back of curb at the property or sidewalk line. This width contains one 14-foot lane in and one 14-foot lane out.
- D. The maximum radius for all driveways is 32 feet.
- E. The dimensions in this section are exact requirements based on anticipated high traffic volumes.
- F. Turning templates and diagrams shall be provided upon request to the City Engineer for drives with anticipated truck and trailer traffic.

### 3.10 DOUBLE FRONTAGE LOTS – FRONT AND BACK:

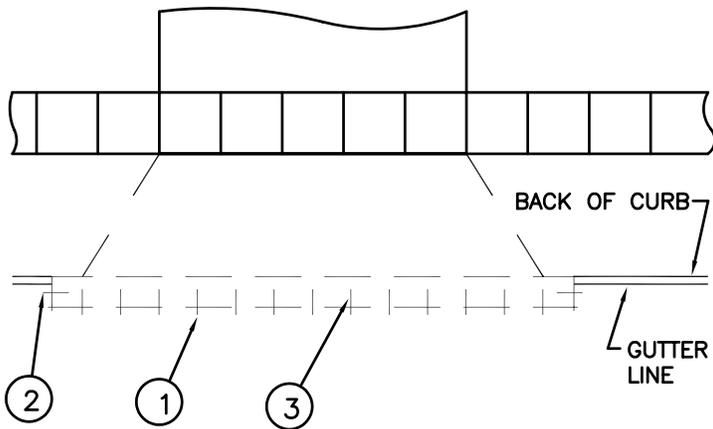
- A. Each frontage of lots with frontage on two parallel streets shall comply with the applicable standards for single frontage lots contained in Sections 3.06, 3.07 and 3.08.
- B. Some subdivisions may prohibit access onto the high classification street. Check the subdivider's agreement in each case.

# DRIVEWAY CONSTRUCTION



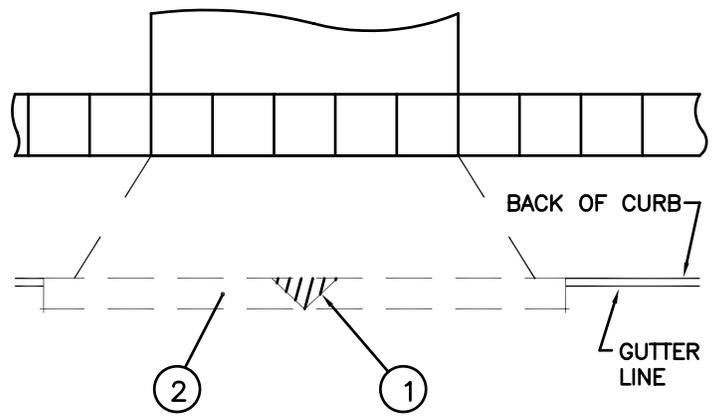
- ① EXTEND WIDTH OF REMOVAL AREA TWELVE (12) INCHES FROM EDGE OF APPROACH, OR TO NEAREST TRANSVERSE JOINT IF NOT MORE THAN TWO (2) FEET FROM EDGE OF APPROACH.
- ② EXTEND REMOVAL AREA EIGHTEEN (18) INCHES FROM BACK OF CURB INTO EXISTING STREET.
- ③ SAWCUT TO A MINIMUM OF TWO-THIRDS (2/3) EXISTING CONCRETE DEPTH.
- ④ SAWCUT THREE (3) INCHES PAST CORNER (BOTH ENDS). IF SAWING TO EXISTING TRANSVERSE JOINT, DO NOT SAW BEYOND JOINT.
- ⑤ USING ONE-HALF (1/2) INCH BIT, DRILL DOWN TO FULL DEPTH OF EXISTING CONCRETE AT INTERSECTION OF SAWCUTS (BOTH ENDS). NOT NECESSARY IF REMOVAL AREA EXTENDED TO AN EXISTING JOINT.

## Sawcut



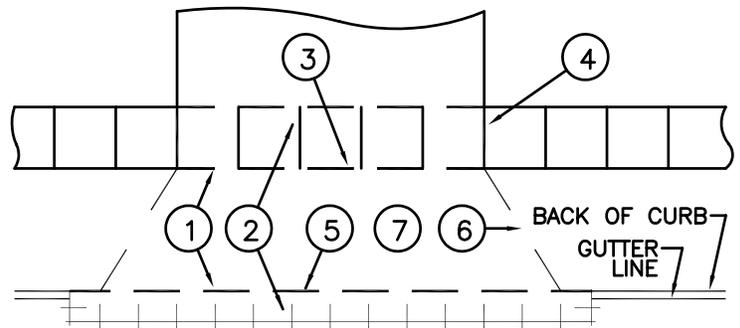
- ① DRILL HOLES AT MID-DEPTH OF SLAB FOR #5 REBAR SIX (6) INCHES INTO EXISTING CONCRETE, AT THIRTY (30) INCH CENTERS.
- ② AT EACH END, DRILL HOLES FOR #5 REBAR SIX (6) INCHES INTO EXISTING CONCRETE, AT NINE (9) INCHES FROM BACK OF CURB.
- ③ PLACE 18 INCH LONG #5 REBAR INTO EXISTING SLAB.

## Reinforcement

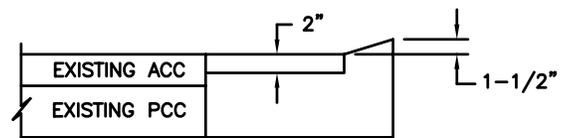


- ① BEGIN CONCRETE REMOVAL FROM MIDDLE OF REMOVAL AREA (CREATE "V" SECTION). CONTINUE REMOVAL FROM MIDDLE TOWARDS EACH END.
- ② PREPARE SUBGRADE AND COMPACT.

## Removal



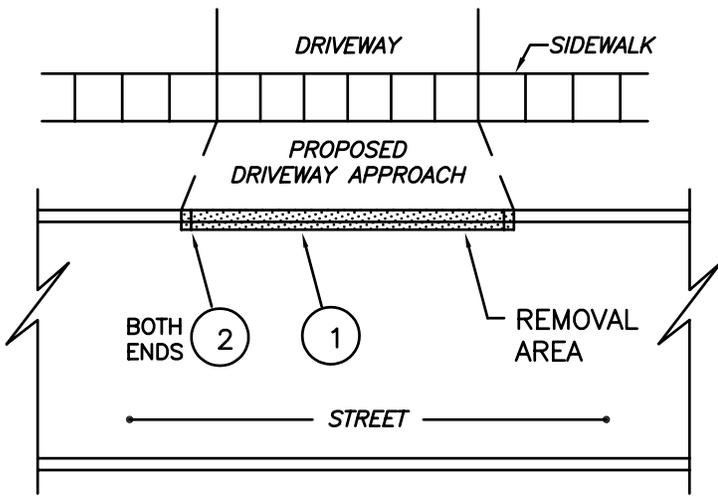
- ① PLACE FORMS FOR BACK OF CURB AND SIDEWALK.
- ② POUR SIDEWALK AND CURB DROP AND FINISH. (NOTE: TOP OF CURB DROP SHALL BE APPROXIMATELY ONE-AND-ONE-HALF (1-1/2) INCHES ABOVE THE GUTTER LINE). MATCH THE THICKNESS OF THE EXISTING SLAB.
- ③ PLACE ONE-HALF (1/2) INCH PREFORMED EXPANSION JOINT MATERIAL AROUND SIDEWALK.
- ④ IF COLD JOINT, USE ONE-HALF (1/2) INCH PREFORMED EXPANSION JOINT MATERIAL OR DOWEL TO ADJACENT PANEL.
- ⑤ COLD JOINT, NO EXPANSION MATERIAL.
- ⑥ PLACE FORMS FOR DRIVEWAY APPROACH.
- ⑦ POUR DRIVEWAY APPROACH AND FINISH.
- ⑧ ON STREETS WITH ASPHALT OVERLAYS, LEAVE A TWO (2") INCH KNOCK-OUT AT THE GUTTER LINE FOR REPLACING ASPHALT.



## Pour and Finish

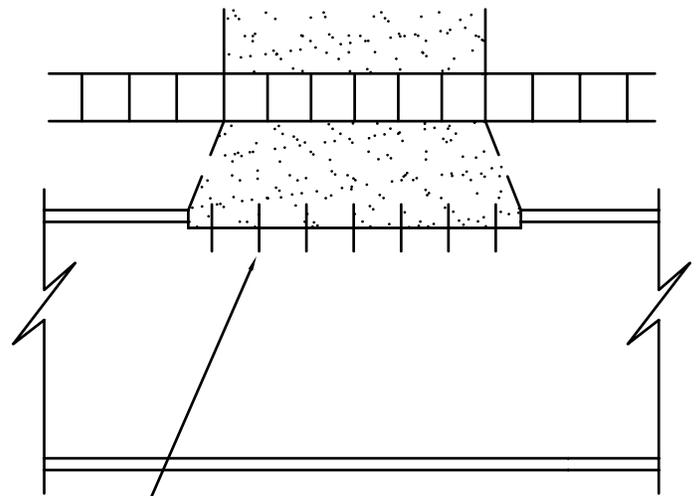
FIGURE 3.1

# DRIVEWAY CONSTRUCTION



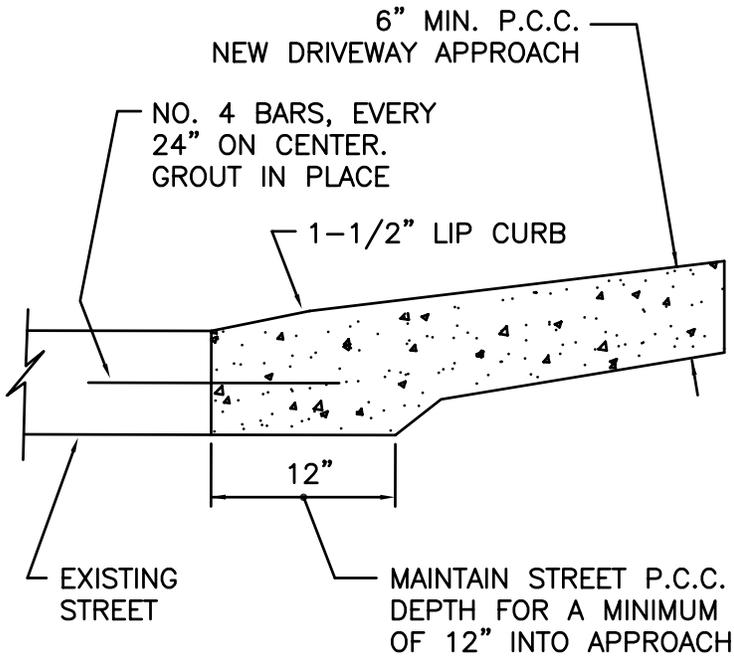
1. SAWCUT AS CLOSE TO CURB AS POSSIBLE, MINIMUM DEPTH=2/3 OF EXISTING PAVING
2. SAWCUT CURB AT FULL WIDTH AND 6" IN FROM BOTH ENDS
3. REMOVE SMALL SECTIONS OF CURB FIRST

## Curb Removal

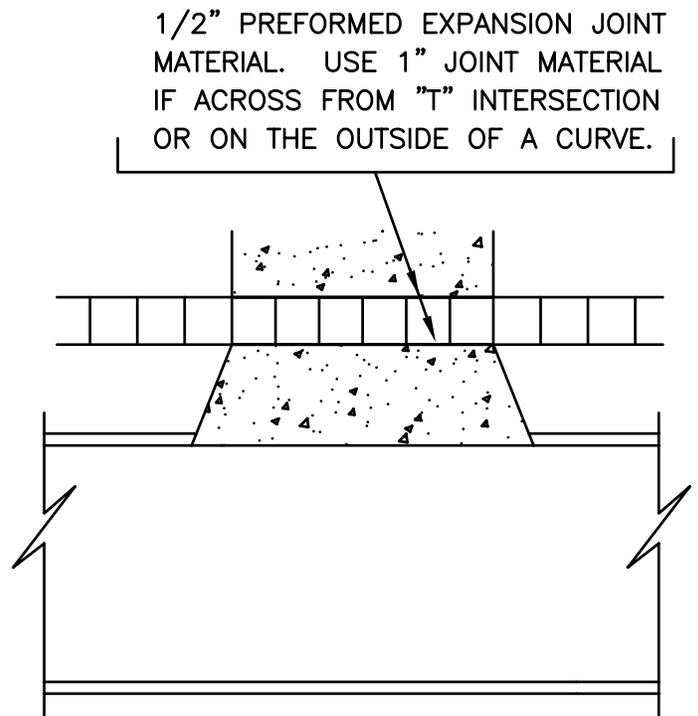


NO. 4 BARS, 18" LONG,  
EVERY 24" ON CENTER AND  
1' MAX. FROM EACH END

## Rebar



## Cross-Section View



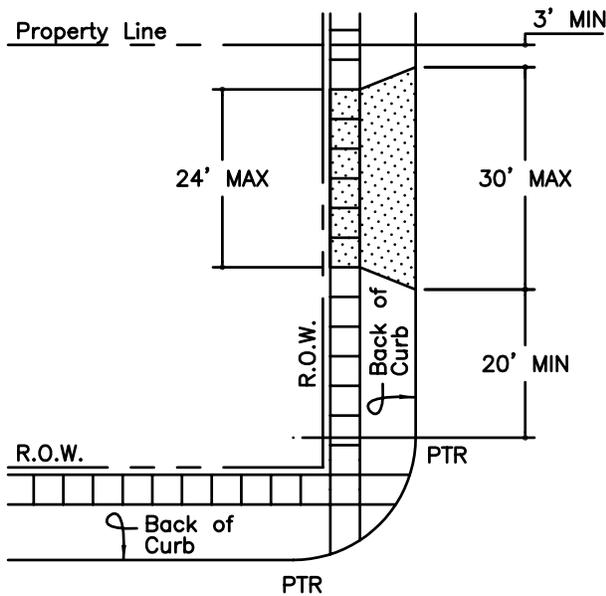
1/2" PREFORMED EXPANSION JOINT  
MATERIAL. USE 1" JOINT MATERIAL  
IF ACROSS FROM "T" INTERSECTION  
OR ON THE OUTSIDE OF A CURVE.

## Expansion Joints

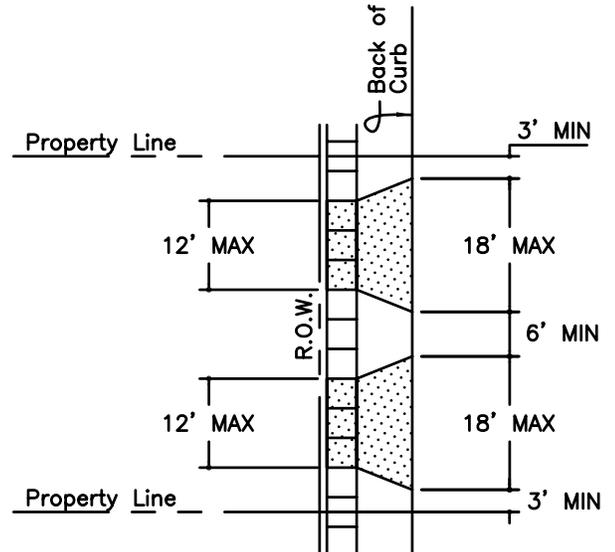
# FIGURE 3.1-A

# DRIVEWAY REGULATIONS

## Single Family Residences

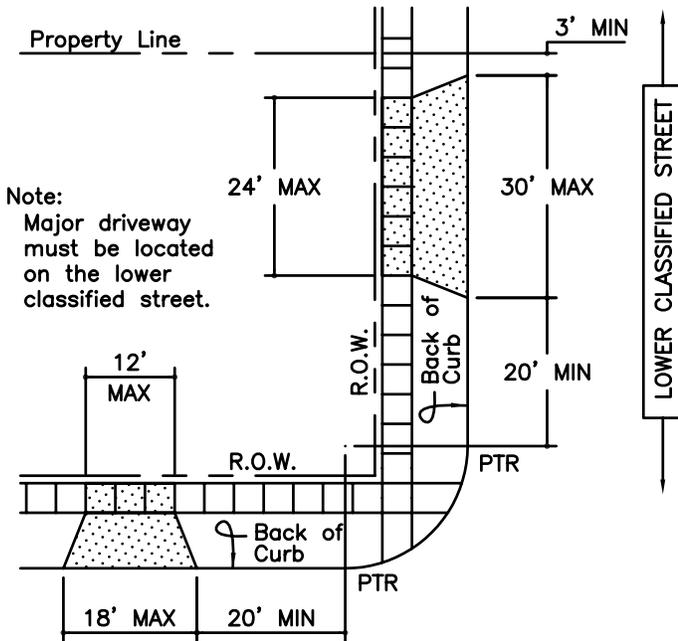


One Driveway



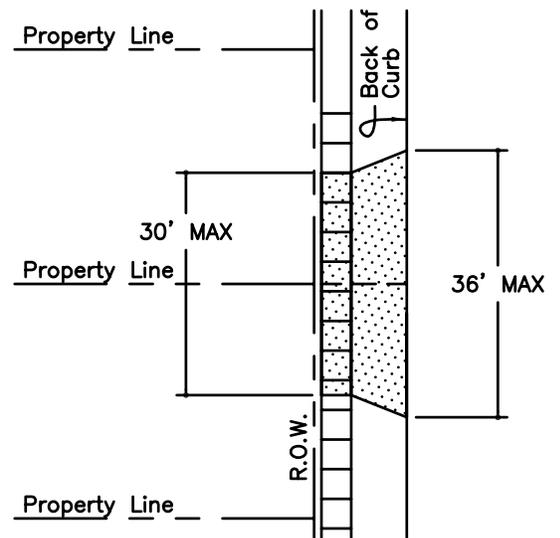
Two Driveways

Single Frontage



Two Driveways

Double Frontage



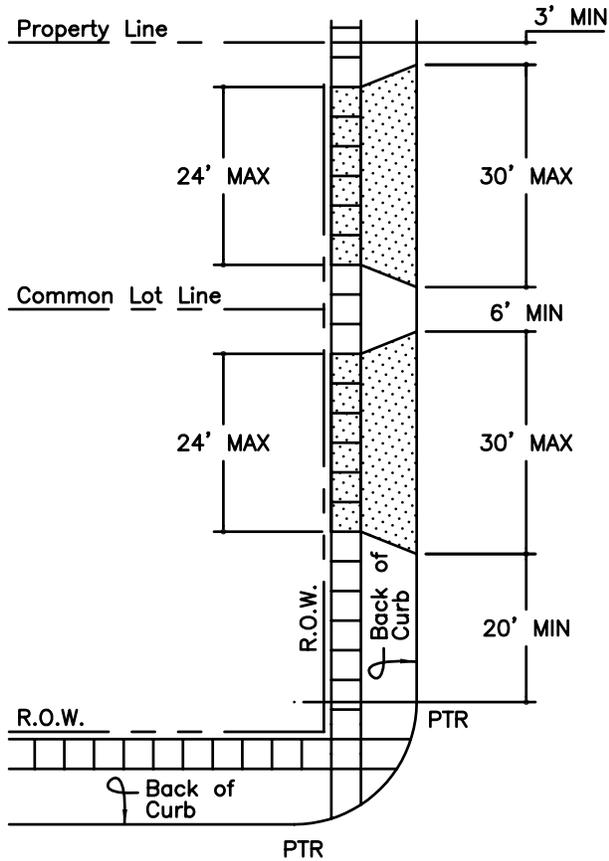
Shared Driveway

Adjacent Single Families

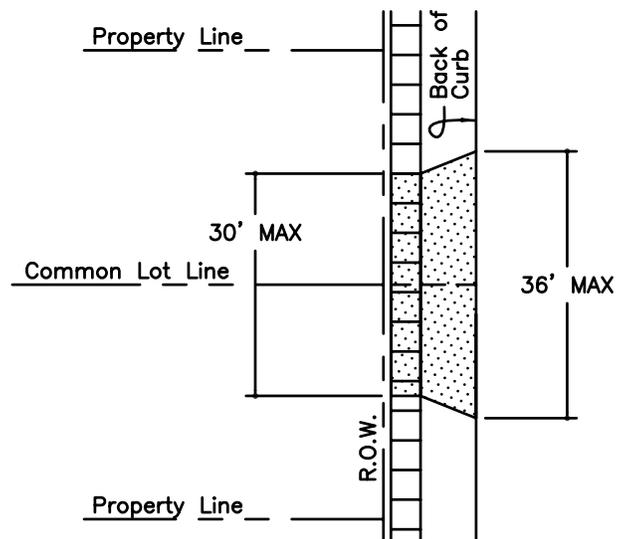
FIGURE 3.2

# DRIVEWAY REGULATIONS

## Two-Family Residences



One Driveway  
Single/Double Frontage

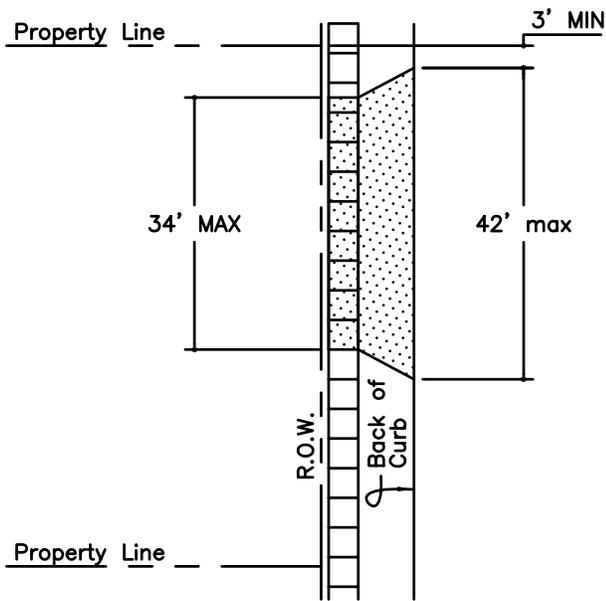


One Driveway  
Garages On Common Lot Line

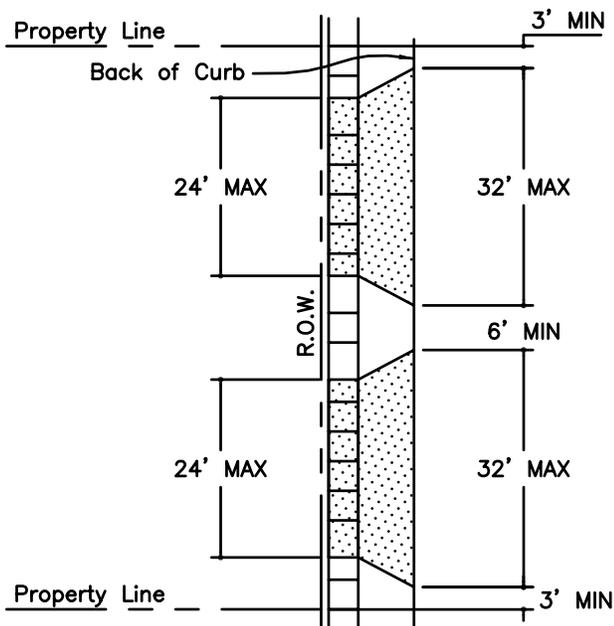
FIGURE 3.3

# DRIVEWAY REGULATIONS

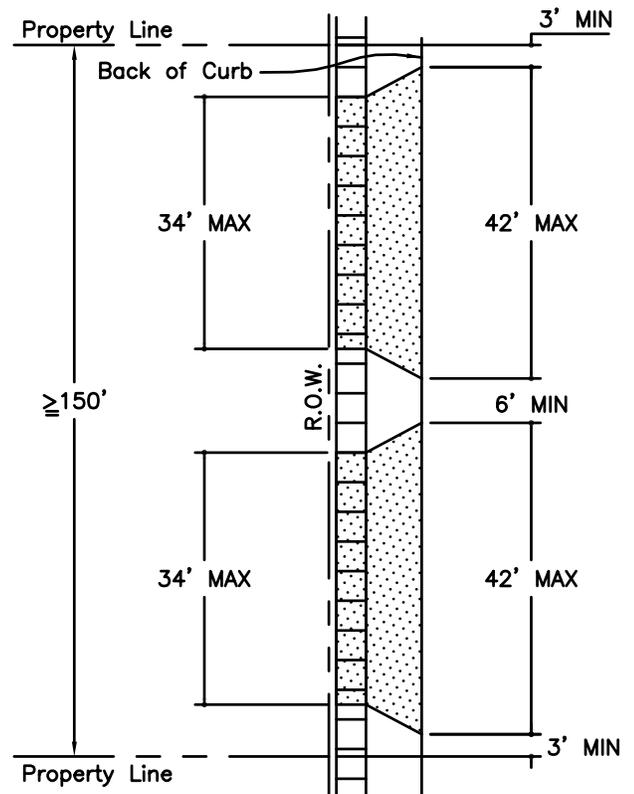
## All Other Driveways Except Single/Two Family Residences



One Driveway  
Single Frontage



Two Driveways  
Single Frontage

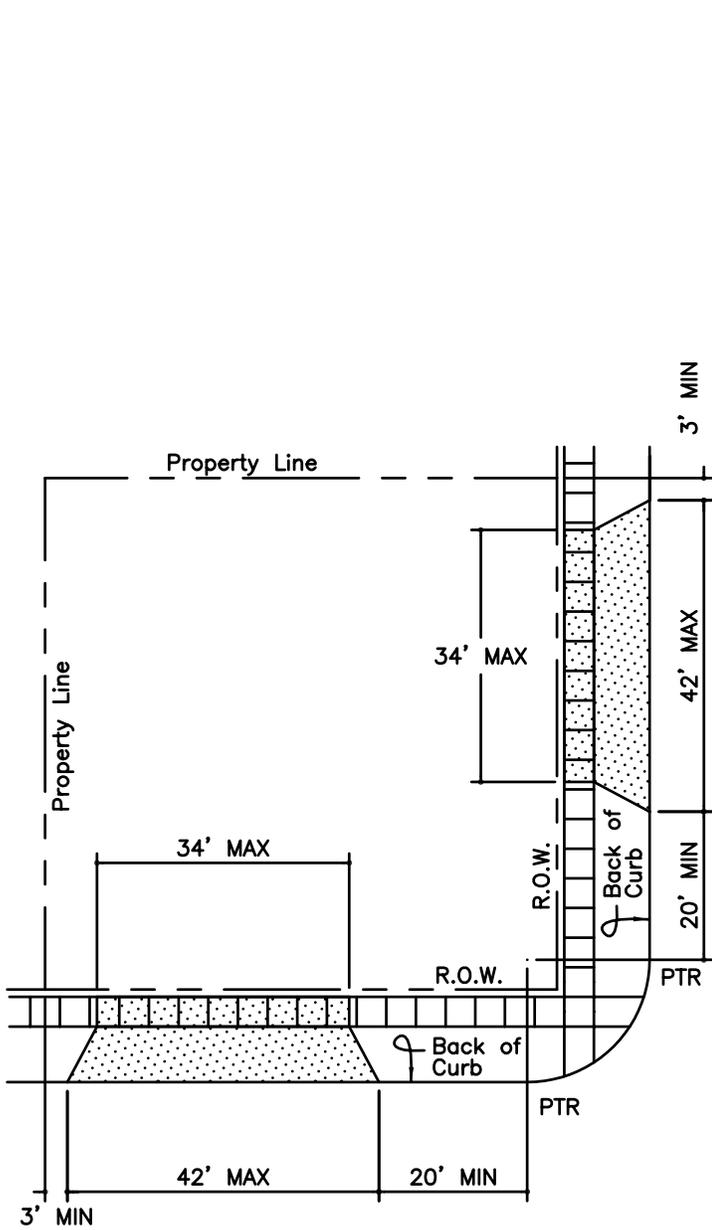


Two Driveways  
Single Frontage  
Lot length  $> \underline{150'}$

FIGURE 3.4

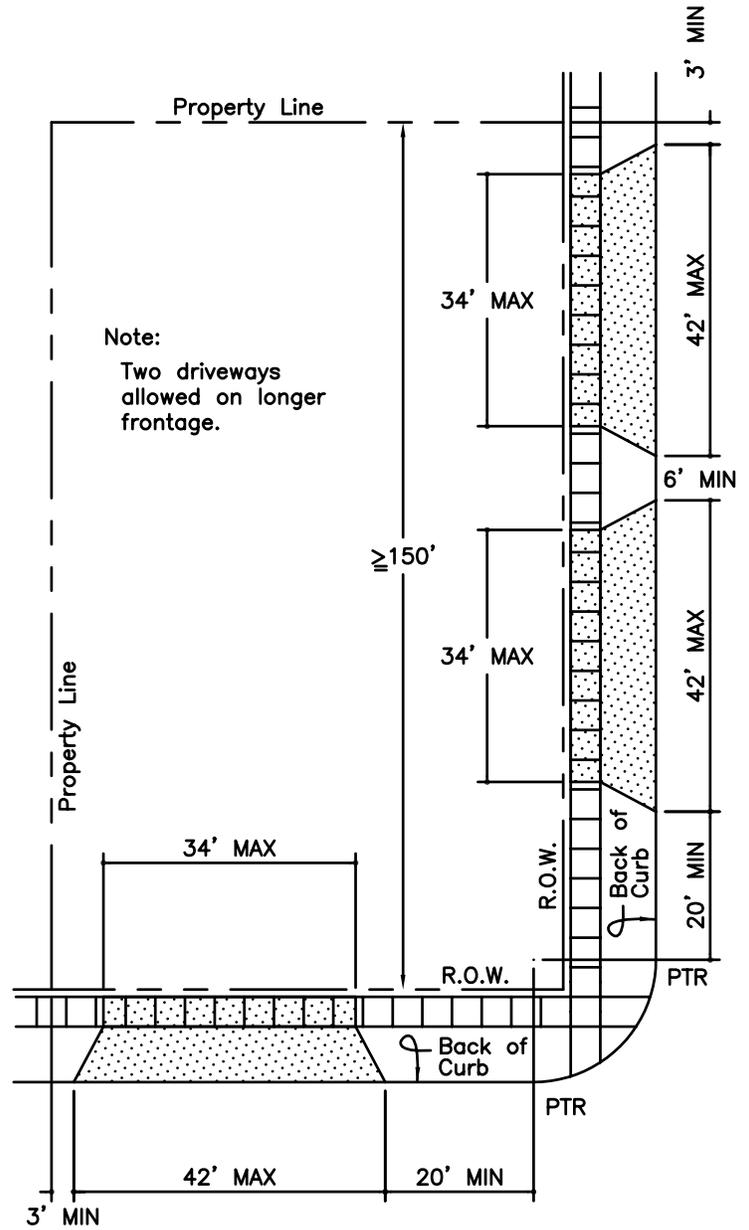
# DRIVEWAY REGULATIONS

## All Other Driveways - Continued



### Two Driveways

Double Frontage



### Two Driveways

Double Frontage

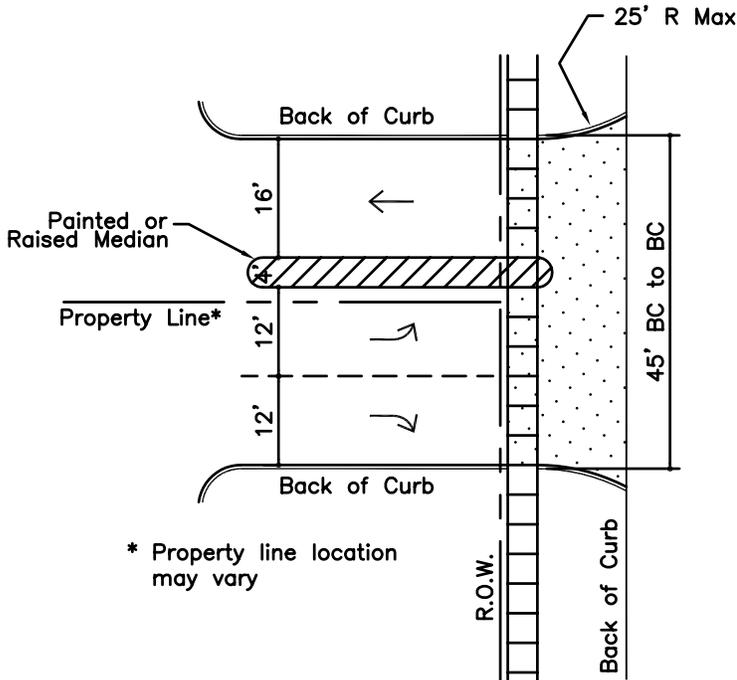
Lot length  $\geq 150'$

FIGURE 3.5

# DRIVEWAY REGULATIONS

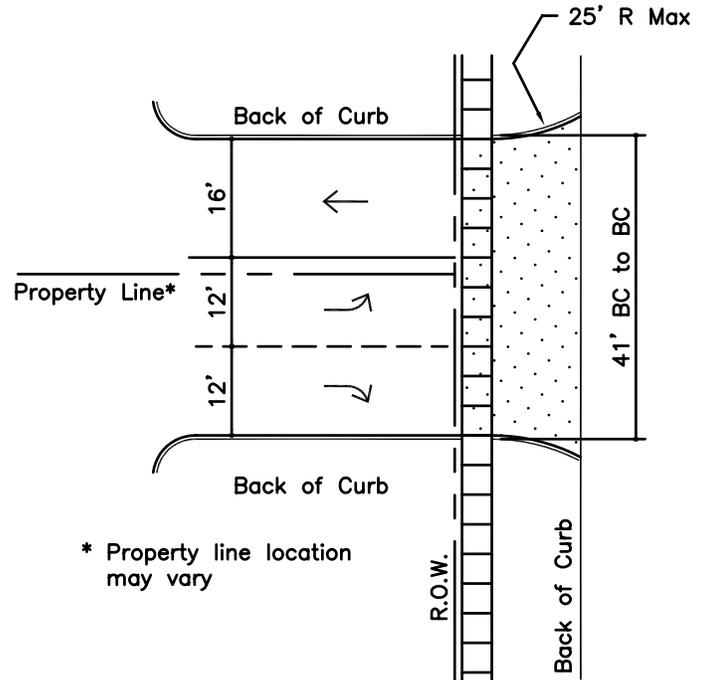
## State Highways and Industrial Areas

(Non-Residential)



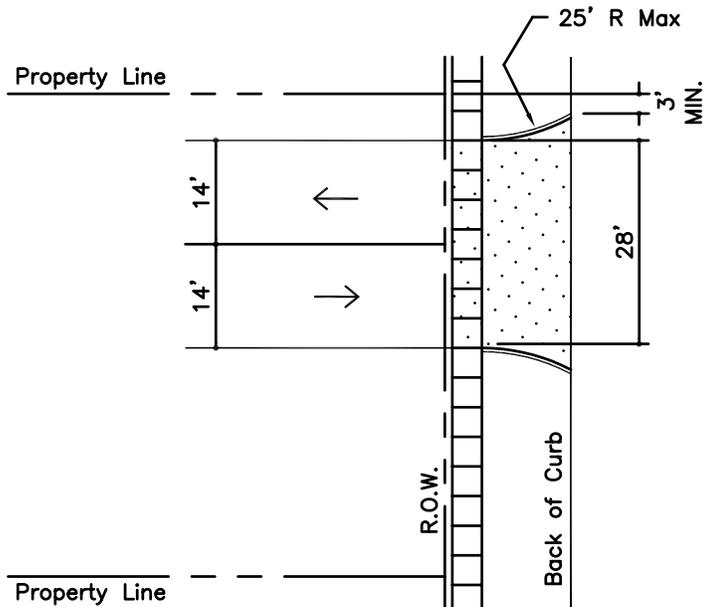
Type A

Joint/Common Property Driveway  
with Painted or Raised Median



Type B

Joint/Common Property Driveway



Type C

Single Property Driveway

FIGURE 3.6

## 4 - ALLEYS

### 4.01 APPROVALS, PERMITS, AS-BUILTS AND MAINTENANCE BONDS:

- A. Plans and specifications for public alley improvements must be certified by a professional engineer registered in the State of Iowa and utilize the NGVD of 1929.
- B. Plans and specifications for public alley improvements must be reviewed and approved by the City Engineer prior to construction.
- C. Other local, state and federal permits may be required, depending on the circumstances. It shall be the responsibility of the Engineer of Record to acquire all applicable permits. A copy of all permits shall be provided to the City Engineer before construction.
- D. The Engineer of Record is responsible to submit "Record of Construction" drawings to the City Engineer and to City Hall on reproducible vellum or mylar and in an AutoCAD based digital format.
- E. A two-year maintenance bond covering defective materials and workmanship is required for all alley improvements.

### 4.02 ALLEY CLASSIFICATION:

- A. A Residential Alley is a route located between local streets used primarily for access to the rear of residential property.
- B. A Commercial Alley is a route located in commercial areas used primarily for access to the rear of commercial property.

### 4.03 RIGHT-OF-WAY WIDTH:

- A. The right-of-way width shall be 20 feet for all alleys.

### 4.04 PAVEMENT WIDTH:

- A. Residential alleys shall have a pavement width of 18 feet.
- B. Commercial alleys shall have a pavement width of 20 feet.

### 4.05 ALLEY GRADES:

- A. The maximum grade for alleys shall be 12% for residential and 10% for commercial alleys. The minimum grade shall be 0.5% for all types of alleys.

### 4.06 ALLEY PAVEMENT CROSS SECTION:

- A. The pavement shall have a 4% inverted crown cross section.

4.07 PAVEMENT MATERIAL AND THICKNESS:

- A. The pavement slab may be constructed of non-reinforced Portland cement concrete conforming to the IDOT specifications C-3 mix or M-3 mix or Hot Mix Asphalt conforming to I.D.O.T. supplemental specifications for gyratory mix design as applicable.
  
- B. Minimum alley P.C.C. pavement thickness: Residential 7" on 6" compacted stone  
Commercial 8" on 6" compacted stone
- C. Minimum alley H.M.A. pavement thickness: Residential 8" on 6" compacted stone  
Commercial 9-1/2" on 6" compacted stone
  
- D. Compacted stone subbase shall be a drainable base; I.D.O.T. specification for modified subbase or I.D.O.T. gradation #14.

4.08 SUBGRADE REQUIREMENTS:

- A. The subgrade shall be compacted to 90% of Modified Proctor Density.
  
- B. All fill sections shall be compacted to 90% of Modified Proctor Density.

## 5 - STREETS

### 5.01 APPROVALS, PERMITS, AS-BUILTS AND MAINTENANCE BONDS:

- A. Plans and specifications for public street improvements must be certified by a professional engineer registered in the State of Iowa and utilize the NGVD of 1929.
- B. Plans and specifications for public street improvements must be reviewed and approved by the City Engineer prior to construction.
- C. Other local, state and federal permits may be required, depending on the circumstances. It shall be the responsibility of the Engineer of Record to acquire all applicable permits. A copy of all permits shall be provided to the City Engineer before construction.
- D. The Engineer of Record is responsible to submit "Record of Construction" drawings to the City Engineer and to City Hall on reproducible vellum or mylar and in an AutoCAD based digital format.
- E. A two-year maintenance bond covering defective materials and workmanship is required for all street improvements.

### 5.02 DESIGN RESOURCES:

- A. "A Policy on Geometric Design of Highways and Streets," American Association of State Highway and Transportation Officials, current edition.
- B. Iowa Department of Transportation Manuals Current editions with revisions:
  - Standard Road Plans
  - Road Design Details
  - Road Design Manual
  - Road Design Aids Manual
- C. Iowa Department of Transportation "Urban Design Guides" and "Alternative Urban Design Guides", current edition.
- D. Iowa Department of Transportation "Standard Specifications for Highway and Bridge Construction", current edition.

### 5.03 STREET CLASSIFICATION:

Streets will be classified according to their functional use as described below. Existing facilities may not fully comply.

- Arterial Streets provide a continuous route for the expeditious movement of large volumes of all types of through-traffic across and beyond the city and between high traffic generation points. The geometric design and traffic-control measures are used to facilitate the safe movement of through traffic. Local street access to arterial streets will be limited. Direct access from abutting properties will not be permitted.
- Collector Streets provide for the movement of traffic between arterial routes and local streets as well as providing limited direct access to abutting property. Moderate amounts ( $\leq 2500$  vehicles per day) of low speed ( $\leq 25$  MPH) traffic, including bus traffic, may be carried on collector streets.
- Local Streets serve as a means of access to abutting property. They are intended to be a low speed ( $\leq 25$  MPH) and short trip routes, with usually less than 500 vehicles per day.

5.04 RIGHT-OF-WAY:

- A. The minimum right-of-way width shall be provided as follows:
  - 1. Arterial rights-of-way shall be 100 feet in width,
  - 2. Collector rights-of-way shall be 66 feet,
  - 3. Local rights-of-way shall be 60 feet in width,
  - 4. Cul-de-sac rights-of-way shall be 100 feet in diameter for local and 120 feet in diameter for industrial.
  - 5. Industrial rights-of-way shall be 60 feet.
- B. Additional width is required for medians or boulevards if they are planned within the right-of-way. This additional right-of-way shall be dedicated to the city by the developer.

5.05 TRAFFIC LANE WIDTHS AND LENGTH RESTRICTIONS:

- A. All street widths shall be measured back-of-curb to back-of-curb.
- B. The minimum traffic lane width will be 12 feet for all public streets.
- C. Bicycles are encouraged to ride on parallel trail or sidewalk systems. Therefore, no additional width will be allocated within the street paving to accommodate bike lanes.
- D. Local streets will have a minimum pavement width of 25 feet.
- E. Collector and industrial streets shall have a minimum pavement width of 31 feet, except where turning lanes are present. Developers are responsible for street widths up to and including 31 feet.
- F. Arterial streets shall have a minimum pavement width of 31 feet, except where turning lanes are present.
- G. Cul-de-sacs
  - 1. Cul-de-sacs shall be paved with a 25-foot wide paving.
  - 2. The outer edge of the cul-de-sac head shall be 10 feet inside the circumference of the right-of-way. The other radius from the stem of the cul-de-sac to the head shall be a minimum of 20 feet.
  - 3. Cul-de-sacs shall not have a raised center median. Alternative paving materials may be utilized within the median area with prior approval of the City Engineer.
  - 4. Cul-de-sacs shall have a maximum length of 600 feet from the center of the bulb to the centerline of the adjoining street.
  - 5. Temporary hard-surfaced cul-de-sacs are required at the end of all dead-end streets that will continue with further development.
  - 6. Hammerhead turnarounds, of appropriate design, may be allowed with the City Engineer's approval.

5.06 SEPARATE TURNING LANES:

- A. Separate turning lanes may be included on arterial streets but will generally not be included in other street design. Where separate turning lanes are required on the basis of a capacity analysis, use a 12-foot width.

5.07 MEDIANS AND BOULEVARDS:

- A. Medians or boulevards on arterial streets shall have a minimum width of 16 feet. At intersections, medians may be used to provide for a separate, left turn storage lane.
- B. Medians or boulevards which are included as a part of local or collector streets shall have a minimum width of 4 feet if paved or 9 feet if grassed. Paved medians on local and collector streets are discouraged.

5.08 DESIGN SPEED:

- A. A design speed will be used to design the geometric features for arterial streets. The design speed will be 45 miles per hour; however, posted speed limits may be less. The design speed will be used to establish geometric features including sight distance, intersections, etc. to current AASHTO standards.

5.09 CLEAR ZONES:

- A. On streets with curbs, the clear zone shall be 3 feet for streets with a posted speed limit of 25 mph or less and 10 feet for streets with a posted speed limit greater than 25 mph. On streets without curbs, the clear zone shall be 10' for two-lane and four-lane facilities.
- B. Variances to clear zone requirements will be considered for overhead electrical facilities where compliance will significantly impact existing trees. In no case will a clear zone of less than 18 inches be allowed. The City Engineer must approve a clear zone variance.

5.10 STREET GRADES:

- A. The maximum street grade for arterial, industrial, and cul-de-sac streets shall be 8%, for collector streets 10%, and for local streets 10%.
- B. When two streets intersect, the grade of lower classification shall be minimized to allow safe stopping and starting in adverse weather.
- C. The minimum grade for streets shall be 0.5%, except around the bulbs of cul-de-sacs where the minimum grade shall be 0.7%.
- D. Streets in flood plains designated on the FEMA Flood Insurance Maps shall be elevated at their lowest point to the 100-year flood elevation. Arterial and collector streets shall be elevated to 1 foot above the 100-year flood elevation.

5.11 CURVE RADIUS:

- A. The minimum center line radius for curves shall be as follows:

Arterial	1000'
Collector	350'
Local	150'
Cul-de-sacs	150'

- B. Under no circumstances will variances be granted for radii less than 75 feet.

5.12 PAVEMENT CROSS SECTION:

- A. All pavements shall have a 2% parabolic or straight crown cross-section as shown in Figure 5.1.

5.13 CURB AND GUTTER SECTION:

- A. Curbs shall be 6" as shown in Figure 5.1. Roll curbs are not allowed without approval from the City Engineer.
- B. For P.C. concrete street construction, curbs shall be integral cast Portland cement concrete. There shall be no joint between the curb and gutter section and the pavement.
- C. For H.M.A. street construction, a minimum 30 inch integral P.C. concrete curb and gutter section shall be required. The thickness of the curb and gutter section shall match the required thickness of H.M.A. for the appropriate street classification.

5.14 INTERSECTION CORNER RADIUS:

- A. The corner radius at intersections will depend on the functional classification of the intersecting streets. These are the minimum criteria:

arterial-arterial	50'
arterial-collector	30'
arterial-local	25'
collector-collector	25'
collector-local	25'
local-local	25'
industrial	50'
alley-all	Maximum allowable that will remain in the street R.O.W. (not more than 20')

Corner radii may be enlarged on routes that will have significant truck or bus traffic.

- B. See Figure 5.2 for typical intersection joint detail.

5.15 PAVEMENT MATERIAL AND THICKNESS:

- A. The pavement slab shall be constructed of non-reinforced Portland cement concrete conforming to the IDOT specifications C-3 mix or M-3 mix or Hot Mix Asphalt conforming to I.D.O.T. supplemental specifications for gyratory mix design.

- B. The minimum required P.C. pavement thickness is as follows:

Arterial	9 inches on 6" compacted roadstone
Collector and Industrial	8 inches on 6" compacted roadstone
Local	7 inches on 6" compacted roadstone

Pavement thickness requirements are intended as a guide. Arterial street projects shall be designed on the basis of soil condition and projected traffic loading.

- C. The minimum required H.M.A. pavement thickness is as follows:

Arterial	11 inches on 6" compacted stone
Collector and Industrial	9-1/2 inches on 6" compacted stone
Local	8 inches on 6" compacted stone

Pavement thickness requirements are intended as a guide. Arterial street projects shall be designed on the basis of soil condition and projected traffic loading.

- D. Compacted stone subbase shall be a drainable base; I.D.O.T. specification for modified subbase or I.D.O.T. gradation #14.

5.16 SUBGRADE AND FILL SECTION REQUIREMENTS

- A. The subgrade shall be compacted to a depth of 6 inches below and 2 feet beyond the width of the pavement to 90% Modified Proctor Density. All streets shall be constructed with a 6-inch thick drainable base compacted to 90% Modified Proctor Density and include subdrains.
- B. All fill sections shall be compacted to IDOT Type A limits.
- C. Some soils may require the use of a drainable base and tile system constructed to IDOT standards. Pavement construction on fully hydric soils or slopes exceeding 8% will require a drainable base and tile system. See Table 5.2 for a list of fully hydric soils. Pavements on other soils will be evaluated on a case-by-case basis. Pavement tile systems may be used for sump pump discharge tiles required by Part 9, Storm Sewers, and Stormwater Management Facilities.

5.17 AREA BETWEEN THE SIDEWALK AND THE CURB (PARKWAY):

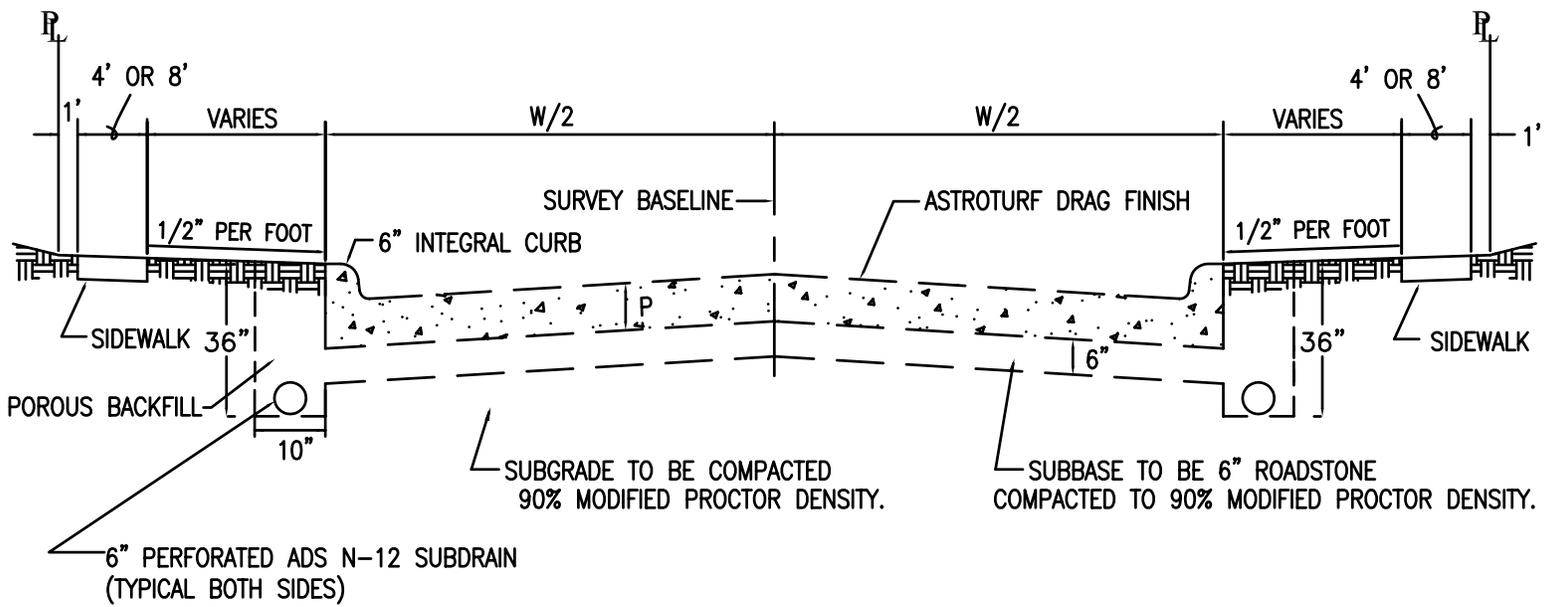
- A. The parkway shall slope to the street at a rate of ½ inch vertical per horizontal foot.
- B. The minimum parkway width shall be 4 feet in all cases.
- C. In residential areas, the parkway shall be grassed except in such areas that the parkway is so narrow that grass does not grow well. In these narrow areas, the alternate materials described in paragraph D may be used upon approval of the Engineer.
- D. In commercial areas, alternate materials may be used in the parkway upon approval of the City Engineer. These materials include exposed aggregate concrete, asphalt, and bricks or concrete pavers on an asphalt or concrete base.

5.18 SIGNAGE:

- A. Developers shall pay the city the costs of the initial street signage for all new developments. The costs shall be determined on a unit cost per sign required basis for the type and number of signs require as determined by the Public Works Director and the City Engineer.

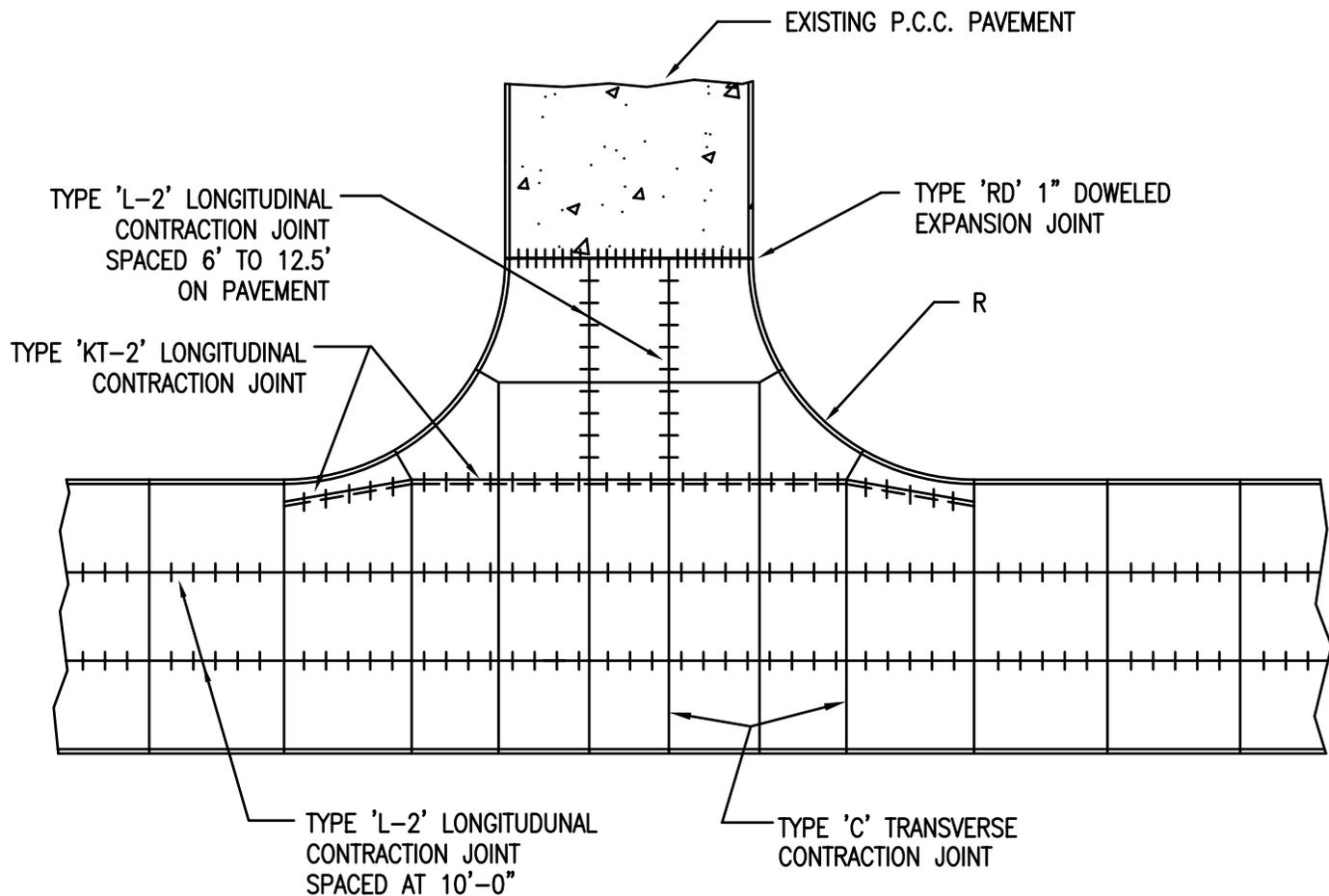
SUMMARY OF DESIGN CRITERIA – TABLE 5.1

DESIGN STANDARD	ARTERIAL	COLLECTOR	LOCAL	CUL- DE- SACS	INDUSTRIAL
Minimum right-of-way width	100'	66'	60'	60'	60'
Minimum lane width	12'	12'	12'	12'	12'
Minimum pavement width	31'	31'	25'	25'	31'
Maximum grade	8%	10%	10%	8%	8%
Minimum grade	0.50%	0.50%	0.50%	0.70%	0.50%
Minimum curve radius	1,000'	350'	150'	150'	150'
Minimum pavement thickness	9	8	7	7	8



TYPICAL PAVEMENT CROSS-SECTION  
2% PARABOLIC OR STRAIGHT CROWN

FIGURE 5.1



NOTES

1. TRANSVERSE CONTRACTION JOINT REQUIRED EVERY 15 FEET.
2. KEYED AND DOWELED JOINT WILL BE REQUIRED AT LONGITUDINAL INTERIOR EDGES OF EACH SEPARATELY Poured SLAB.
3. SEE I.D.O.T. STANDARD ROAD PLANS RH-50, RH-51 AND RH-52.

TYPICAL INTERSECTION DOWELING PLAN

FIGURE 5.2

## **6 – UTILITY WORK AND OTHER CONSTRUCTION WITHIN PUBLIC RIGHT-OF-WAY**

### **6.01 PERMIT REQUIRED:**

- A. A right-of-way construction permit is required to work within the public rights-of-way. Permits may be obtained from the Public Works Director. The owner of the utility must obtain permits for utility work. A right-of-way construction permit is not required for sidewalk, driveway, or mail box construction. See Parts 2 and 3 for the construction of sidewalks and driveways and section 6.03A for the construction of mailboxes.

### **6.02 TRAFFIC CONTROL:**

- A. The permittee is responsible for all traffic control and work site safety. Traffic control shall meet the standards for Work Zone Traffic Control as defined in the current edition of the Manual on Uniform Traffic Control Devices for Streets and Highways. The City Engineer may require a traffic control plan.
- B. The permittee shall provide adequate lighted barricades and/or fencing to protect pedestrians and vehicles. All excavations shall be fenced when the contractor is not at the site.
- C. There may be situations where the traffic load or site conditions will allow only a portion of the street to be closed at one time. On collector and arterial streets, contractors may be required to bore and jack to place a new utility beneath the street surface.

### **6.03 MISCELLANEOUS CONSTRUCTION**

- A. Mail Boxes – The base of all mail boxes shall be a minimum of 12 inches from the edge of the pavement. Brick or other masonry support structures are not allowed. Contact the local post office for current recommendations regarding the height and offset of the face of the box. See Figure 6.1 for guidelines for installation of curbside mail boxes.
- B. Retaining Walls – Private retaining walls are not allowed within the public right-of-way without an agreement for temporary use of public right-of-way approved by the City Council.
- C. Monitoring Wells – Monitoring wells are allowed in the public right-of-way only when it can be shown that the wells cannot be located on private property. Monitoring wells are subject to special permit conditions.

### **6.04 CLEAR ZONES**

- A. On streets with curbs, the clear zone shall be 10' for four-lane facilities and 3' for two-lane facilities. On streets without curbs, the clear zone shall be 10' for two-lane and four-lane facilities.
- B. Variances to clear zone requirements will be considered for overhead electrical facilities where compliance will significantly impact existing trees. In no case will a clear zone of less than 18 inches be allowed. The City Engineer must approve a clear zone variance.

### **6.05 EXCAVATION AND BACKFILL:**

- A. Within public right-of-way, backfill shall consist of Class A crushed stone or suitable job excavated material placed in one foot lifts compacted to 90% Modified Proctor Density. If crushed stone is used, the top 12 inches of backfill shall consist of suitable job excavated materials. Flowable mortar may be used upon approval of mix design by the City Engineer. Backfill under pavement shall be compacted fill sand or road stone.

- B. In all other areas backfill shall consist of suitable job excavated material placed in one foot lifts and compacted to 85% Modified Proctor Density.

6.06 WORK AROUND TREES:

- A. Use care to prevent work within the drip lines of trees.
- B. When work falls within the drip lines of trees, contact the Public Works Director.

6.07 RESTORATION OF BRICK OR CONCRETE PAVER STREET SURFACE:

- A. Use care to salvage brick during excavation.
- B. Construct a 7 inch thick base of IDOT M-3 concrete. Allow enough depth of installation of brick on a bituminous setting bed.
- C. The setting bed shall be rolled to a nominal depth of  $\frac{3}{4}$ " while still hot.
- D. After the setting bed has cooled, a coating of 2% neoprene-modified asphalt adhesive shall be applied over the top surface of the setting bed. Bricks shall be placed on the bituminous setting bed making sure the pattern of elevation match the surrounding street.
- E. Sweep concrete sand or finer into joints.
- F. Sweep excess sand from paved surface and remove from site.

6.08 RESTORATION OF ASPHALT OVERLAY ON PORTLAND CEMENT CONCRETE STREETS:

- A. Construct a concrete base of the same thickness as was removed using M-3 mix. An IDOT type BT-3 joint shall be used to joint the base to the existing concrete. Use #5 epoxy coated bars, 24 inches in length, spaced 30 inches on center drilled and grouted 9 inches into the existing slab. The concrete base shall be flush with the existing concrete.
- B. Tack and place 3/8-inch Type A asphalt and compact to the proper elevation.

6.09 RESTORATION OF PORTLAND CEMENT CONCRETE STREETS:

- A. Concrete shall be removed to the nearest longitudinal joint and a minimum of half the panel between traverse joints. Only full or half panels may be removed. Full panels must be removed if the portion to remain is cracked and settled.
- B. Concrete shall be sawn to insure a clean break at the joints.
- C. An IDOT type BT-3 joint shall be used to joint to existing concrete. Use #5 epoxy coated bars, 24 inches in length, spaced 30 inches on center drilled and epoxied 9 inches into the existing slab for longitudinal joints, and the same except spaced 12 inches on center for transverse joints.
- D. Place new concrete of the same thickness as was removed using IDOT M-3 mix.
- E. All joints shall be sawn and sealed according to IDOT detail RH-51

6.10 OTHER SURFACES:

- A. All areas outside the paving which are disturbed shall be restored to their original condition.

- B. When approved by the governing authority, unimproved streets (rock or rock and oil, seal coated streets, or asphaltic concrete surfaced streets) may be repaired or restored with Bituminous Seal Coat consisting of one or more applications of Binder Bitumen with one or more successive applications of cover aggregate. Materials, Equipment and Construction methods shall be general conformity with Section 2307 of the current Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction.

6.11 MAINTENANCE

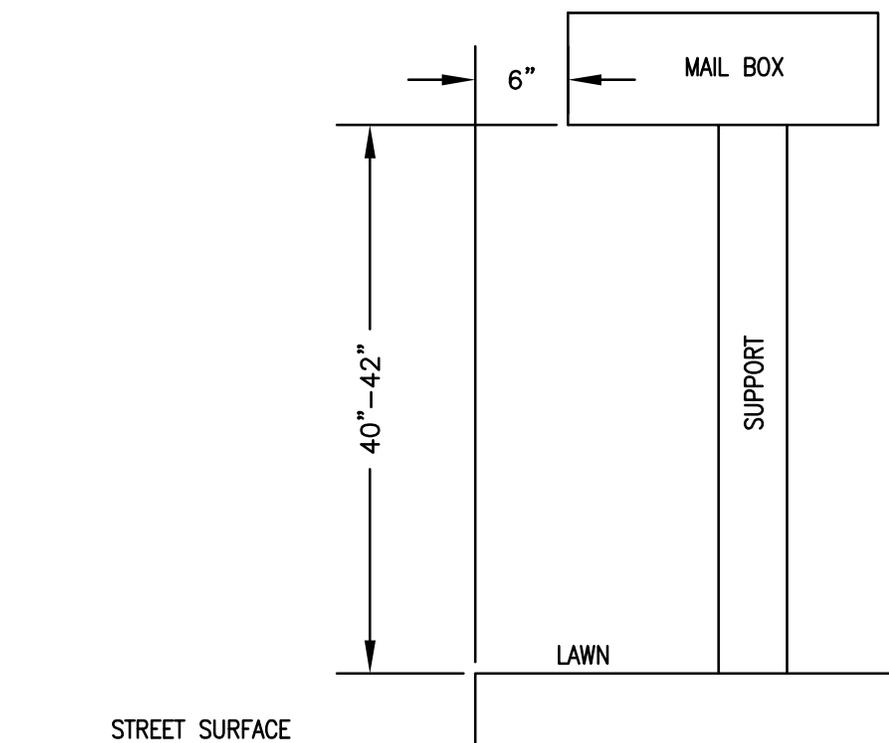
- A. Seeding or sodding of disturbed areas shall be maintained until water is no longer required for self-sustaining growth.
- B. The owner of the utility will be responsible for repair or maintenance of settle areas within the right-of-way and pavement repairs for a period of five years from the date the work is completed.

UNITED STATES POSTAL SERVICE  
WILLIAMSBURG, IA 52361-9998

THE BOTTOM OF THE MAIL BOX SHOULD BE FORTY TO FORTY-TWO INCHES ABOVE STREET SURFACE AND THE FRONT DOOR OF THE INSTALLED BOX SHOULD BE SIX INCHES BACK FROM THE EDGE OF THE CURB ADJACENT TO THE STREET SURFACE.

THE HOUSE NUMBERS MUST BE SHOWN ON THE SIDE OF THE BOX VISIBLE TO THE APPROACHING CARRIER AND ON THE HOUSE.

THE HOUSE NUMBERS MUST BE ON THE HOUSE FOR DELIVERY OF PACKAGES AND ACCOUNTABLE MAIL.



GUIDELINES FOR INSTALLATION OF  
CURBSIDE MAIL BOXES

FIGURE 6.1

## 7 - WATER DISTRIBUTION SYSTEM

### 7.01 APPROVALS, PERMITS, AS-BUILTS AND MAINTENANCE BONDS:

- A. Plans and specifications for public water distribution facilities must be certified by a professional engineer registered in the State of Iowa and utilize the NGVD of 1929.
- B. Plans and specifications for public water distribution facilities must be reviewed and approved by the City Engineer prior to construction.
- C. Plans and specifications for public water distribution facilities must be reviewed and approved by the Iowa Department of Natural Resources prior to construction. Other local, state, and federal permits may be required, depending on the circumstances. It shall be the responsibility of the Engineer of Record to acquire all applicable permits. A copy of all permits shall be provided to the City Engineer before construction.
- D. The Engineer of Record is responsible to submit "Record of Construction" drawings to the City Engineer and to City Hall on reproducible vellum or mylar and in an AutoCAD based digital format.
- E. A two-year maintenance bond covering defective materials and workmanship is required for all water main improvements.

### 7.02 DESIGN RESOURCES:

The design for water distribution facilities shall be in conformance with the following:

- A. Requirements and Standards of the Iowa Department of Natural Resources.
- B. City's Constructions Specifications.
- C. City's Plumbing Code.
- D. Conflict – In case of a conflict between the above design standards, the most restrictive requirement shall apply.

### 7.03 DEFINITIONS:

- A. A Distribution Main means a water pipe owned, operated, or maintained by the City which is used for the purpose of distribution of water and from which service connections are made.
- B. A Private Service Pipe means a water pipe installed, owned, operated, and maintained by the private consumer. Service pipes are often 1 inch in size for residential and may be 2 to 6 inch in size for commercial or 8 to 12 inches for large industrial applications.

### 7.04 CONSTRUCTION SPECIFICATIONS:

- A. Construction must comply with the City's standard construction specifications for water distribution facilities.

7.05 SYSTEM DESIGN:

- A. Size: All mains shall be a minimum of 6 inches in diameter. The Engineering Department has established a network of larger sized main that provides a grid system for fire flows and water demand. If a larger sized main is required in an area of new development, the developer is required to pay for the cost of an 8 or 12 inch diameter main and fixtures.
- B. Depth: Water main shall be installed with a minimum depth of cover of 5 ½ feet. Generally, the maximum depth shall not exceed 7 feet.
- C. Alignment:
  - 1. All mains shall be looped, except for short runs to serve cul-de-sacs where the distance is less than 500 feet.
  - 2. Water mains shall be constructed such that no services shall be extended beneath the paving of the circular turnaround on cul-de-sacs.
  - 3. Water distribution mains will be extended to and through or across the frontage of all subdivisions and land development projects. Provisions will be made to connect water mains to serve future adjacent undeveloped land.
  - 4. Water mains will be located so the front of each property has access for a service connection.
- D. Changes in Alignment:
  - 1. Thrust restraints are required at all changes in alignment exceeding 10 degrees, at all dead ends, and on fire hydrants. Thrust restraints shall be constructed as shown in Figure 7.1. Wrap pipes and fittings in plastic before pouring thrust blocks.
  - 2. The maximum deflection at joints shall not exceed the pipe manufacturer's recommendations.
  - 3. Where there is considerable deflection of the water main materials required for either horizontal or vertical changes in alignment, ductile iron materials shall be used. PVC water main materials shall not be bent more than manufacturer's recommendations.
- E. Separation from Sewers:
  - 1. There shall be no physical connection between a public or private potable water supply system and a sewer appurtenance that would permit the passage of any sewage or polluted water in the potable supply.
  - 2. Under normal conditions, water mains parallel to sewers shall be placed at least 10 feet horizontally from any sanitary sewer, storm sewer, or manhole. Where local conditions prevent this separation, the water main may be laid closer provided the bottom of the water main is at least 18 inches above the top of the sewer and the water main is placed in a separate trench or in the same trench on a bench of undisturbed earth at a minimum horizontal separation of 3 feet from the sewer.
  - 3. Water mains crossing sewer services, storm sewers, or sanitary services shall be laid to provide a separation of at least 18 inches between the bottom of the water main and the top of the sewer. Where local conditions prevent this vertical separation, the water main shall not be placed closer than 6 inches above a sewer or 18 inches below a sewer under any circumstances. Additionally, one full length of water pipe crossing the sewer shall be centered at the point of crossing so that the water pipe joints will be equal distance as far as

possible from the sewer. The water and sewer pipes must be adequately supported and have pressure tight joints. A low permeability soil shall be used for backfill material within 10 feet of the point of crossing.

4. No water pipe shall pass through or come in contact with any part of a sewer manhole. A minimum horizontal separation of 3 feet shall be maintained.
5. A horizontal distance of at least 10 feet shall separate water mains from sewer force main unless:
  - a. The force main is constructed of water main materials meeting a minimum pressure rating of 150 psi and the requirements of Sections 8.2 and 8.4 of these standards, and:
  - b. The water main is laid at least four linear feet from the sewer force main.

F. Location of Valves:

1. Four-way connections will have 4 valves.
2. Three-way connections will have 3 valves.
3. Maximum valve spacing will be 800 feet in residential areas or 400 feet in commercial areas. Maximum spacing of 400 feet will apply to mains bordering both residential and commercial areas.
4. A valve shall be placed two pipe lengths from all dead-ends to allow the extension of the pipe without shutting off the existing system. Do not tap services in the final two sections.
5. Auxiliary valves shall be provided for all fire hydrants.
6. Valves shall be located as close as possible to tees and crosses.
7. Valves should not be located within paving whenever possible.
8. Steel posts shall be placed next to all valves not located within paving to provide a means for locating the valve.

G. Location of Fire Hydrants:

1. Fire hydrant spacing will be on an average distance of 400 feet. This average spacing will generally mean one hydrant for every block in residential, commercial, and industrial areas.
2. A fire hydrant will be required at the end of every cul-de-sac regardless of the proximity of a hydrant on the intersecting through street. The water main shall be extended a minimum of 5 feet past a lot line on a cul-de-sac before the hydrant assembly is installed.
3. A fire hydrant will be required at the end of all dead end lines.
4. Fire hydrants shall be installed at every street intersection regardless of proximity to other hydrants.
5. The location of fire hydrants may be modified at the request of the local jurisdiction's fire department.

6. Full fire hydrant assemblies are required to be installed in all cases. See Figure 7.2 for the definition of a fire hydrant assembly and typical installation guide.

H. Service Pipes:

1. Every building, including each unit of zero-lot-line residences, shall have a direct service connection to a public water main. The public works director has complete authority over design and installation of service pipes to the point where pipe connects to the building.
2. No water consumer shall construct water service pipes across lots or buildings to adjoining premises, but all service pipe shall be laid on streets, alleys or public ground to the premises to be served, and enter at the front or rear of the building nearest the main.
3. Such services pipe shall be laid in a straight line at right angles to the water main, and connection made within two lines drawn parallel to the side of the building to be served or not more than three feet outside of these sides.
4. Multiple stop boxes shall be permanently marked to identify the correct individual metered services.
5. See Figure 7.3 for typical water service installation.

7.06 MATERIALS:

General: All materials utilized in public water system installations shall be manufactured by an approved manufacturer and meet all applicable standards.

A. Ductile-Iron Pipe:

1. Thickness design shall conform to AWWA C150.
2. Manufacturer shall conform to AWWA C151.
3. Thickness class, unless otherwise indicated or specified, shall be Class 52.
4. Cement mortar lining shall conform to AWWA C104.
5. All ductile iron pipe 12" in diameter and larger shall be wrapped with a 8 mil polyethylene encasement in accordance with ANSI/AWWA C105/A21.5 installation methods.
6. Use single rubber-gasket push-on joints or mechanical joints conforming to ANSI/AWWA C111/A21.11. Furnish with all necessary hardware and gaskets.
7. Bell-and-spigot pipe joints conforming to ANSI A21.6 or ANSI 21.8.
8. For bolted/restrained mechanical joint, use Griffin Bolt-Lok restrained joint or approved equal.
9. For unbolted/restrained mechanical joint, use Griffin Snap-Lok restrained joint or approved equal.
10. Do not use drilled & tapped retainer glands.
11. Plain end push-on pipe factory machined to a true circle and chamfered to facilitate fitting gasket.

B. Polyvinyl Chloride (PVC) Pipe:

1. Allowed for use in sizes 6 to 18 inch, except where noted otherwise in the specifications.
2. PVC pipe design shall conform to AWWA C900 and all pipe shall have the same outside dimensions as ductile-iron pipe.
3. Thickness class shall be DR 18 (Class 150)
4. PVC pipe materials shall not be used in any area where there is likelihood the pipe will be exposed to significant concentrations of pollutants comprised of low-molecular-weight petroleum products or organic solvents or their vapors.
5. PVC water main shall be marked with an isolated wire for the entire length to make electronic location possible.
  - a. The insulation shall be protected to prevent accidental grounding. Make few splices, and where necessary, wrap the bare wire with electrical tape.
  - b. The wire shall be installed continuously as the pipe is backfilled. The wire shall be fixed to the side of the pipe at a position of 2 o'clock or 10 o'clock and attached with duct tape every 5 feet.
  - c. Bring the wire to the ground surface at each fire hydrant. Leave 18 inches of wire exposed. If there is no fire hydrant within 500 feet, bring the wire to the surface in a valve box and mark the drawings appropriately.
6. Where there is evidence there will be considerable underground construction or several large diameter service taps or connections, ductile iron pipe materials will be used.
7. Where there is considerable deflection of the water main materials required for either horizontal or vertical changes in alignment, ductile iron materials shall be used. PVC water main materials may not be deflected more than manufacturer's recommendations. PVC water main joint deflections shall be limited to manufacturer's recommendation.

C. Polyethylene (P.E.) Service Lines:

1. P.E. service lines shall meet requirements of AWWA C901 and ASTM D2239 and be minimum 1" inside diameter, double wall with clear polyethylene inside wall, black polyethylene outer wall, and rated for 200 psi.
2. Pipe marking shall be continuous along the length of pipe at intervals not to exceed 5' and include:
  - a. Normal size and OD base.
  - b. Material code designation number
  - c. Dimension ratio (SDR) number
  - d. AWWA pressure class
  - e. Applicable AWWA designation number (AWWA C901).
3. P.E. service lines shall have flared end tube joints with USAS (ASA) A40.2 flared cast brass, flared nuts, for each tube end, Anaconda, Nibco or Engineer approved equal. An approved pipe compound shall be applied to threaded fittings.
4. P.E. service lines shall have unions provided for all connections to ferrous and plastic piping: Ecoff Products Company "EPCO" or Engineer approved equal.

5. Corporation stops: Ford Type F600, A.Y. McDonald Manufacturing Company, Mueller Company, Clow or Engineer approved equal.
6. Curb stops: Ford B21-333 Flared Connection; or Engineer approved equal.
7. Curb stop service box complete with lid, 2 hole Erie pattern (5601-L), Minneapolis – 5612 or Engineer approved equal.

D. Copper Service Lines:

1. Copper service lines shall be a minimum 1" diameter seamless annealed copper, Type K, conforming with ASTM B-88.
2. Copper service lines shall have flared tube joints with USAS (ASA) A40.2 flared cast brass, flared nuts, for each tube end, Anaconda, Nibco or Engineer approved equal. An approved pipe compound shall be applied to threaded fittings.
3. Copper service lines shall have dielectric unions provided for all connections to ferrous piping: Ecoff Products Company "EPCO"d or Engineer approved equal.
4. Corporation stops: Ford Type F600, A. Y.McDonald Manufacturing Company, Mueller Company, Clow or Engineer approved equal.
5. Curb stops: Ford B21-333 Flared Connection or Engineer approved equal.
6. Curb stop service box complete with lid, 2 hole Erie pattern (5601-L), Minneapolis - 5612 or Engineer approved equal.

E. Fittings:

1. Restraining tees are required.
2. All fittings shall conform to ANSI/AWWA C110/A21.10, with pressure rating of class 250.
3. Mechanical-joint fittings shall be ductile iron compact C153/A21.53 or ductile standard C110/A21.10. Large fittings, 12-inch through 20-inch shall be ductile iron standard C110.A21. Swivel tees shall be ductile iron stand C110.A21.10. Where ductile iron is not available (i.e. offsets) cast iron standard C110.A2 shall be provided.
4. All fittings shall be Class 250, shall be bituminous coating inside and outside, and shall be furnished complete with necessary accessories including plain rubber gaskets, ductile iron glands, bolts and nuts. Verify the gasket seats are not made irregular by improper application of the lining materials.

F. Valves & Valve Boxes:

1. Gate valves shall conform to AWWA C509. Use full line size resilient seat gate valves with epoxy or polymer lining. Use Clow or Waterous valves, with 200 psi working pressure and gaskets rated at 250 psi. The waterway must be a full sized waterway. Valves shall be capable of being repacked or replacing O-rings under pressure.
2. Valves shall open left and be furnished with a 2" square operating nut. Use Cor-Ten steel.
3. Valve boxes shall be American Flow Control Trench Adapter.

G. Hydrants:

Specification standard: AWWA Standard C502  
Acceptable manufacturers and model: Waterous Pacer  
Type of construction: Break flange or break bolt

H. Special Fittings:

1. The Public Works Director must approve special pipe fittings.
2. Special fittings must be the same diameter, thickness, and pressure class as standard fittings.
3. Special fittings shall be manufactured to meet requirements of same specifications as standard fittings except for laying length and types of end connection.
4. Retaining spools may be used.
5. Cast iron tapping sleeves shall be Mueller or Clow. Stainless steel may be required in acidic soils where extra strength is required.
6. Stainless steel tapping sleeves shall be epoxy coated with ductile-iron flange and shall be compatible with Mueller or Clow tapping valves. Sleeves shall be Smith-Blair 662.
7. Tapping sleeves for 12" or 18" shall be ductile iron or CASI. The outlet of the tap shall not be greater than ½ of the diameter of the pipe tapped.

G. Sleeve Type Couplings:

1. Standard solid black sleeves shall be Tyler 5-144L or approved equal.

H. Gaskets, Bolts, and Nuts:

1. Mechanical joints made with:
  - a. Bolts: ¾ inch Cor-ten steel
  - b. Bolt studs with nut on each end
2. All thread rod used to restrain fittings shall be stainless steel and ¾" diameter.

I. Service Taps:

1. All service taps shall be made with an epoxy coated, double band, stainless steel tapping saddle, Rockwell or approved equal.
2. Contractors installing taps larger than 2-inch diameter must be approved by the Water Department.

7.07 INSTALLATION:

- A. All water main installations shall be inspected during construction by the Water Department or a City Representative.

7.08 BEDDING AND BACKFILL:

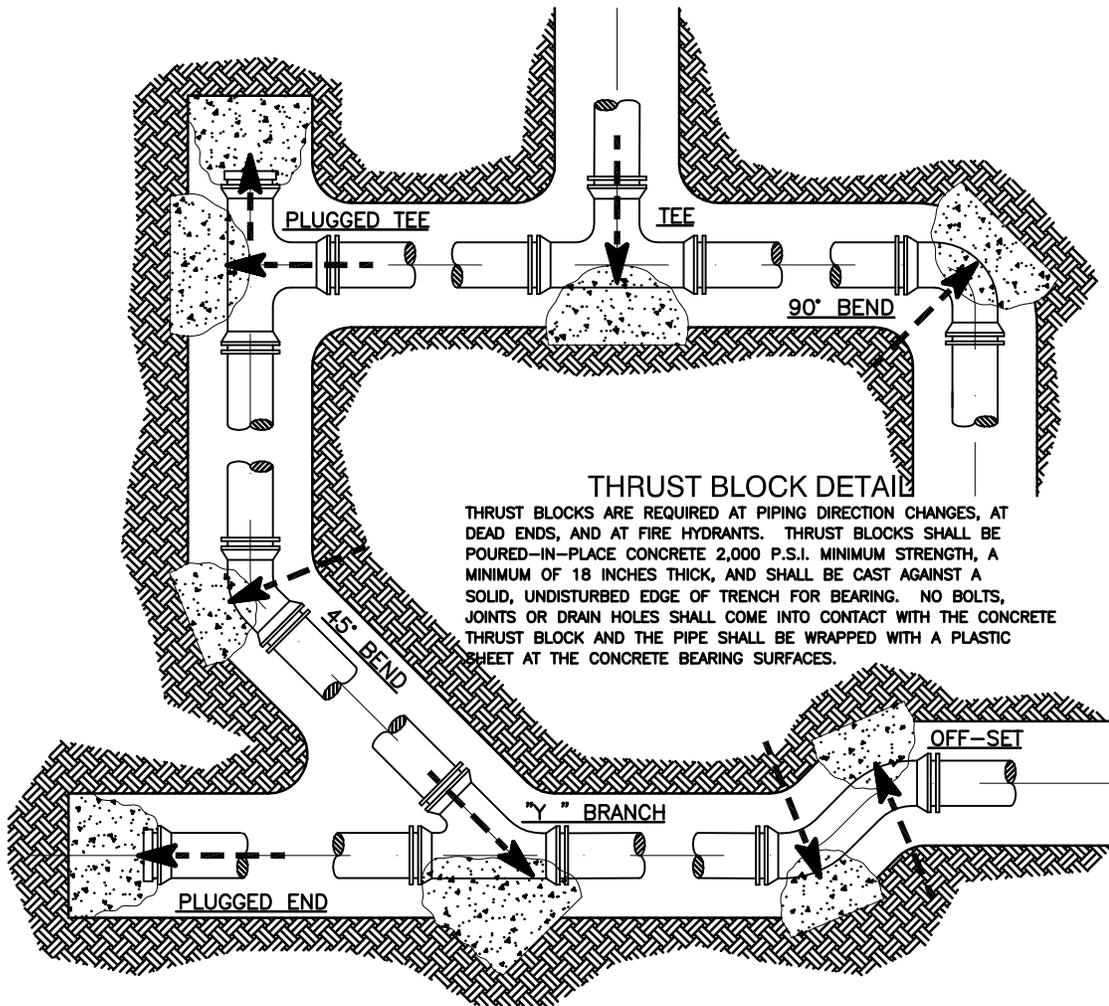
- A. All mains shall be bedded with sand from a minimum depth of 4 inches below, and up to, the spring line of the main.
- B. Within public right-of-way, backfill shall consist of native material placed in one foot lifts compacted to 90% Modified Proctor Density. If crushed stone is used, the top 12 inches of backfill shall consist of suitable job excavated materials. See City's construction specifications for type of crushed stone. Flowable mortar may be used upon approval of mix design by the City Engineer. Clean fill sand or crushed road stone is required as backfill under pavement. Backfill must be compacted to 90% Modified Proctor Density.
- C. At hydrant installations, use ¾-inch ballast.
- D. In all other areas, backfill shall consist of suitable job excavated material placed in one foot lifts and compacted to 85% Modified Proctor Density.

7.09 PERFORMANCE AND TESTING:

- A. Bacterial test for coli form organisms shall be performed by the contractor in accordance with AWWA C601. These tests shall be taken at a minimum spacing of 1,000 feet. A minimum free residual chlorine concentration of 10mg/l shall be maintained for the 24-hour disinfection period. The contractor shall provide documentation of bacterial tests from a certified laboratory. The Water Department may require additional testing beyond the amount specified above if required to assure safe drinking water. Test results shall be submitted to the Engineering and Water Departments.
  - 1. Pressure and leakage test in accordance with AWWA C600.
  - 2. Valves shall be located and tested to verify operation.
  - 3. Fire hydrants shall be tested to verify operation.
  - 4. Flow tests shall be conducted to verify that all components of the water system are fully open and operations and to determine fire flow capacity.

7.10 LOCATION OF EASEMENTS:

- A. All public water mains should be located within the public right-of-way. In rare exceptions, dedicated easements may be used for location of water main outside of public right-of-way.
- B. To limit damage to structures in the event of a main break, water mains shall be placed a minimum distance of 1.5 times the depth from building setback lines. Greater separations are desirable.
- C. All water mains outside public right-of-way shall be placed in an easement for operation and maintenance. Easement width from the center of the pipe shall generally be 1.0 times the pipe depth rounded up to the nearest 5 feet.
- D. The minimum easement width is 15 feet.



### THRUST BLOCK QUANTITIES (SQUARE FEET)

PIPE SIZE	DEAD END OR TEE	90° BEND	45° BEND	11-1/4 BEND	22-1/2 BEND
4"	1.4	1.9	1.0	1.0	1.0
6"	2.8	4.0	2.1	1.1	1.0
8"	4.8	6.8	3.7	1.9	1.0
10"	7.3	10.3	5.8	2.8	1.4
12"	10.3	14.5	7.9	4.0	2.0
16"	17.8	25.2	13.6	7.0	3.5
20"	27.5	38.9	21.0	10.7	5.4
24"	39.2	55.5	30.0	15.3	7.7
30"	60.3	85.3	46.2	23.5	11.8
36"	86.4	122.2	66.1	33.7	16.9
42"	116.6	165.0	89.3	45.5	22.9
48"	152.0	215.0	116.3	59.3	29.8
54"	192.1	271.6	147.0	74.9	37.6

THE ABOVE AREAS ARE BASED UPON A SOIL BEARING CAPACITY OF 2000 PSF OF UNDISTURBED SOIL. IF ACTUAL SOIL BEARING STRENGTH IS LESS THAN 2000 PSF, THE THRUST BEARING AREA SHALL BE INCREASED BASED ON ACTUAL SOIL BEARING STRENGTH.

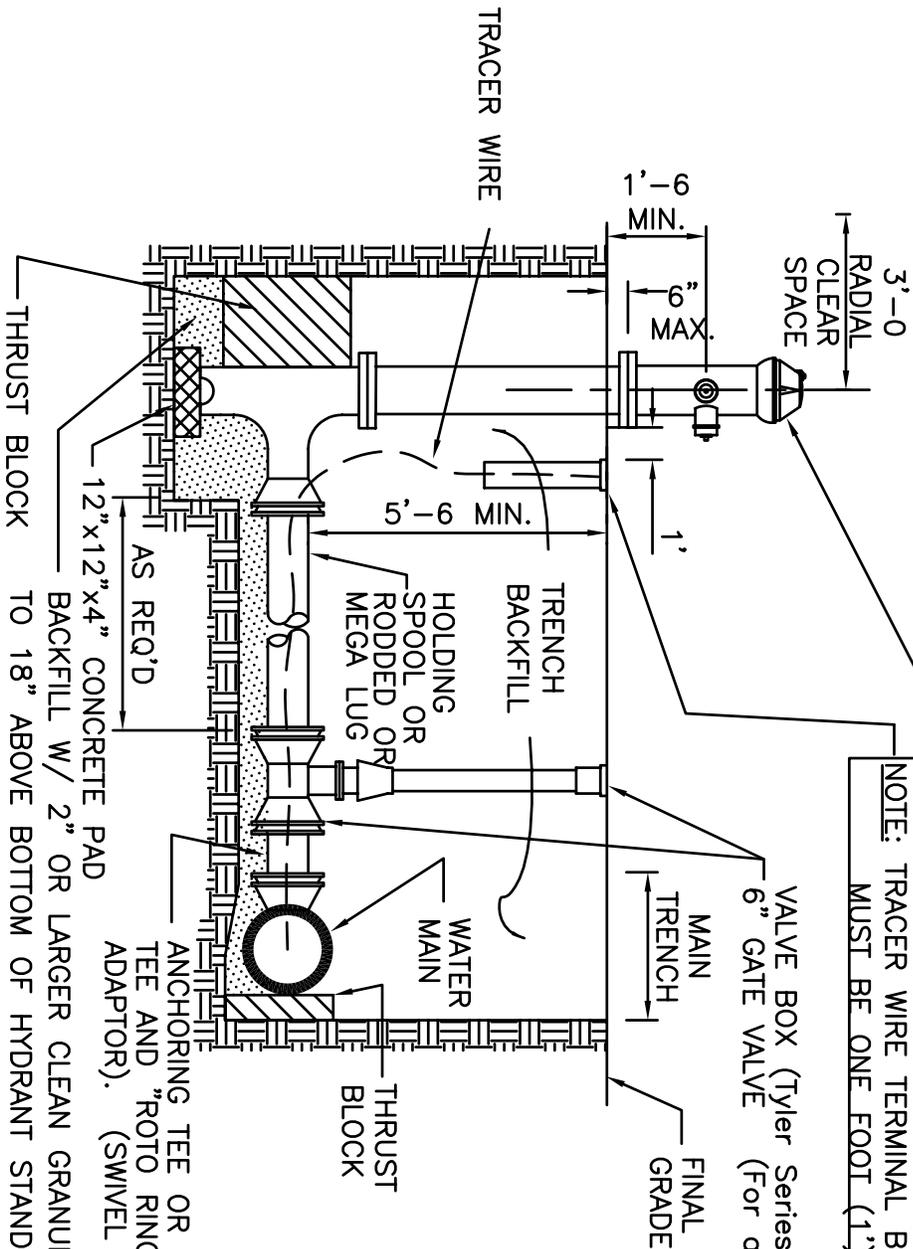
## THRUST BLOCK BEARING AREA (in square feet) (FIGURE 7.1)

HYDRANT  
(For approved Brands—see list @ right)

VALVCO 95E-TRACER WIRE TERMINAL BOX (DAYLIGHT BOX)

2- $\frac{1}{2}$ " I.D. — LOCKABLE C.I. LID

NOTE: TRACER WIRE TERMINAL BOX (DAYLIGHT BOX) MUST BE ONE FOOT (1') AWAY FROM HYDRANT



VALVE BOX (Tyler Series 6855 and Item 666A) AND  
6" GATE VALVE (For approved Brands—see list below)

HYDRANTS:	4 $\frac{1}{2}$ " for 12" Dia. MAINS or smaller
	5 $\frac{1}{4}$ " for 16" Dia. MAINS or larger
	Clow F-2545 Medallion
	Kennedy Guardian K-81
	Mueller Super Centurion 250
	American Darling MK-73 for 4 1/2" or
	B84-B for 5 1/4"
GATE VALVES:	
	Clow F-6100
	Kennedy 1571-X
	Mueller Resilient Seat-A-2360-20
	American Flow Control AFC-500
	U.S. Pipe Metro Seal 250 #5460

THRUST BLOCK  
12"x12"x4" CONCRETE PAD  
BACKFILL W/ 2" OR LARGER CLEAN GRANULAR FILL  
TO 18" ABOVE BOTTOM OF HYDRANT STAND PIPE

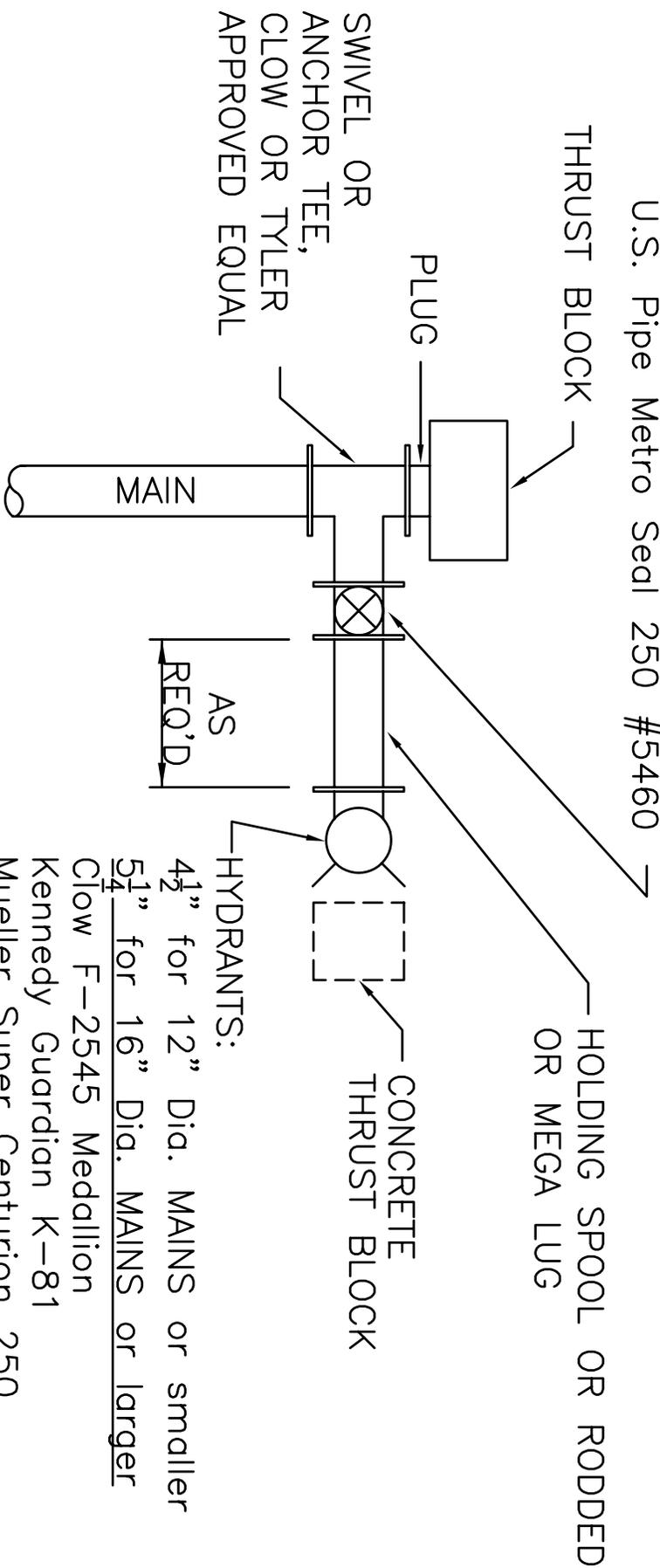
THRUST BLOCK

ANCHORING TEE OR STANDARD  
TEE AND "ROTO RING" (SWIVEL  
ADAPTOR). (SWIVEL TEE PREFERRED)

TYPICAL HYDRANT & VALVE ASSEMBLY  
(Fig 7.2)

GATE VALVES:

- Clow F-6100
- Kennedy 1571-X
- Mueller Resilient Seat-A-2360-20
- American Flow Control AFC-500
- U.S. Pipe Metro Seal 250 #5460



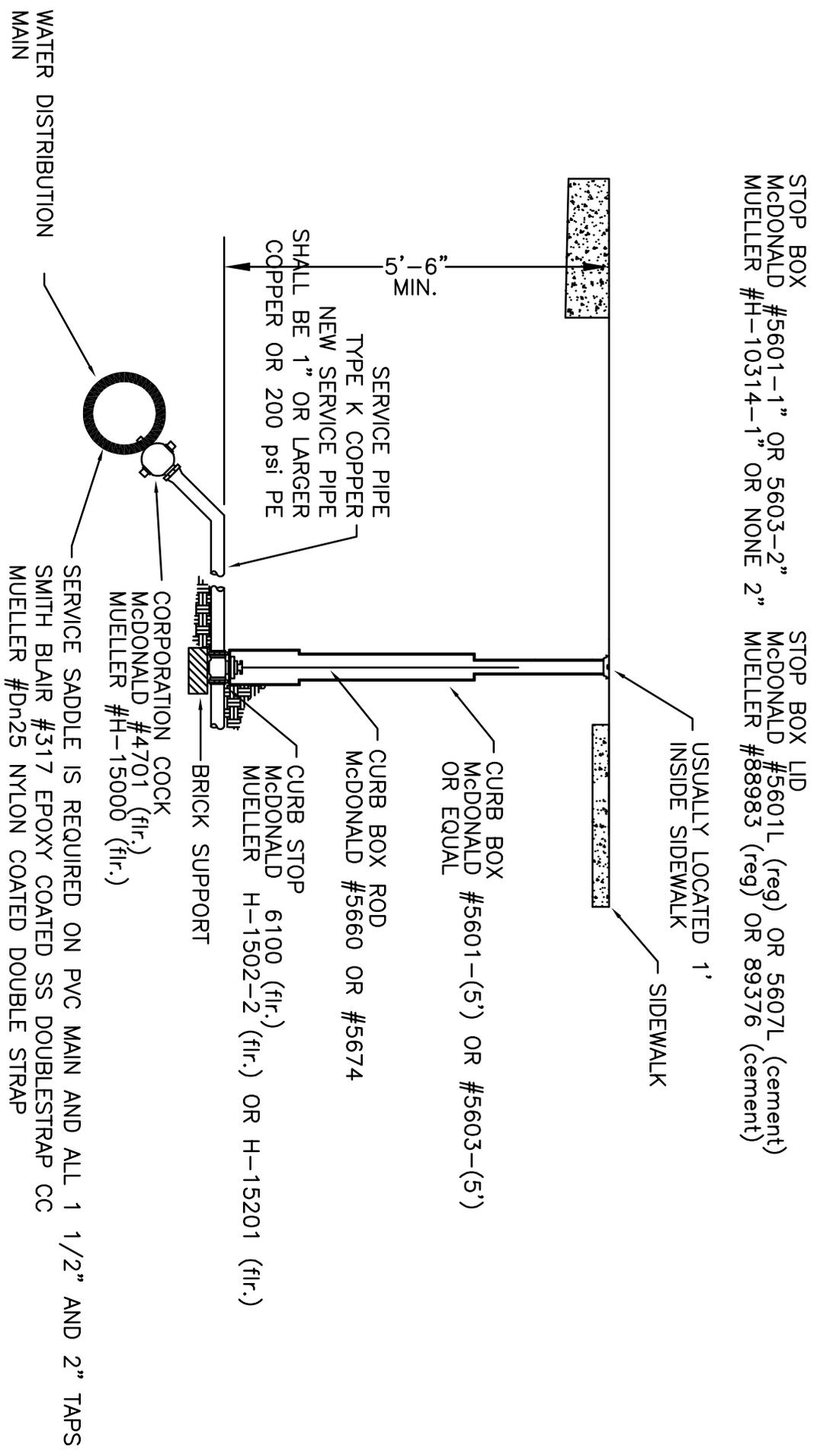
- HYDRANTS:
- 4 $\frac{1}{2}$ " for 12" Dia. MAINS or smaller
  - 5 $\frac{1}{4}$ " for 16" Dia. MAINS or larger
  - Clow F-2545 Medallion
  - Kennedy Guardian K-81
  - Mueller Super Centurion 250
  - American Darling MK-73 for 4 1/2" or B84-B for 5 1/4"

**DEADEND HYDRANT DETAIL**

**(Fig. 7.3)**

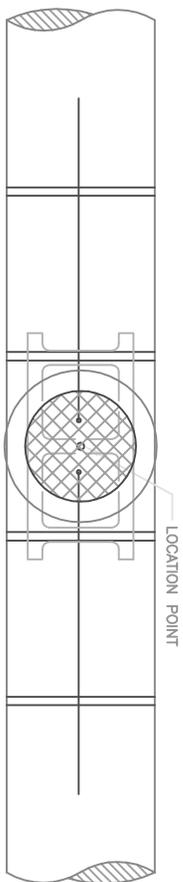
NOT TO SCALE





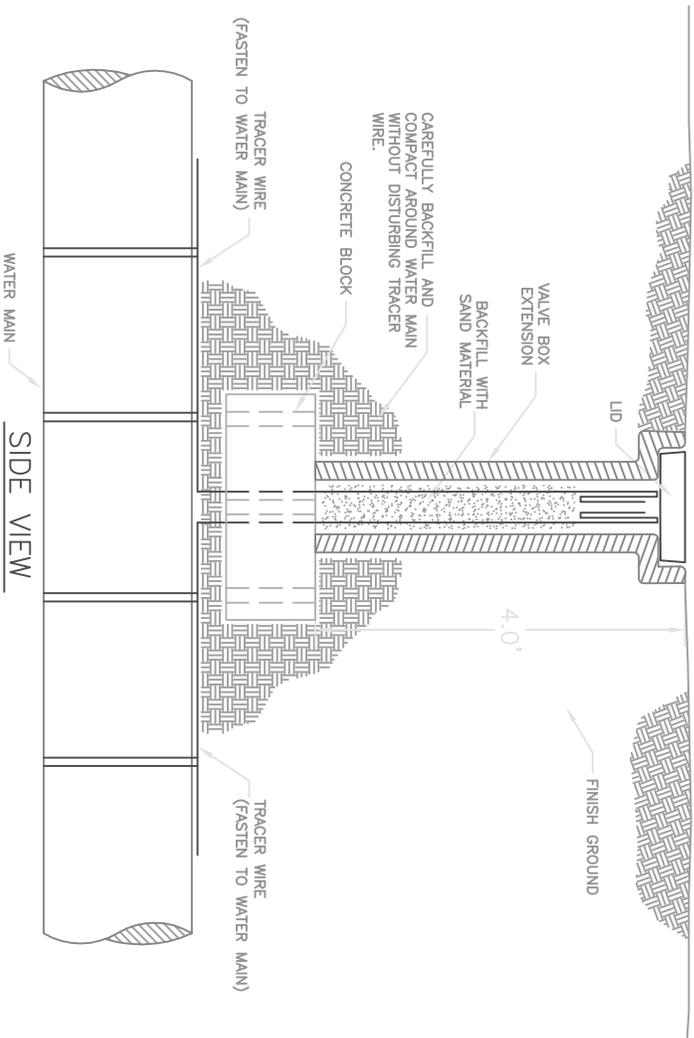
**WATER SERVICE**

(Fig. 7.5)



PLAN VIEW

- NOTES:
1. FASTEN TRACER WIRE TO WATER MAIN.
  2. VALVE BOX EXTENSION SHALL NOT SIT DIRECTLY ON TOP OF WATER MAIN.
  3. EXTEND TRACER WIRE 3.0' BEYOND TOP OF VALVE BOX EXTENSION. PLACE EXCESS TRACER WIRE INSIDE OF VALVE BOX EXTENSION AND INSTALL LID.
  4. USE EXTREME CAUTION NOT TO DAMAGE TRACER WIRE WHILE BACKFILLING AND COMPACTING.



SIDE VIEW

# TYPICAL DETAIL TRACER WIRE DAYLIGHT

SCALE: NOT TO SCALE

(Fig. 7.6)

## 8- SANITARY SEWERS

### 8.01 APPROVALS, PERMITS, AS-BUILTS AND MAINTENANCE BONDS:

- A. Plans and specifications for public sanitary sewer facilities must be certified by a professional engineer registered in the State of Iowa and utilize the NGVD of 1929.
- B. Plans and specifications for public sanitary sewer facilities must be reviewed and approved by the City Engineer prior to construction
- C. Plans and specifications for public sanitary sewer facilities must be reviewed and approved by the Iowa Department of Natural Resources prior to construction. Other local, state and federal permits may be required, depending on the circumstances. It shall be the responsibility of the Engineer of Record to acquire all applicable permits. A copy of all permits shall be provided to the City Engineer before construction.
- D. The Engineer of Record is responsible to submit "Record of Construction" drawings to the City Engineer and to City Hall on reproducible vellum or mylar and in an AutoCAD based digital format and shall include the horizontal and vertical locations of services.
- E. A two-year maintenance bond covering defective materials and workmanship is required for all sanitary sewer facilities.

### 8.02 DESIGN RESOURCES AND REFERENCES:

The design for sanitary facilities shall be in conformance with the following:

- A. Requirements and Standards of the Iowa Department of Natural Resources.

### 8.03 PERMITTED FLOWS AND CONNECTIONS:

- A. No combined sewers shall be constructed. Sanitary and storm sewers shall be kept separate.
- B. Only sewage shall be permitted in the sanitary sewers. Footing drains, downspouts, sump pumps, etc., conveying clear water will not be allowed to discharge into the sewer system. Air conditioning condensation water may be allowed in the sanitary sewer.
- C. Flows from commercial car washes must be discharged to the sanitary sewer after passing through approved oil and sediment traps.
- D. Each building shall have a direct connection to a public sewer.

### 8.04 DESIGN FLOWS AND CAPACITY:

- A. Peak rates will be taken as approximately 2.5 times the normal flow. Infiltration will be calculated by the addition of 100 gallons per capita per day.

B. The peak wet weather flows for various land usage area as follows; adjust the peaking factor for communities less than 10,000:

1. Single Family Dwellings  
(100 gal/ca/day) x 2.5 (peak factor) +  
1200 gal/acre day (infiltration) = 250 gpcd + infiltration  
Assume 3.5 people/home
2. Mobile Homes  
(50 gal/cap/day) x 2.5 (peak factor) +  
1200 gal/acre day (infiltration) = 125 gpcd + infiltration  
Assume 2.5 people/home
3. Multi Family Dwellings  
(75 gal/cap/day) x 2.5 (peak factor) +  
1200 gal/acre day (infiltration) = 187 gpcd + infiltration  
Assume 1.5 people/bedroom
4. Motels and Hotels  
(50 gal/cap/day) x 2.5 (peak factor) +  
1200 gal/acre day (infiltration) = 125 gpcd + infiltration  
Assume 1.5 people/room
5. Schools, without cafeteria or showers  
(10 gal/cap/day) x 2.5 (peak factor) +  
1200 gal/acre day (infiltration) = 25 gpcd + infiltration
6. Schools, with cafeteria or showers  
(20 gal/cap/day) x 2.5 (peak factor) +  
1200 gal/acre day (infiltration) = 50 gpcd + infiltration
7. Office Buildings  
(10 gal/cap/day) x 2.5 (peak factor) +  
1200 gal/acre day (infiltration) = 25 gpcd + infiltration  
Assume 1 person/200 sq. ft.
8. Light Industrial  
(14,000 gal/acre/day) x 2.5 (peak factor) +  
1200 gal/acre day (infiltration) = 36,200 gpad

gpcd = gallons per capita per day  
gpad = gallons per acre per day

- C. If a proposed sewer is to serve a predominantly wet area or an area prone to excessive infiltration and inflow, special design information should be obtained from the City Engineer. If no information is available, the designer should use a minimum of 1000 gpcd for infiltration.
- D. All sanitary sewers shall be a minimum of 8 inches in diameter.
- E. Pipes will be sized to carry peak rates with the pipe flowing at no more than 0.67 of the pipe diameter for pipes 15" and smaller and 0.75 of the pipe diameter for pipes larger than 15" in diameter.
- F. All sewers shall have a slope which will give a mean velocity when flowing full of not less than 2.0 feet per second based on Manning's formula using an "n" value of 0.013.

- G. Where velocities greater than 15 feet per second are calculated, special provisions shall be made to protect against displacement, erosion or shock.
- H. Sanitary sewers shall be sufficiently deep so as to receive sewage by gravity from basements and to prevent freezing.

8.05 SERVICE CONNECTIONS:

- A. A sanitary service pipe will be provided for every platted lot or location where construction of a building is likely. A 4-inch sanitary service pipe will be used for single-family residential. Pipes for multi-family residential, commercial, or industrial, will be sized as required. Services must not cross adjacent property frontage.
- B. Sanitary service pipes will be extended from the main to the right-of-way line or outer utility easement line, whichever is further.
- C. No two sanitary services shall be constructed in the same trench. Service connections shall be separated by a minimum of 6 feet.
- D. The end of all sanitary services shall be marked with a metal post or #4 reinforcing steel at least 24 inches in length buried within one foot of the finished grade.
- E. Service taps in manholes are allowed only in extreme conditions and with the approval of the City Engineer. If permitted, service connections to manholes must be between 6" and 12" above the invert elevation of the outlet. Sewer flow channels in the manhole bottom must be provided for all services. Internal drops for service connections may be permitted on manholes deeper than 12 feet upon approval of the City Engineer. Internal drops shall be constructed of SDR 23.5 PVC with stainless steel bands and fasteners spaced at a maximum of 4 feet.

8.06 PIPE STANDARDS AND STRENGTH DESIGN:

- A. Reinforced concrete pipe manufactured in accordance with ASTM C-76 and meeting the following standards may be used for pipe 12 inches in diameter or larger.
  - 1. Joints: All joints will be confined O-ring gasket meeting ASTM C443. All pipe 36-inch diameter and smaller will have bell and spigot joints. Pipe larger than 36-inch diameter may have tongue and groove joints.
  - 2. Wall Thickness: Minimum wall thickness will be B-wall as defined in ASTM C 76.
  - 3. The required pipe strength and bedding requirements shall be calculated on a case-by-case basis. The minimum pipe strength shall be Class III as defined in ASTM C 76.
  - 4. Pipe Markings: All pipe shall be marked with the date of manufacture and ASTM class. If quadrant reinforcement is used, the top shall be marked on the outside of the pipe.
  - 5. No lift holes.
  - 6. Hydrogen sulfide shall be considered in the design of concrete pipe sewers downstream from lift stations.
- B. Ductile iron pipe manufactured in accordance with ANSI/AWWA-C150/A21.50 and ANSI/AWWA-C151/A21.5A and meeting the following standards may be used.
  - 1. Joints: Use push on gasketed joints.
  - 2. Thickness: Use Class 52 ANSI standard unless a thicker wall is required because of depth.

3. Lining and Coating:
  - a. Inside of pipe and fittings: Double thickness cement lining and bituminous seal coat conforming to ANSI/AWWA-C104/A21.4.
  - b. Outside of other pipe and fittings: Standard bituminous coating conforming to appropriate ANSI Standard.
  
- C. Polyvinyl chloride (PVC) manufactured in accordance with ASTM D3034-88 and meeting the following standards may be used for 4-inch and 6-inch services.
  1. Joints: ASTM D3212 gasketed.
  2. All 4: and 6" services shall be SDR 23.5.
  
- D. Polyvinyl chloride (PVC) manufactured in accordance with ASTM D3034-88 and meeting the following standards may be used for 8-inch in diameter and larger sanitary sewer mains.
  1. Joints ASTM D3212 gasketed.
  2. All mains shall be SDR 35.
  3. All mains shall be crushed stone encasement to 6" above top of pipe.
  
- E. The designer shall specify pipe material, bedding and trench width to withstand anticipated dead and live loads. Minimum pipe and bedding standards are listed in Table 8.1.

TABLE 8.1 MINIMUM PIPE AND BEDDING STANDARDS\*

PIPE MATERIAL	SIZE	JOINT	MINIMUM STRENGTH	MINIMUM BEDDING*
<u>Sanitary Sewers</u>				
*Reinforced Concrete	12" & up	See Para. A	Class III, B wall	Class B
*Ductile Iron	8" & up	Gasket, push	Class 52	Class B
*PVC	8" & up	Gasket, push	SDR 35	Crushed stone encasement 6" above top of pipe
<u>Sanitary Service</u>				
*PVC	4" & 6"	Gasket	SDR 23.5	Crushed stone encasement 6" above top of pipe
*DIP	4" & 6"	Gasket	Class 52	Class B

\* See Figure 8.4.

- F. Locator Wire
  1. All force mains shall be marked with an insulated wire for the entire length to make electronic location possible.
    - a. The insulation shall be protected to prevent accidental grounding. Make few splices, and where necessary, wrap bare wire with electrical tape.
    - b. The wire shall be installed continuously as the pipe is backfilled. The wire shall be fixed to the side of the pipe at the 2 o'clock or 10 o'clock position and attached with duct tape every 5 feet.

- c. Bring the wire to the ground surface at each manhole. Leave 18 inches of wire exposed.

#### 8.07 MANHOLE STANDARDS:

##### A. Manholes shall be located as follows:

1. At the end of each line.
2. At all changes in grade, size, or alignment.
3. At all intersections of pipes.
4. At distances not greater than 400 feet for sewers 15 inches or less in diameter and 500 feet for sewers 18 inches to 30 inches in diameter. Greater spacing may be permitted in larger sewers.
5. Pipe shall enter at bottom of manhole and a concrete channel poured across the bottom of the manhole.

##### B. Drop Connections:

1. Drop connections are generally discouraged.
2. An external drop pipe shall be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert.
3. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert shall be filleted to prevent solids deposition.
4. Drop connections are allowed only within public street rights-of-way. Exceptions will be reviewed on a case-by-case basis and granted only if hardship can be proven.

##### C. Minimum Drop Across Manholes:

1. For the same size pipe with a change in alignment of 45° or less, no drop is required.
2. For the same size pipe with a change in alignment of greater than 45°, or junction of two inflow pipes, a 0.2' drop is required.
3. For the same size pipe with a junction of three or more inflow pipes, a 0.3' drop is required.
4. When a smaller sewer joins a larger one, the invert of the larger sewer shall be lowered sufficiently to match the 0.8 depth point of both sewers at the same elevation.

##### D. Bedding: All manholes shall be placed on a minimum of 6 inches of crushed stone bedding.

##### E. Materials:

1. Joints: All joints will be confined O-ring gasket meeting ASTM C443.
2. No lift holes through the entire wall.
3. Mark date of manufacture.

4. Inverts: Precast inverts must provide manufacture installed A-lock gaskets and a channel at least one-half the depth of the pipe and match the full cross-sectional area of the pipe. All junctions and changes in directions of inverts shall be smooth and rounded to the maximum extent possible to supplement flow through the manholes.
  5. Diameter: The minimum diameter for manholes is 48 inches for pipe 21 inches in diameter and smaller, and 60 inches for pipe greater than 21 inches in diameter.
  6. Castings shall be Neenah R-1670 or Deter 1270, machined and gasketed. The lid shall be self sealing, water tight and Type C cope with 2 concealed pick holes.
- F. Standard manholes, step details, drop connections and risers are shown in Figures 8.1, 8.2 and 8.3.
- G. All manholes shall be marked with two metal fence posts, immediately following installation, to remain in place until landscaping is complete. In subdivisions, the posts shall remain in place until the lot owner has completed landscaping.
- H. An interior or exterior Cretex manhole chimney seal (or approved equal) shall be installed that spans from the casting ring to the cone section on all sanitary manholes. Generally exterior in green space and interior in pavement installations.
- I. Manholes are not allowed to be located within sidewalks. Manholes located within street paving shall have a three piece casting and lid, Neenah R-1673-A or an interior Cretex manhole chimney seal (or approved equal) that spans from the casting ring to the cone section.
- J. The top of rim elevation of manholes located outside of the public right-of-way shall be constructed a minimum of 1 foot above the final surrounding ground elevation. This shall not apply to manholes located in a front yard. The manholes shall be constructed of barrel sections, cone sections and castings only.
- K. The top of rim elevations for manholes located in the 100 year flood plain shall be a minimum of 1 foot above the 100 year flood elevation. The manholes shall have bolt down castings, interior chimneys, if above grade, and no spacer rings.
- L. Concrete or HDPE spacer rings, and metal shims shall be the only materials utilized to adjust manhole frame elevations. Maximum height of adjustment with spacer rings is 18”.
- M. Any penetrations after new construction must be core sawed and have a Link Seal brand gasket installed.

#### 8.08 PROTECTION OF WATER SUPPLIES:

- A. There shall be no physical connection between a public or private potable water supply system and a sewer appurtenance that would permit the passage of any sewage or polluted water in the potable supply.
- B. Under normal conditions, water mains parallel to sewers shall be placed at least 10 feet horizontally from any sanitary sewer, storm sewer or manhole. Where local conditions prevent this separation, the water main may be laid closer provided the bottom of the water main is at least 18 inches above the top of the sewer and the water main is placed in a separate trench or in the same trench on a bench of undisturbed earth at a minimum horizontal separation of 3 feet from the sewer.
- C. Water mains crossing sewer services, storm sewers or sanitary sewers shall be laid to provide a separation of at least 18 inches between the bottom of the water main and the top of the sewer. Where local conditions prevent this vertical separation, the water main shall not be placed closer than 6 inches above a sewer or 18 inches below a sewer under any circumstances. Additionally, one full length of water pipe crossing the sewer shall be centered at the point of crossing so that the water pipe

joints will be equal distance as far as possible from the sewer. The water and sewer pipes must be adequately supported and have pressure tight joints. A low permeability soil shall be used for backfill material within 10 feet of the point of crossing.

- D. No water pipe shall pass through or come in contact with any part of a sewer manhole. A minimum horizontal separation of 3 feet shall be maintained.

#### 8.09 CREEK CROSSINGS:

- A. Sanitary sewers crossing creeks shall be Class 52 D.I.P. encased in reinforced concrete or steel casing pipe (smooth wall welded steel pipe, ASTM A139; minimum wall thickness 0.5 in.).
- B. Rip rap (min. 6-in. dia., 1 ft. thick) all disturbed creek banks and bottom after construction.

#### 8.10 BACKFILL AND BEDDING:

- A. Within right-of-way – backfill shall consist of Class A crushed stone placed in one foot lifts and compacted to 90% modified proctor density or suitable job excavated material placed in one foot lifts and compacted to 90% Modified Proctor Density. If Class A crushed stone is used, the top 12 inches of backfill shall consist of suitable job excavated materials. Flowable mortar may be used upon approval of mix design by the City Engineer. Sand backfill or compacted road stone backfill are required under all paved areas and are to be compacted to 90% Modified Proctor Density.
- B. In all other areas backfill shall consist of suitable job excavated material placed in one foot lifts and compacted to 95% Modified Proctor Density.
- C. The gradation of bedding material shall be compatible with surrounding soils to prevent migration of fines.
- D. See Table 8.1 and Figure 8.4 for pipe bedding requirements.

#### 8.11 PERFORMANCE & TESTING:

- A. All sewers and manholes will be mandrelled prior to acceptance.
- B. All sanitary sewers, including service pipes, will be air-tested using current ASTM standards prior to acceptance.
- C. All tests will be completed after backfill is complete.
- D. PVC Pipe shall have a deflection test conducted after the final backfill has been in place at least 30 days. No pipe shall exceed a deflection of 5%. If the deflection test is to be run using a rigid ball or mandrel, it shall have a diameter equal to 95% of the inside diameter of the pipe and the tests shall be performed without mechanical pulling devices.
- E. Pressure and leakage test shall be performed on all force mains in accordance with AWWA C600.

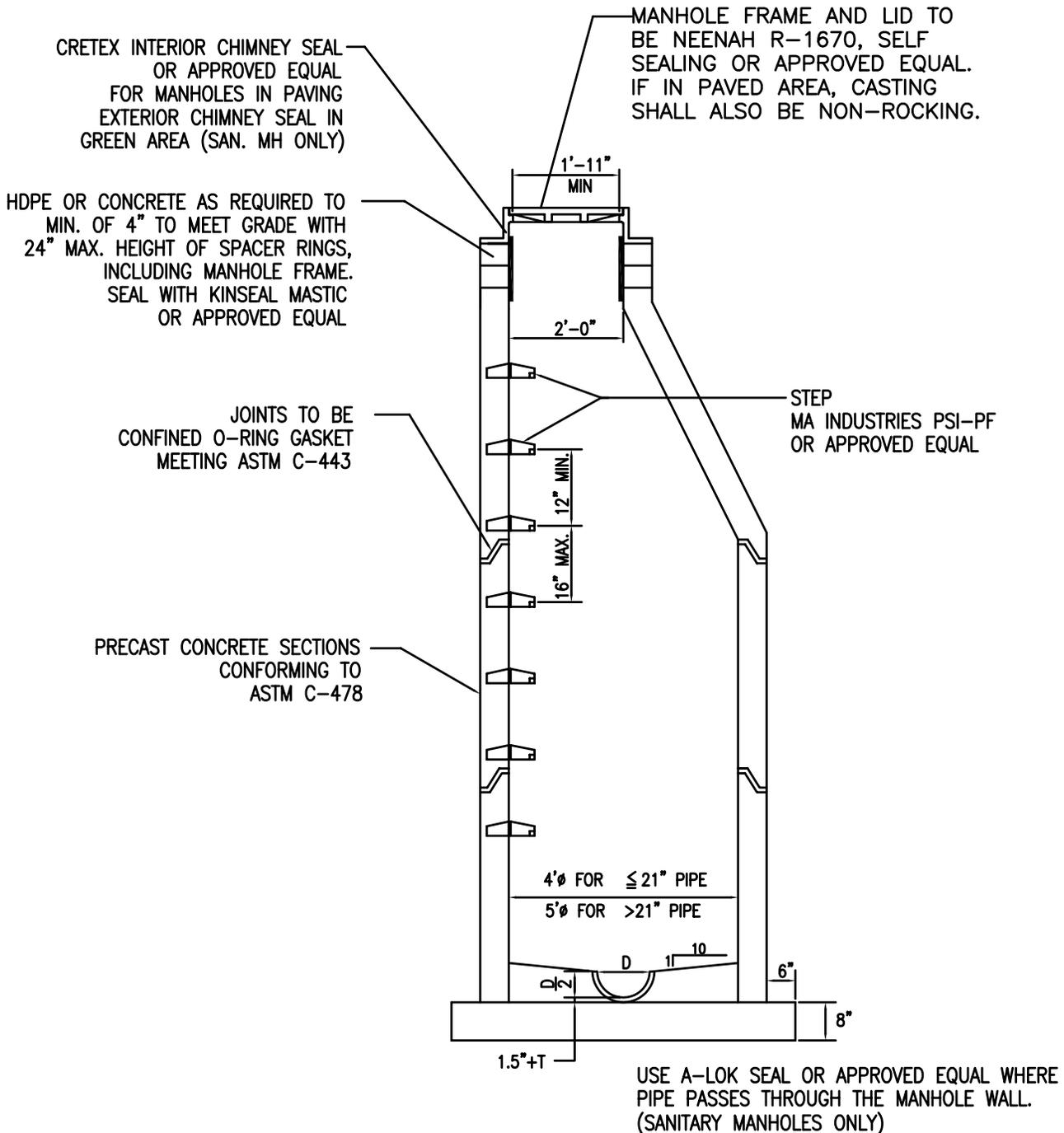
#### 8.12 SEWER LOCATION AND EASEMENTS:

- A. Manholes in street right-of-way must be located in areas that allow direct access by maintenance vehicles. Manholes in areas outside the street right-of-way shall be subject to the approval of the City Engineer in which case access to the manhole shall be along a route in which the transverse slope does not exceed 4% and longitudinal slope does not exceed 12%. Placement of sewers in front yards outside of the right-of-way is discouraged.
- B. Sewers shall be placed a minimum horizontal distance of 1.5 times the depth from potential or existing building sites. Greater separations are desirable.

- C. All sanitary sewers outside public right-of-way shall be placed in an easement for operation and maintenance. Easement width from the center of the pipe shall generally be 1.0 times the sewer depth rounded up to the nearest 5 feet.
- D. The minimum easement width is 15 feet.
- E. All sanitary sewers outside of public right-of-ways shall have a permanent hard surfaced access way constructed by the developer to provide access for maintenance activities. This access way shall be 10 feet wide, constructed of 6 inch thick PCC (or 5 inch thick PCC with fiber mesh) on a 6 inch thick compacted granular base.

8.13 LIFT STATIONS & FORCE MAINS:

- A. It is the City's intention and preference to have all extensions or additions to the sanitary sewer collection system be gravity sewer systems. If gravity sewer is not feasible, lift stations shall be designed to have regional service areas before the City will consider accepting the lift station.
- B. Telemetered alarm systems are required.
- C. Provisions for the connection of standby power or auxiliary pumping are required.
- D. Private and individual or multiple lift stations will be considered by the City, but are highly discouraged.
- E. All force mains shall have permanent post markers at all bends and transitions and the force main must have locator wire attached.



TYPICAL

SANITARY SEWER AND STORM SEWER MANHOLE

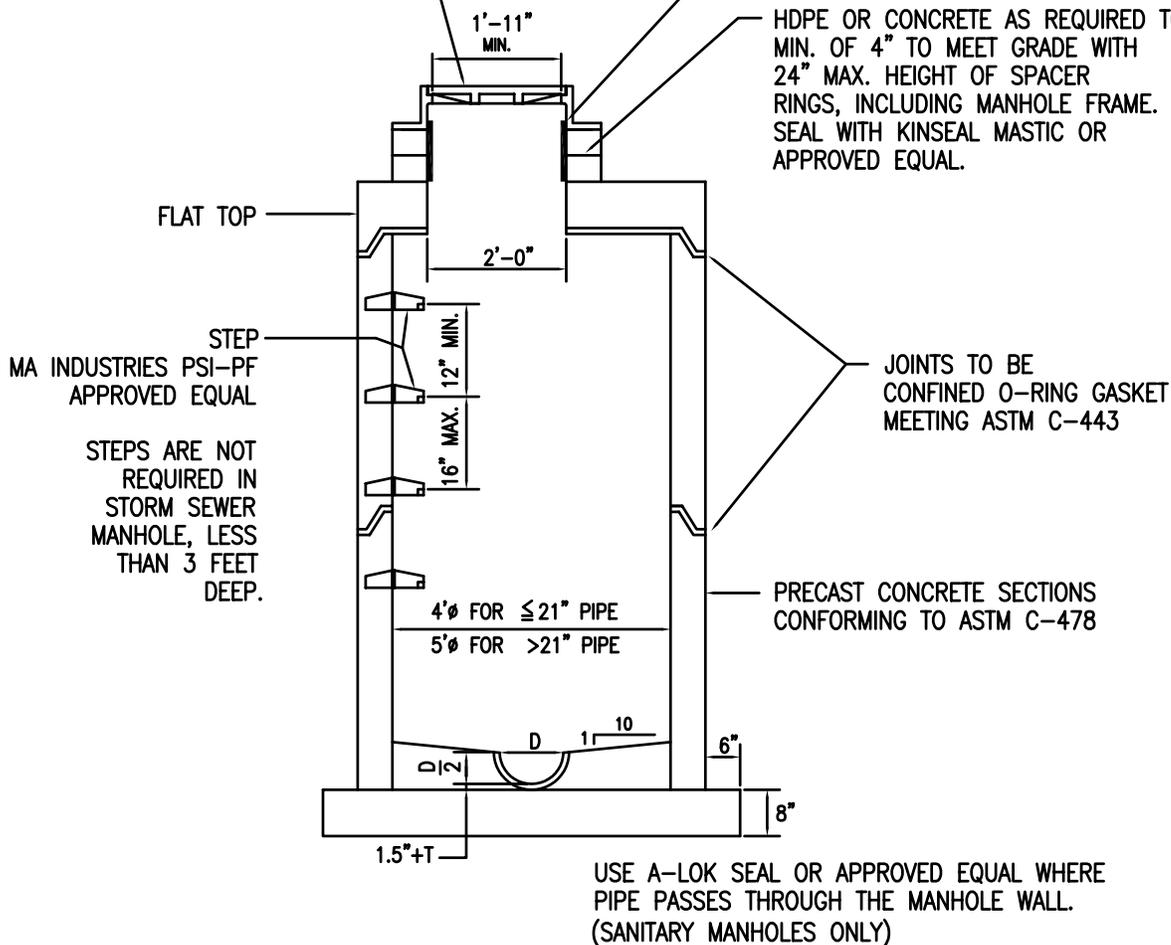
GREATER THAN 6' IN DEPTH

FIGURE 8.1

MANHOLE FRAME AND LID TO BE NEENAH R-1670, SELF SEALING OR APPROVED EQUAL. IF IN PAVED AREA, CASTING SHALL ALSO BE NON-ROCKING.

CRETEX INTERIOR CHIMNEY SEAL OR APPROVED EQUAL FOR MANHOLES IN PAVING EXTERIOR CHIMNEY SEAL IN GREEN AREA (SAN. MH ONLY).

HDPE OR CONCRETE AS REQUIRED TO MIN. OF 4" TO MEET GRADE WITH 24" MAX. HEIGHT OF SPACER RINGS, INCLUDING MANHOLE FRAME. SEAL WITH KINSEAL MASTIC OR APPROVED EQUAL.

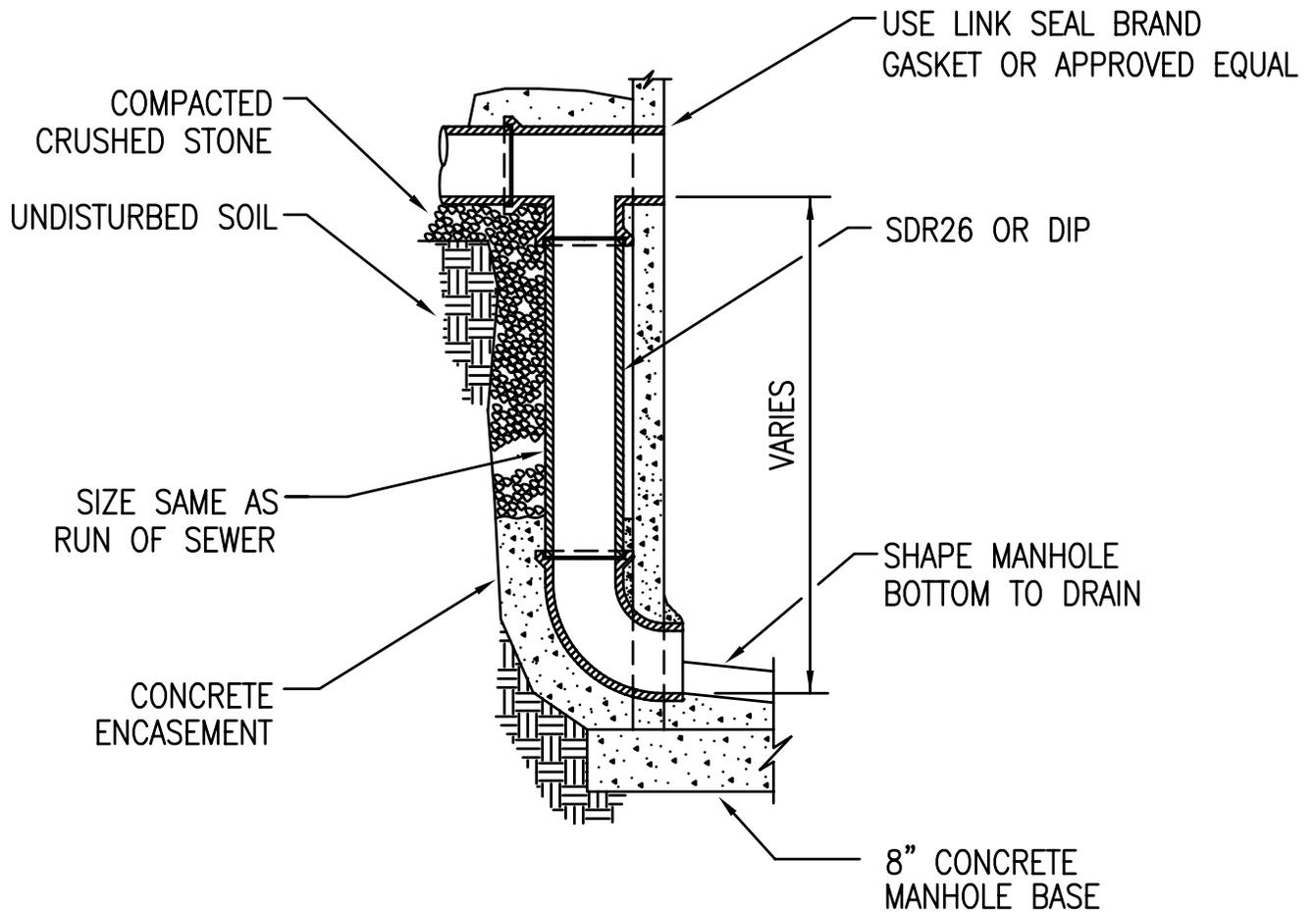


TYPICAL

SANITARY SEWER AND STORM SEWER MANHOLE

6' OR LESS IN DEPTH

FIGURE 8.2

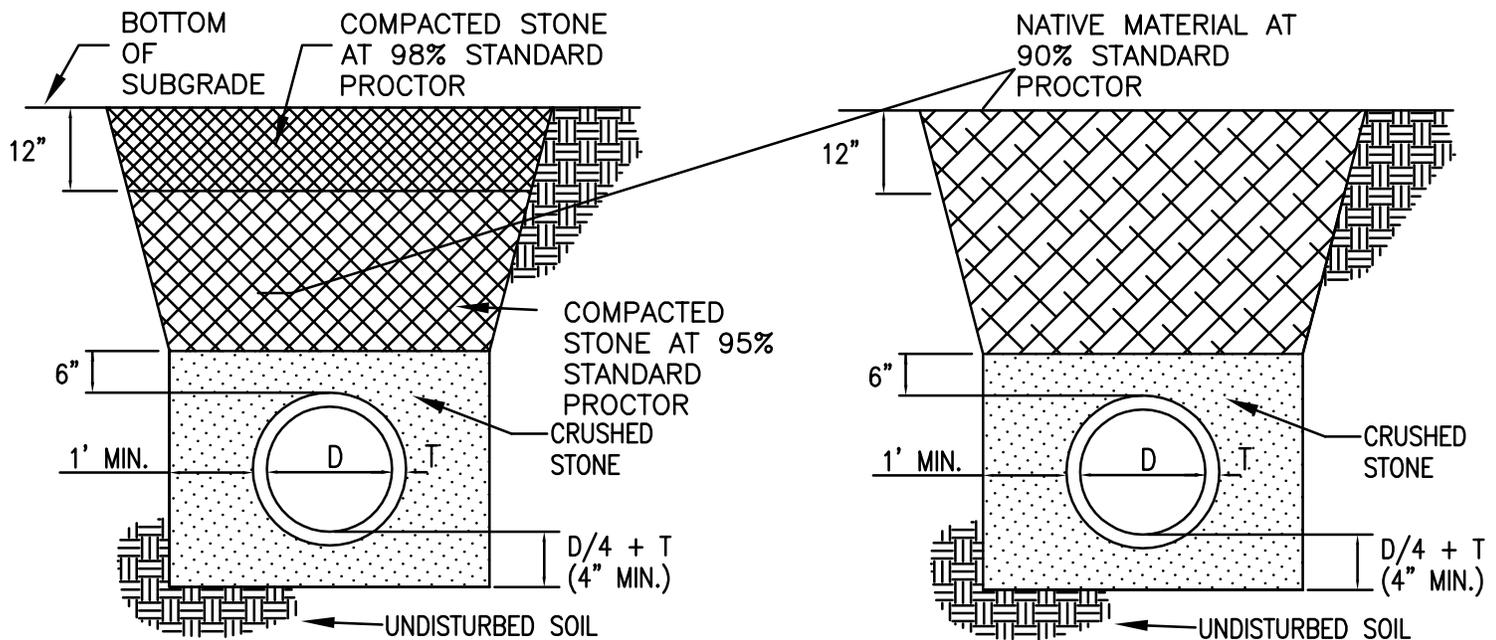


### NOTES

1. MINIMIZE DISTANCE TO UNDISTURBED SOIL AROUND DROP CONNECTION.
2. DROP CONNECTION TO BE USED FOR ALL PIPE ENTERING MANHOLES MORE THAN 24" ABOVE OUTLET PIPE.
3. FOR GENERAL DIMENSIONS OF MANHOLE, SEE TYPICAL MANHOLE DRAWING.

### SANITARY DROP CONNECTION

## FIGURE 8.3

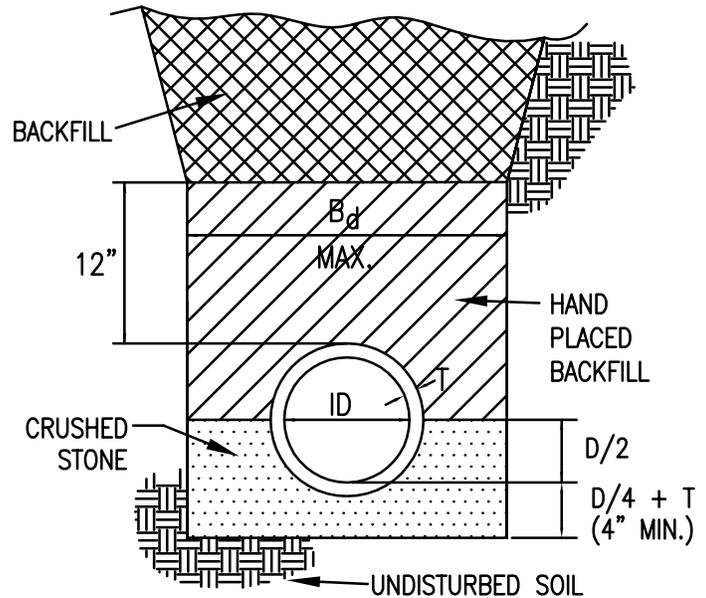


**CRUSHED STONE ENCASEMENT  
BEDDING AND BACKFILL UNDER PAVED AREA  
SEE NOTE 2**

**CRUSHED STONE ENCASEMENT  
BEDDING & BACKFILL  
SEE NOTE 2B**

ID INCHES	B <sub>d</sub> FEET & INCHES	ID INCHES	B <sub>d</sub> FEET & INCHES
4	2-0	30	4-3
6	2-0	36	4-9
8	2-3	42	5-6
10	2-3	48	6-3
12	2-3	54	7-0
15	2-9	60	7-9
18	3-0	66	8-6
21	3-3	72	9-3
24	3-6	78	10-0
27	4-0	84	10-9

**ALLOWABLE TRENCH WIDTHS**



**CLASS "B" BEDDING**

**NOTES**

1. PIPE SHALL BE PLACED ON CRUSHED STONE MATERIAL

2. MATERIALS AND COMPACTION:

A.) PAVED AREAS: UNDER AND WITHIN 5 FEET OF PAVED SURFACES, INCLUDING STREETS, SIDEWALKS AND DRIVEWAYS, BACKFILL SHALL BE CLASS A CRUSHED STONE PLACED IN ONE FOOT LIFTS COMPACTED TO 95% STANDARD PROCTOR DENSITY. THE TOP 12 INCHES DIRECTLY BELOW PAVED SURFACES SHALL BE CLASS A CRUSHED STONE COMPACTED TO 98% STANDARD PROCTOR DENSITY. IF UNDER PAVEMENT, BACKFILL TO BOTTOM OF THE SUBGRADE. IF NOT UNDER PAVEMENT, BACK FILL TO WITHIN 12 INCHES OF FINISHED SURFACE.

B.) ALL OTHER AREAS: BACKFILL SHALL CONSIST OF SUITABLE JOB EXCAVATED MATERIAL PLACED IN ONE FOOT LIFTS COMPACTED TO 90% STANDARD PROCTOR DENSITY. IF EXCAVATED MATERIAL IS UNSUITABLE, BACKFILL WITH CLASS A CRUSHED STONE TO WITHIN 12 INCHES OF FINISHED SURFACE.

3. BELL HOLES SHALL BE HAND SHAPED SO THAT ONLY PIPE BARREL RECEIVES BEARING PRESSURE.

4. PLACE BEDDING TO ENSURE THAT THERE ARE NO VOIDS UNDER OR ALONG THE LENGTH OF PIPE.

5. BACKFILL SHALL BE HAND TAMPED UP TO 12 INCHES ABOVE TOP OF PIPE.

6. SEE TABLE FOR ALLOWABLE TRENCH WIDTH B<sub>d</sub>.

**FIGURE 8.4**

## 9 - STORM SEWERS AND STORMWATER MANAGEMENT

### 9.01 APPROVALS, PERMITS, AS-BUILTS, AND MAINTENANCE BONDS:

- A. Plans and specifications for public storm sewer and stormwater management facilities must be certified by a professional engineer registered in the State of Iowa and utilizes the NGVD of 1929.
- B. Plans and specifications for public facilities must be reviewed and approved by the City Engineer prior to construction
- C. Other local, state and federal permits may be required, depending on the circumstances. It shall be the responsibility of the Engineer of Record to acquire all applicable permits. A copy of all permits shall be provided to the City Engineer before construction.
- D. The Engineer of Record is responsible to submit "Record of Construction" drawings to the City Engineer and to City Hall on reproducible vellum or mylar and in an AutoCAD based digital format.
- E. A two-year maintenance bond covering defective materials and workmanship is required for all storm sewer and stormwater management facilities, including riprap and channel erosion control measures, to be dedicated to the City.

### 9.02 PERMITTED FLOWS:

- A. No sanitary sewers, sanitary sewer services or septic tanks shall be discharged into storm sewers.
- B. No flows from commercial car washes shall be discharged into storm sewers.
- C. Sump pump discharge of ground and surface water is permitted. (See Figure 9-1) Developer is responsible for installing sump pump lines to storm water system.
- D. Only ground water is permitted in sump pump discharge tiles less than 12 inches in diameter. Roof drains are encouraged to be discharged into pavement subdrains or storm sewer pipe. Roof drains are not permitted to be discharged directly to street if subdrains or storm sewer system is accessible.

### 9.03 DESIGN FLOWS AND CAPACITY:

- A. Storm sewer systems consist of pipe and overland flow routes to convey stormwater. All storm sewer designs shall contain both components.
- B. Storm sewer pipes shall be designed to convey the five-year return frequency flow except for pipe used to discharge water from stormwater management facilities (see 9.12). If the five-year return frequency flow exceeds the capacity of a 48-inch pipe, open channel flow may be used in lieu of an enclosed system upon approval of the City Engineer. Generally, this will be approved only where a stream or creek exists.
- C. The overland flow route shall be designed to convey the 100-year return frequency flow assuming the pipe is inoperative. Such routes shall be designed to convey the flows with damage to property and shall be clearly designated on the construction drawings and final plat or site plan.
- D. All design flows shall be calculated using commonly accepted engineering practices appropriate for the size of the drainage area under consideration. All designs shall consider existing and fully developed conditions and use the larger of the two flows.

- E. The minimum size for any storm sewer receiving surface water is 15 inches in diameter, excluding stormwater management control structures. The minimum size for subsurface drainage pipes receiving only ground water and stormwater management control structures, is 6 inches in diameter.
- F. All storm sewer pipes shall have a slope which will give a mean velocity when flowing full of not less than 2.0 feet per second based on Manning's formula using a minimum "n" value of 0.013.
- G. Where velocities in a pipe are greater than 15 feet per second are calculated, special provisions shall be made to protect against displacement, abrasion or shock.
- H. All area intakes (excluding street intakes) shall include trash racks and be designed assuming 25% blockage by debris.
- I. The maximum slope for storm sewer outlet lines shall be 10%, with the final segment of the storm sewer outletting at a slope of 1% or less.
- J. If RCP is utilized for outlet lines having a slope greater than or equal to 8%, all joints must be tied together. The flared end section and last two pipe joints shall be tied together in all instances.
- K. All pipe outlets must extend to an existing, established drainage channel or property line. If there are no existing channels within the property being developed, the pipe outlets must be extended to the property lines and stilling basins constructed to dissipate the energy of the storm water discharge. The design of the stilling basins will be approved on a case-by-case basis.
- L. Storm sewer pipe outlets must be protected from erosion by rip rap over structural fabric.

9.04 OPEN CHANNEL FLOW:

- A. The erosion potential of the soil shall be evaluated with regard to anticipated velocities. Appropriate measures shall be taken to protect the soil and/or reduce velocities to prevent erosion.
- B. The channel capacity in conjunction with possible over-bank flow shall be designed to safely convey the 100 year return frequency flow. If over-bank flow is considered, its impact must be evaluated and area of conveyance protected by easement.

9.05 SUBSURFACE DRAINAGE:

- A. A subsurface drainage system, either storm sewer pipe or subdrains for pavement, shall be provided to receive the discharge from sump pumps as set forth in the Municipal Code for Williamsburg, Iowa in Chapter 123.
- B. A service connection manufactured specifically for the pipe being used and approved by the City Engineer shall be provided for each lot abutting the subsurface drainage system.
- C. The end of all sump pump services shall be marked with a metal post or #4 reinforcing steel at least 24" in length buried to within one foot of the finished grade.
- D. All sump pump services required a check valve to prevent back flow (see Figure 9-1).

9.06 INTAKES AND DRAINAGE OF STREETS:

- A. All intakes on public streets will be designed to the IDOT Type RA standards.
- B. DOT RA-16 intakes are allowed on storm sewer laterals.
- C. Intakes shall be spaced so that for a five (5) year storm arterial streets shall have two traffic lanes free of excess water at all times. Local and collector streets shall be designed to have one twelve (12) foot

traffic lane free of water. Storm water shall not cross an intersection but can follow a curb around its radius.

- D. For a one hundred (100) year storm, the ponding of surface water on local, collector and arterial streets must not exceed a depth of one (1) foot at the gutter. Water exceeding one (1) foot shall be designed to overflow into an overland flow route. This applies to temporary ponding from local drainage only.
- E. Streets in flood plains designated on the FEMA Flood Insurance Maps shall be elevated at their lowest point to the 100 year flood elevation.

#### 9.07 PIPE STANDARDS AND STRENGTH DESIGN:

- A. Reinforced concrete pipe meeting the following standards may be used for pipe 15 inches in diameter or larger.
  - 1. Joints:
    - a. Circular pipe: All joints will be confined O-ring gaskets meeting ASTM C443 or bell and spigot joints with mastic sealer and wrapped with 24 inches of filter fabric.
  - 2. Wall Thickness: Minimum wall thickness will be B-wall as defined in ASTM C 76.
  - 3. The required pipe strength and bedding requirements shall be calculated on a case-by-case basis. The minimum pipe strength shall be Class III as defined in ASTM C 76.
  - 4. Pipe Markings: All pipes shall be marked with the date of manufacture and ASTM class. If quadrant reinforcement is used, the top shall be marked on the outside of the pipe.
  - 5. No lift holes.
  - 6. All RCP shall be manufactured by an IDOT certified facility.
- B. Ductile iron pipe meeting the following standards may be used in rare situations and only approved by Engineer.
  - 1. Joints: Use push on gasketed joints.
  - 2. Thickness: Use Pressure Class 350 standard unless a thicker wall is required because of depth.
  - 3. Lining and Coating:
    - a. Inside of pipe and fittings: Double thickness cement lining an bituminous seal coat conforming to ANS A21.4.
    - b. Outside of other pipe fittings: Standard bituminous coating conforming to appropriate ANS Standard.
- C. Corrugated PVC with a smooth interior wall meeting the following standards may be used only under the conditions specified below:
  - 1. The pipe shall meet the standards of ASTM F949-90 constructed of resins meeting the requirements of ASTM D1784, cell class 12454B.

2. Size: 15" through 18".
  3. Joints: Gasketed.
  4. Perforated PVC pipe meeting the standards of paragraph 1 and 2 above may be used provided the pipe is surrounded by a freely draining aggregate or fabric shock.
  5. The City Engineer shall approve manhole connections.
  6. No corrugated PVC pipe shall be used within public right-of-way or with easements shared with other utilities except for subsurface drainage pipes.
  7. No corrugated PVC pipe shall be used where the pipe crosses easements use by other utilities.
- D. Subsurface Drainage Pipes meeting the following specifications may be used for subsurface drainage systems:
1. Corrugated PVC with a smooth interior wall meeting the standards of ASTM F949-90 constructed of resins meeting the requirements of ASTM D1784, cell class 12454B may be used for 6", 8" and 10" diameters.
  2. Corrugated HDPE with a smooth interior wall from a manufacturer approved by the City Engineer may be used for 6" diameter.
  3. All subsurface drainage pipes shall be perforated and shall be protected by freely draining aggregate placed around the pipe. Subsurface drainage pipes serving as pavement subdrains shall be surrounded by a freely draining aggregate that extends up to and contiguous with the aggregate base of the pavement.
- E. The designer shall specify pipe material, bedding and trench width to withstand anticipated dead and live loads. Minimum pipe bedding shall be Class B.
- F. See pipe bedding diagrams, Figure 8.4

#### 9.08 MANHOLE AND INTAKE STANDARDS:

- A. Manholes or intakes shall be located as follows:
1. At the end of each line.
  2. At all changes in grade, size, or alignment.
  3. At all intersections of pipes.
  4. At distances not greater than 400 feet for sewers 15 inches or less in diameter and 500 feet for sewers 18 inches to 30 inches in diameter. Greater spacing may be permitted in larger sewers.
  5. Flared end sections are required at all storm sewer line outlets.
- B. Minimum Drop Access Manholes
1. For the same size pipe with a change in alignment of 45° or less, no drop is required.
  2. For the same size pipe with a change in alignment of greater than 45°, or junction of two pipes, a 0.2' drop is required.

3. For the same size pipe with a junction of three or more pipes, a 0.3' drop is required.
  4. When a smaller sewer joins a larger one, the invert of the larger sewer shall be lowered sufficiently to match the 0.8 depth point of both sewers at the same elevation.
- C. Bedding: All precast manhole bases shall be placed on a minimum of 6 inches of crushed stone bedding.
- D. Materials:
1. Joints: All joints will be confined O-ring gaskets meeting ASTM C443.
  2. No lift holes through the entire wall.
  3. Mark Class and date of manufacture.
  4. Inverts: Precast and cast-in-place inverts must provide a channel at least one-half the depth of the pipe and match the full cross-sectional area of the pipe. All junctions and changes in directions of inverts shall be smooth and rounded to the maximum extent possible to supplement flow through the manholes.
  5. Diameter: The minimum diameter for manholes is 48 inches for pipe 24 inches in diameter and smaller, and 60 inches for pipe greater than 24 inches in diameter. 72" diameter manholes may be required for pipes greater than 36" in diameter. Reducers may be used above the chamber section of 60" and 72" manholes. Precast T's may be used on pipe 48" and larger in diameter.
  6. Castings shall be Neenah R-1670 non-rocking self-sealing or approval equal.
- E. Standard manholes, step details, and risers are the same as for sanitary sewers as shown in Figures 8.1, 8.2 and 8.3, except that Cretex chimney seals are not required.
- F. All manholes shall be marked with two metal fence posts to remain in place until landscaping is complete. In subdivisions, the posts shall remain in place until the lot owner has completed landscaping.
- G. Concrete spacer rings, metal shims and HDPE adjust rings shall be the only materials utilized to adjust manhole frame elevations. Mastic or grout must be used to bond and seal materials used for adjustment. Maximum allowable height adjustment with spacer rings is 18 inches.

#### 9.09 PROTECTION OF WATER SUPPLIES:

- A. There shall be no physical connection between a public or private potable water supply system and a sewer appurtenance that would permit the passage of any sewage or polluted water in the potable supply.
- B. Under normal conditions, water mains parallel to sewers shall be placed at least 10 feet horizontally from any sanitary sewer, storm sewer or manhole. Where local conditions prevent this separation, the water main may be laid closer provided the bottom of the water main is at least 18 inches above the top of the sewer and the water main is placed in a separate trench or in the same trench on a bench of undisturbed earth at a minimum horizontal separation of 3 feet from the sewer.
- C. Water mains crossing sewer services, storm sewers or sanitary sewers shall be laid to provide a separation of at least 18 inches between the bottom of the water main and the top of the sewer. Where local conditions prevent this vertical separation, the water main shall not be placed closer than 6 inches above a sewer or 18 inches below a sewer under any circumstances. Additionally, one full length of water pipe crossing the sewer shall be centered at the point of crossing so that the water pipe

joints will be equal distance as far as possible from the sewer. The water and sewer pipes must be adequately supported and have pressure tight joints. A low permeability soil shall be used for backfill material within 10 feet of the point of crossing.

- D. No water pipe shall pass through or come in contact with any part of a sewer manhole. A minimum horizontal separation of 3 feet shall be maintained.

#### 9.10 MINIMUM COVER AND BACKFILL AND BEDDING:

- A. The minimum cover for storm sewers shall be 1' below the bottom of pavements and 2' below the surface of non-paved areas. All shallow pipe shall be designed to withstand anticipated live loads.
- B. Within public right-of-way, backfill shall consist of crushed stone placed in one foot lifts and compacted to 90% Modified Proctor Density or suitable job excavated material placed in one foot lifts and compacted to 90% Modified Proctor Density. If crushed stone is used, the top 12 inches of backfill shall consist of suitable job excavated materials. Flowable mortar may be used upon approval of mix design by the City Engineer. Sand and crushed stone backfill are required under paved surfaces. Backfill must be compacted to 90% Modified Proctor Density.
- C. All other areas – backfill shall consist of suitable job excavated material placed in one foot lifts and compacted to 85% Modified Proctor Density.

#### 9.11 PERFORMANCE & TESTING:

- A. All sewers and manholes will be lamped and visually checked prior to acceptance.
- B. All tests will be completed after backfill is complete.
- C. All flexible pipe 15" in diameter and larger shall have a deflection test conducted after the final backfill has been in place for at least 30 days. No pipe shall exceed a deflection of 5%. The deflection test is to be run using a rigid ball or mandrel having a diameter equal to 95% of the inside diameter of the pipe and the tests shall be performed without mechanical pulling devices.

#### 9.12 SEWER LOCATION AND EASEMENTS:

- A. Manholes in street right-of-way must be located in areas that allow direct access by maintenance vehicles. Manholes in areas outside the street right-of-way shall be subject to the approval of the City Engineer in which case access to the manhole shall be along a route in which the transverse slope does not exceed 4% and longitudinal slope does not exceed 12%.
- B. Sewers shall be placed a minimum horizontal distance of 1.5 times the depth from potential or existing building sites. Greater separations are desirable.
- C. All storm sewers outside public right-of-way shall be placed in an easement for operation and maintenance. Easement width from the center of the pipe shall generally be 1.5 times the sewer depth rounded up to the nearest 5 feet.
- D. The minimum easement width is 15 feet.
- E. Drainage easements for overland flow shall be of sufficient width to contain the 100-year flow and as a minimum shall include the bottom width and side slopes of the drainage and any necessary overbank areas.

9.13 STORMWATER MANAGEMENT FACILITIES:

A. Thresholds:

1. Stormwater management will be required for all new subdivisions and resubdivisions of residential developments larger than 3 acres in size and for commercial and industrial developments larger than 3 acres in size.
2. In developments where the natural drainage is divided into more than one watershed, the individual watershed drainage areas must meet the criteria mentioned in A.1 above before stormwater management is required. However, the designer has to account for the stormwater runoff, which may include easements from downgrade property owners, to ensure public safety and not create property damage.
3. No stormwater management facilities are required if stormwater runoff from a development, up to and including the 100 year storm, can be piped or conveyed in its entirety directly to Old Man's Creek provided:
  - a. It can be shown by hydrograph analysis that the runoff from the subdivision will arrive at Old Man's Creek sufficiently ahead of the peak flow on Old Man's Creek so as not to increase the peak flow on said creek  
and
  - b. Flows from the subdivision can be safely conveyed to Old Man's Creek without significant adverse impact to intervening properties.

Similar waivers of stormwater management requirements may be considered on other watersheds on a case-by-case basis.

B. Detention Requirements:

1. New developments that require stormwater management shall be required to detain the difference in the volume between the five-year undeveloped storm and the 100-year developed storm events for their development sited. For redevelopment of a site that does not presently have stormwater management. The undeveloped condition shall be calculated assuming pasture conditions.
2. The maximum release rate for detention calculations shall be the five-year undeveloped storm.

C. Methodology:

7. The SCS TR-20 computerized runoff volume program or other technically proven method shall be used to determine the volume of runoff that must be detained.
8. The results of these calculations, including with a design summary, shall be submitted on a standardized form that shall include all of the individual parameters that the designer inputs into the program.

D. Locational Criteria:

1. Regional stormwater management facilities are encouraged and may be required.
2. Regional stormwater management facilities that are of sufficient size may be deeded to and maintained by the City. The conditions for City ownership will be reviewed on a case-by-case basis.

3. Stormwater detention is not allowed within any front or side yard setbacks required by building code, or within 25 feet from the estimated back building line.

E. Design Considerations:

1. Dry-bottomed detention facilities shall be oversized by 10% to help offset anticipated sedimentation prior to total watershed development.
2. Maximum side slopes of dry bottom facilities shall not exceed 3.5:1.
3. Low flow pipes are required to convey low flows from storm sewer outlets to the detention facility outlet structure. Low flow pipes shall be a minimum of 12 inches in diameter unless it can be shown that the bottom of the detention facility will remain dry. Low flow pipes shall be slotted and bedded in freely draining aggregate. Alternate methods of subsurface drainage may be proposed.

## 10- SITE GRADING AND EROSION CONTROL

### 10.01 APPROVALS AND PERMITS

- A. Site grading and erosion control plans must be certified by a professional engineer, architect, or landscape architect registered in the State of Iowa.
- B. Site grading and erosion control plans must be reviewed and approved by the City Engineer.
- C. Other local, state and federal permits may be required, depending on the circumstances of the project. It shall be the responsibility of the registered design professional of record to acquire all applicable permits. A copy of all permits shall be provided to the City Engineer prior to the start of construction.

### 10.02 THRESHOLDS

- A. Stockpiling of granular construction material in excess of 5000 cubic yards on any site other than where permitted by State Law will require a site grading and erosion control plan.
- B. Grading a site for new subdivisions will require a site grading and erosion control plan.
- C. Grading or disturbing a site with a total area of 50,000 square feet will require a site grading and erosion control plan.

### 10.03 REQUIREMENTS

- A. Goals of the Site Grading and Erosion Control Plan.
  - 1. To protect the site from the significant loss of soil and topsoil due to erosion.
  - 2. To protect downstream properties and facilities from deposition of sediments.
  - 3. To protect onsite facilities and public improvements from damages due to erosion.
  - 4. To protect water quality.
- B. Grading Design Standards:
  - 1. In general, property shall be graded so that it drains to an approved piping or drainage system or street approved by the City Engineer. Alternative drainage will only be allowed where, due to existing topography, street drainage would be very difficult to achieve or would not be feasible.
  - 2. All proposed developments shall be graded so that storm water discharge is directed away from proposed building sites to a City approved piping system, to swales in drainage easements along property lines, to public rights-of-ways, or to another City approved drainage course.
  - 3. No storm water discharge from a development shall flow onto other adjacent lands in a higher volume, with greater velocity or in a different location than under natural conditions.
  - 4. The property owner shall design for overland flow of storm water from adjacent properties where the existing off site land slopes to the site.

5. Grading design should, to the greatest extent possible, maintain the natural gradient and contours of the site and include measures to preserve natural features including, but not limited to, trees larger than 6" caliper, natural drainage ways, and rock outcrops.
6. Graded slopes steeper than three (3) horizontal to one (1) vertical (3:1) shall be stabilized. Shallower slope angles may be required if detailed soils and geologic investigations indicate such.
7. No filling will be allowed on lands which lie, either wholly or in part, within the flood plain of a river, stream, creek, or lake unless such fill is approved under the terms of a permit granted by the applicable Federal, state or county agency of the City of Coralville.
8. During construction, if a disturbed area is to be left idle for more than 21 days, temporary erosion control practices need to be initiated within 14 days of the disturbance. Temporary erosion control measures include temporary seeding, mulching, geotextiles, etc. Temporary erosion control measures shall be maintained at all times.
9. City approved permanent erosion control (e.g., seed, sod, etc.) is to be installed during or immediately following the completed work. Permanent erosion control measures shall be maintained at all times.

B. Drainage Standards:

1. To the maximum feasible extent, all natural drainage courses serving major drainage areas and containing significant vegetation that may constitute a significant wildlife habitat, as determined by the City, should remain in their natural state. Alterations to natural drainage courses may be allowed if the application of this Ordinance will result in upstream or downstream flooding hazards for which there is not other feasible means of mitigation consistent with the findings.
2. All grading work in drainage facilities (e.g., swales, ditches, detention basins, etc.) shall be in accordance with City's Municipal Design Standards.
3. The overall drainage system shall be completed and made operational at the earliest possible time during construction or shall otherwise be provided for in a manner acceptable to the City.
4. If a development is to be phased, the approved drainage facilities will be completed or otherwise provided for in a manner acceptable to the City before the completion of the first phase.

C. Administration Responsibilities:

A grading permit applicant must designate the individual, including name, title, address, and phone number, who will perform the following duties:

1. Initial installation of the erosion control measures specified by the erosion control plan.
2. Site inspections on a weekly basis and after rains greater than 1/4" to assess the effectiveness of the existing erosion control measures and to direct installation of additional erosion control measures in response to problems noted during site inspections. Inspections are not required when the ground is frozen or snow covered.
3. Conduct weekly inspection until adequate groundcover is established to control erosion.
4. Keep a log of site inspections recording any corrective measures taken.

#### 10.04 METHODS

- A. Methods of erosion control shall be consistent with those outlined in the Iowa Construction Site Erosion Control Manual or other community accepted engineering practices.
- B. The plan shall include provisions for responding to unanticipated erosion problems as they arise during the construction process.
- C. Special care shall be taken to prevent erosion behind the curbs and beneath the pavement of streets.

## **11- TRAFFIC CONTROL SIGNALS**

### **11.01 APPROVALS, PERMITS, AS-BUILTS AND MAINTENANCE BONDS**

- A. Plans and specifications for traffic control signals must be certified by a professional engineer registered in the State of Iowa.
- B. Plans and specifications for traffic control signals must be reviewed and approved by the City Engineer prior to construction.
- C. Other local, state and federal permits may be required, depending on the circumstances. It shall be the responsibility of the Engineer of Record to acquire all applicable permits. A copy of all permits shall be provided to the City Engineer before construction.

### **11.02 DESIGN**

- A. Warrants for traffic control signals shall be as defined in the “Manual of Uniform Traffic Control Devices”, current edition.
- B. Design of traffic control signals shall comply with the requirements of the “Manual on Uniform Traffic Control Devices”, current edition, except as noted below.
- C. The minimum lens size shall be 12 inches.

## 12- ROADWAY LIGHTING

12.01 The required lumen output and mounting height is as follows:

<u>Roadway Classification</u>	<u>Luminaire</u>	<u>Wattage</u>
Local	8,500 lumen ASA Type III	100
Collector	14,500 lumen ASA Type III	150
Arterial	23,000 lumen ASA Type III	250

12.02 The light source shall be high pressure sodium or metal halide.

12.03 The general criteria for the location of street lights are as follows:

1. A street light at all intersections.
2. Street lights at mid-block locations if the blocks are more than 600 feet in length.
3. Closer spacing of street lights in problem areas such as major arterials or high pedestrian areas, as determined by an engineering study.

# **APPENDIX A**

TITLE V - BUILDING AND PROPERTY REGULATIONS  
ZONING, LAND USE AND SUBDIVISIONS

CHAPTER 122  
SUBDIVISION REGULATIONS

122.01 Purpose	122.16 Lots
122.02 Jurisdiction	122.17 Improvements Required
122.03 Definitions	122.18 Sanitary Sewerage System
122.04 Fees	122.19 Building Sewers
122.05 Variances	122.20 Water Mains
122.06 Enforcement	122.21 Water Service Lines
122.07 Amendments	122.22 Storm Drainage System
122.08 Professional Assistance	122.23 Disposal of Storm Water
122.09 Preliminary Platting Procedure	122.24 Curb and Gutter
122.10 Preliminary Plat Requirements	122.25 Surfacing
122.11 Final Platting Procedure	122.26 Markers
122.12 Final Plat Requirements	122.27 Plans and Specifications
122.13 Plats Outside Corporate Limits	122.28 Approval of Governmental Agencies
122.14 Streets and Alleys	122.29 Inspection
122.15 Blocks	

122.01 PURPOSE. The purpose of this chapter is to secure coordination of subdivisions of land and extensions of streets; to promote proper standards for development of land, utilities and streets; to promote health and the general welfare; to facilitate the adequate provisions of transportation, water supply, sewage treatment, storm drainage and other public improvements and services in areas of new development throughout the City, all in accordance with a comprehensive plan.

122.02 JURISDICTION. Jurisdiction under this chapter shall extend to within two (2) miles of the corporate limits of the City. A subdivision plat shall be made when a tract of land is subdivided by repeated divisions or simultaneous division into three or more parcels, any of which are described by metes and bounds description for which no plat of survey is recorded. A subdivision plat is not required when land is divided by conveyance to a governmental agency for public improvements. A subdivision plat shall have a succinct name or title that is unique, as approved by the Auditor. The plat shall include an accurate description of the land included in the subdivision and shall give reference to two section corners within the United States public land survey system in which the plat lies or, if the plat is a subdivision of any portion of an official plat, two

established monuments within the official plat. Each lot within the plat shall be assigned a progressive number. Streets, alleys, parks, open areas, school property, other areas of public use, or areas within the plat that are set aside for future development shall be assigned a progressive letter and shall have the proposed use clearly designated. A strip of land shall not be reserved by the subdivider unless the land is of sufficient size and shape to be of practical use or service as determined by the governing body. Progressive block numbers or letters may be assigned to groups of lots separated from other lots by streets or other physical features of the land. The surveyor shall not assign lot numbers or letters to a lot shown within a subdivision plat unless the lot has been surveyed by the surveyor in compliance with Chapter 114A of the Code of Iowa. The Auditor may note a permanent real estate index number upon each lot within a subdivision plat. Sufficient information, including dimensions and angles or bearings, shall be shown on the plat to accurately establish the boundaries of each lot, street and easement. Easements necessary for the orderly development of the land within the plat shall be shown and the purpose of the easement shall be clearly stated. If a subdivision plat, described as part of the United States public land survey system and not entirely within an official plat, lies within more than one forty-acre aliquot part of a section, the acreage shall be shown only for assessment and taxation purposes for the portion of the subdivision that lies within each forty-acre aliquot part of the section. The area of the irregular lots within the plat shall be shown and may be expressed in either acres, to the nearest one-hundredth acre, or square feet, to the nearest ten square feet. The surveyor shall not be required to establish the location of a forty-acre aliquot line by survey but is required to use reasonable assumptions in determining its approximate location for assessment and taxation purposes.

122.03 DEFINITIONS. For use in this chapter, the following terms and words are defined:

1. "Alley" means a permanent public service way or right-of-way designed to provide a secondary means of access to abutting property.
2. "Auditor" means the County Auditor of Iowa County, Iowa.
3. "Building Line" means a line established on a plat as a restrictive covenant, beyond which no building may be placed. The building lines need not correspond to the front, side or rear yard requirement established in the zoning ordinance, and where they do not, the most restrictive requirement will control.

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Prepared:

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WILLIAMSBURG CITY ORDINANCE # 465

An Ordinance amending the ordinances of the City of Williamsburg, Iowa County, Iowa.

The City Council of the City of Williamsburg, State of Iowa, does ordain as follows:

SECTION ONE

Title V, Chapter 122, Section 122.02 shall be amended by deleting the second sentence of Section 122.02 and replacing it with the following:

A subdivision plat shall be made when a tract of land is subdivided by repeated divisions or simultaneous division into three or more parcels. However, certain divisions, as set out below, are not deemed "subdivisions" provided the lots or parcels involved are abutting and contiguous and the division, combining or adjustment does not result in any lot or parcel being nonconforming or more nonconforming or accomplish "gerrymandering" with land areas or frontage for signage purposes all regarding the zoning and subdivision requirements of this Code of Ordinances.

- A. A division of two existing subdivision lots into three lots (once only).
- B. A combining of a portion of one lot or parcel with another lot or parcel (once only).
- C. The adjusting of a common boundary between lots or parcels (two boundaries only).

SECTION TWO

All ordinances or parts of ordinances inconsistent or in conflict with this ordinance are hereby repealed.

SECTION THREE

This ordinance shall take effect and be enforced after its passage and adoption by the City Council of the City of Williamsburg, Iowa and publication as required by law.

Passed and approved by the City Council of the City of Williamsburg, Iowa this day of June, 2001.



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4. "Commission" means the Planning and Zoning Commission of the City.
5. "Cul-de-sac" means a short minor street having one end open to motor traffic, the other end being permanently terminated by a vehicular turn-around.
6. "Easement" means authorization by a property owner for the use by another, and for a specified purpose, of any designated part of said owner's property.
7. "Final Plat" means the map or drawing on which the subdivision plan is presented in the form which, if approved by the Council and the Commission, will be filed and recorded with the County Recorder.
8. "Preliminary Plat" means a study or drawings indicating the proposed manner or layout of the subdivision which is submitted to the Council and the Commission for consideration.
9. "Separate Tract" means a parcel of land or a group of contiguous parcels of land under one ownership on the effective date of the ordinance codified in this chapter.
10. "Street" means a right-of-way other than an alley dedicated or otherwise legally established to be accepted for public use, usually affording the principal means of access to abutting property. A street may be designated as a street, highway, thoroughfare, parkway, avenue, road, lane, drive, place or other appropriate designation.
11. "Thoroughfare" means a street intended for cross-country or through traffic.
12. "Collector Street" means a street intended to carry vehicular traffic from residential streets to thoroughfares or traffic generators.
13. "Residential Street" means a street used primarily for access to abutting property.
14. "Right-of-way" means the area measured between property lines dedicated to and accepted for public use and providing access to abutting properties.
15. "Subdivider" means any person who shall lay out, for the purpose of sale or development, any subdivision or part thereof, as defined herein, either for said individual person or others.

16. "Subdivision" means the division of a separate tract of land into three (3) or more lots or parcels for the purpose of transfer of ownership or building development, or if a new road is involved, any division of a parcel of land.

122.04 FEES. Each preliminary plat submitted for approval shall be accompanied by a fee as established by Council resolution.

122.05 VARIANCES. Where the strict application of standards or requirements established by this chapter would cause substantial hardship or impose unreasonable restrictions on the development of a tract of land because of natural or physical conditions or limitations, not created by the owner or developer, the Commission may recommend and the Council may grant such variances from these standards or requirements as may be necessary to permit the reasonable development of the land while preserving the intent of this chapter.

122.06 ENFORCEMENT. In addition to other remedies and penalties prescribed by law, the provisions of this chapter shall not be violated subject to the following:

1. Recording. No plat or subdivision in the City or within two (2) miles thereof shall be recorded or filed with the County Auditor or County Recorder, nor shall any plat or subdivision have any validity until it complies with the provisions of this chapter and has been approved by the Council as prescribed herein.
2. Building Permits. Not more than two (2) building permits shall be issued for each separate tract existing at the effective date of the ordinance codified in this chapter unless the tract shall have been platted in accordance with the provisions contained herein.
3. Public Improvements. No public improvements over which the Council has control shall be made with City funds, nor shall any City funds be expended for street maintenance, street improvements, or other services in any area that has been subdivided after May 10, 1971, unless such subdivision and streets have been approved in accordance with the provisions of this chapter and the street accepted by the Council as a public street.
4. Penalty. Any person who shall dispose of or offer for sale or lease any lots in the City or addition thereto, unless the plat thereof has been approved in accordance with

this chapter and recorded, shall forfeit and pay fifty dollars (\$50.00) for each lot or part of lot sold or disposed of, leased or offered for sale.

122.07 AMENDMENTS. This chapter may be amended from time to time by the Council. Such amendments as may be proposed shall first be submitted to the Commission for study and recommendation. The Commission shall report within thirty (30) days, after which the council shall give notice of and hold a public hearing on the amendment. The amendment shall become effective from and after its adoption and publication as required by law.

122.08 PROFESSIONAL ASSISTANCE. The Council or the Commission may request such professional assistance as it deems necessary to properly evaluate the plats as submitted.

122.09 PRELIMINARY PLATTING PROCEDURE.

1. Plats Filed. The owner or developer of any tract of land to be subdivided shall cause a preliminary plat to be prepared, a plat of the subdivision containing the information specified herein and shall file three (3) copies and a reproducible sepia or tracing of the plat with the Clerk.

2. Plats Distributed. The Clerk shall immediately transmit two (2) copies of the preliminary plat to the Commission for study and recommendation.

3. Commission Action. The Commission shall examine the plat as to its compliance with this chapter and the comprehensive plan of the City and shall have thirty (30) days to submit a recommendation to the Council, provided that the owner or developer may agree to an extension of time not to exceed sixty (60) days. A copy of the recommendation shall be forwarded to the owner or developer.

4. Council Action. The Council, upon receipt of the Commission's recommendation, or after thirty (30) days, or any extension thereof shall have passed, shall by resolution grant approval or reject the preliminary plat. If the preliminary plat is rejected, the Council will advise the owner or developer of any changes which are desired or should have consideration before approval will be given. Approval of the preliminary plat by the Council shall constitute approval to proceed with the preparation of the final plat but shall not be deemed approval of the subdivision.

122.10 PRELIMINARY PLAT REQUIREMENTS. The preliminary plat shall contain the following:

1. Map. A location map showing:
  - A. The subdivision name.
  - B. An outline of the area to be subdivided.
  - C. The existing streets and public or community utilities, if any, on adjoining property.
  - D. North point and scale.
2. Plat Contents. A preliminary plat of the subdivision drawn to the scale of fifty (50) feet to one (1) inch, provided that if the resulting drawing would be over thirty-six (36) inches in shortest dimension, a scale of one hundred (100) feet to one (1) inch may be used, said preliminary plat to show:
  - A. Legal description, acreage and name of proposed subdivision.
  - B. Name and address of the owner.
  - C. Name of person who prepared the plat, and the date thereof.
  - D. Location of existing lot lines, streets, public utilities, water mains, sewers, drain pipes, culverts, water courses, bridges, railroads and buildings in the proposed subdivision.
  - E. Location and widths, other dimensions and names of the proposed streets, utility easements and other open spaces or reserved areas.
  - F. Tract boundary lines showing dimensions, bearings, angles, and references to known lines or bench marks.
  - G. Names of adjacent property owners.
  - H. Layout of proposed blocks (if used) and lots including the dimensions of each, and the lot and block number in numerical order.
  - I. A statement concerning the location and approximate size or capacity of utilities proposed to be installed.

- J. Contours at vertical intervals of not more than two (2) feet.
- K. Grades of proposed streets.
- L. Proposed building lines.
- M. A cross section of the proposed streets showing the roadway location, the type and width of surfacing, type of drainage and other improvements to be installed.
- N. The location of proposed wells and/or water mains and sewage disposal system if a public or community system is used.
- O. The drainage of the land including proposed storm sewers, ditches, culverts, bridges and other structures.
- P. North point and graphic scale.
- Q. Layout of lots showing approximate dimensions and number.
- R. Location of proposed sidewalks unless the sidewalks are waived by the Council pursuant to Section 185.06 of this Code of Ordinances.

#### 122.11 FINAL PLATTING PROCEDURE.

1. Plat Submitted. A final plat shall be submitted within twelve (12) months of the approval of the preliminary plat, or such approval shall expire and the preliminary plat shall be resubmitted for approval prior to preparation of a final plat.
2. Procedures. Procedures for final plats shall be the same as set out for preliminary plats in Section 122.09.
3. Certification. Upon approval of the final plat, a certification of approval signed by the Mayor and attested by the Clerk shall be affixed to the original tracing of the final plat and copies of the same filed with the Clerk, County Auditor and County Recorder along with such other certifications and instruments as may be required by law.

122.12 FINAL PLAT REQUIREMENTS. The final plat shall meet the following specifications:

1. Inclusions. It may include all or only part of the preliminary plat.
2. Scale. The plat shall be drawn to the scale of fifty (50) feet to one (1) inch, provided that if the resulting drawing would be over thirty-six (36) inches in the shortest dimension, a scale of one hundred (100) feet to one (1) inch may be used.
3. Plat Contents. The final plat shall contain the following:
  - A. Accurate boundary lines with dimensions and angles which provide a survey of the tract closing with an error of not more than one (1) foot in three thousand (3,000) feet.
  - B. Accurate references to known or permanent monuments giving the bearing and distance from some corner of a congressional division of the County of which the subdivision is a part.
  - C. Accurate locations of all existing and recorded streets intersecting the boundaries of the tract.
  - D. Accurate metes and bounds description of the boundary.
  - E. Street names.
  - F. Complete curve notes for all curves included in the plat.
  - G. Street right-of-way lines with accurate dimensions in feet and hundredths of feet with angles to right-of-way lines and lot lines.
  - H. Lot numbers and dimensions.
  - I. Block numbers, if used.
  - J. Accurate locations of easements for utilities and any limitations on such easements.
  - K. Accurate dimensions for any property to be dedicated or reserved for public, semi-public or community use.
  - L. Building lines and dimensions.
  - M. Location, type, material and size of all monuments and markers.

- N. Name of the subdivision.
  - O. Name and address of owner and subdivider.
  - P. North point, scale and date.
  - Q. Certification by a registered land surveyor of the State.
  - R. Certification of dedication of streets and other public property.
  - S. Resolution and certificate for approval by the Council and signatures of the Mayor and Clerk.
  - T. Location of proposed sidewalks unless the sidewalks are waived by the Council pursuant to Section 185.06 of this Code of Ordinances.
4. Instruments Required. The final plat shall be accompanied by the following instruments:
- A. A certified statement from the owner and spouse, if any, that the subdivision as it appears on the plat is with their free consent and is in accordance with the desires of the proprietor and spouse. This certificate must be signed and acknowledged by the owner and spouse before some officer authorized to take the acknowledgments of deeds.
  - B. One of the following:
    - (1) A certificate bearing the approval of the Council stating that all improvements and installations in the subdivision required by this chapter have been made or installed in accordance with the City specifications, or
    - (2) A surety bond with the City which will insure the City that the improvements will be completed by the subdivider or property owner within two (2) years after the official acceptance of the plat. The form and type of bond shall be approved by the City Attorney, and the amount of the bond shall not be less than the amount of the estimated cost of the improvements plus ten percent (10%) and the amount of the

estimate must be approved by the Council. If the improvements are not completed within the specified time, the Council may use the bond or any necessary portion thereof to complete the same, or

(3) A petition by the developer to the Council to provide the necessary improvements and to assess the costs thereof against the subdivided property in accordance with the requirements regarding special assessments, provided, however, that the subdivider or property owners shall furnish the necessary waivers to permit the assessment of the entire cost of the improvement plus the necessary and reasonable costs of the assessment proceedings against the platted property even though the total amount exceeds the statutory limitations.

If option (2) or option (3) above is chosen, the final plat shall state that the developer, the grantees, assignees and successors in interest agree that public services including but not limited to street maintenance, snow and ice removal, rubbish, refuse and garbage collection will not be extended to this subdivision until the pavement is completed and accepted by the City.

C. Copy of all restrictive covenants to be attached to the lots of the subdivision.

5. Additional Submissions. The final plat shall also be accompanied by the following at the time it is presented for filing:

A. An opinion by an attorney-at-law who has examined the abstract of title of the land being platted. The opinion shall state the names of the proprietors and holders of mortgages, liens or other encumbrances on the land being platted and shall note the encumbrances, along with any bonds securing the encumbrances.

B. A certificate of the County Treasurer that the land is free from certified taxes and certified special assessments or that the land is free from certified taxes and that the certified special assessments are secured by bond in compliance with Section 354.12 of the Code of Iowa.

C. The encumbrance bond, if any.

122.13 PLATS OUTSIDE CORPORATE LIMITS. Procedure for approval of preliminary and final plats of land within two (2) miles of the corporate limits shall be same as set out in Section 122.09 and 122.11 above, except that five (5) copies of the plat shall be filed with the Clerk and the Clerk shall refer one (1) copy to the County Engineer and request a recommendation to be submitted to the Commission.

122.14 STREETS AND ALLEYS. The minimum required design standards for streets and alleys are as follows:

1. Access. The street and alley layout shall provide access to all lots and parcels of land within the subdivision.
2. Jogs. Street jogs of less than 150 feet shall be avoided.
3. Cul-de-sacs shall not exceed 500 feet in length.
4. Continuation. New subdivisions shall make provisions for future continuation and extension of thoroughfares and collector streets and roads to the boundaries thereof.
5. Dead Ends. No dead-end streets or alleys will be permitted except at subdivision boundaries. In no event can any dead-end street exceed 500 feet in length.
6. Alleys. Alleys shall not be permitted in residential areas but shall be provided in commercial and industrial areas.
7. Intersections. Intersection of road centerlines shall be between 80 degrees and 100 degrees.
8. Parkways. Where parkways or special types of streets are proposed, the Commission may apply special standards for the design of such parkways or streets.
9. Names. Proposed streets that are extensions of or in alignment with existing streets shall bear the name of the existing street.
10. Right-of-way. Minimum rights-of-way shall be provided as follows:
  - A. Thoroughfares -- 100 feet;
  - B. Collector streets -- 70 feet;

- C. Residential streets -- 60 feet;
  - D. Cul-de-sacs -- 110 feet in diameter;
  - E. Alleys -- 20 feet.
11. Surfacing. Minimum width of surfacing to be provided shall be as follows:
- A. Thoroughfare streets -- 53 feet;
  - B. Collector streets -- 41 feet;
  - C. Residential streets -- 25 feet;
  - D. Cul-de-sacs -- 85 feet in diameter;
  - E. Alleys -- 20 feet.
  - F. Sidewalks -- 4 feet.
12. Grades. No street grade shall be less than one-half of one percent and shall not exceed the following limits:
- A. Thoroughfare streets -- 4 percent (4%);
  - B. Collector streets -- 6 percent (6%);
  - C. Residential streets -- 8 percent (8%).

122.15 BLOCKS. Block layout shall be as follows:

1. Length. The length of blocks shall be not less than five hundred (500) feet and not more than nine hundred (900) feet in length.
2. Width. Blocks shall be of sufficient width to permit two (2) tiers of lots of appropriate depth and in no case shall the width be less than two hundred twenty (220) feet, except where a single tier of double frontage lots parallels a

limited access highway, a thoroughfare, drainage course, railroad or other barrier, the width shall be not less than one hundred fifty (150) feet.

3. Crosswalks. Crosswalks may be required in blocks over seven hundred (700) feet long or in areas where curved streets require excessive out-of-distance travel. If required, they shall be constructed by the developer.

122.16 LOTS. Lot layout shall be as follows:

1. Street Access. All lots shall abut on a street or place. Corner lots which abut on a thoroughfare or collector street shall have a minimum radius of fifteen (15) feet at the intersection.

2. Side Lines. Side lines of lots shall approximate right angle to straight street lines and radial angles to curved street lines except where a variation will provide better lot layout.

3. Double Frontage. Lots with double frontage shall be avoided, except in specific locations where good planning indicates their use. In that event, a planting screen shall be provided along the rear of the lot.

4. Corner Lots. Corner lots shall be not less than eighty (80) feet in width and interior lots shall not be less than seventy-five (75) feet in width at the building lines, provided, however, that in a subdivision which is intended for and restricted to by a perpetual covenant attached to the plat, occupancy of lots by mobile homes or mobile homes converted to real estate, the minimum lot width may be reduced to not less than fifty (50) feet.

5. The minimum lot size shall be eight thousand (8,000) square feet.

122.17 IMPROVEMENTS REQUIRED. The subdivider shall construct and install the improvements described herein in accordance with detailed construction plans and specifications approved by the Council and constructed to the satisfaction of the Council.

122.18 SANITARY SEWERAGE SYSTEM. The subdivider shall provide the subdivision with a complete sanitary sewerage system which shall connect with a sanitary sewer outlet approved by the Council. The sewers shall extend to the subdivision boundaries as necessary to provide for the future extension of the sewers to

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serve adjacent property. The design and construction of the sanitary sewer system shall be in full compliance with the requirements as set forth in Chapter 12 of the Design Manual of Iowa Standards for Sanitary Sewer Systems as established by the Iowa Department of Natural Resources. (A copy of these requirements is on file with the Clerk.) The subdivider shall also make application to the City for connection of the proposed sanitary sewer system to the existing public sewer system in accordance with the requirements established by the Iowa Department of Natural Resources. Application shall be made on Treatment Agreement Form C, available from the Clerk.

122.19 BUILDING SEWERS. The subdivider shall provide for connection of building sewers to the sanitary sewerage system. This shall be accomplished by installing a suitably located "Y" branch or, for existing sewer lines, a cast iron saddle in accordance with the requirements set forth in Section 96.06 of this Code of Ordinances. From the "Y" branch or saddle, the subdivider shall provide a building sewer extending to the property line, in accordance with Chapter 96 of this Code of Ordinances. A separate building sewer shall be provided for each lot in the subdivision. The ends of the newly installed building sewers shall be securely capped to prevent the entrance of groundwater and soil. The location of building sewers shown as the distance from the nearest manhole and the depth below the top of the adjacent curb, shall be placed on file with the Clerk.

122.20 WATER MAINS. The subdivider shall provide the subdivision with a complete water distribution system which shall connect with the municipal water distribution system at location(s) approved by the Council. The water mains shall extend to the subdivision boundaries as necessary to provide for the future extension of the mains to serve adjacent property. The design and construction of the water distribution system shall be in full compliance with the requirements as set forth in Chapter 8 of the Design Manual of Iowa Standards for Water Supply Distribution Systems as established by the Iowa Department of Natural Resources. (A copy of these requirements is on file with the Clerk.) Poly (Vinyl Chloride) (PVC) water mains shall have a maximum dimension ratio (DR) of eighteen (18) and shall be rated for not less than one hundred fifty (150) pounds per square inch working pressure. Fire hydrants shall be located to provide for a maximum coverage area of that equal to a circle with a radius of two hundred fifty (250) feet. A coverage area equal to that of a circle with a radius of three hundred (300) feet will be allowed upon receipt of approval by the Council. The threads on all fire hydrant nozzles shall be the City's standard.

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122.21 WATER SERVICE LINES. The subdivider shall provide for connection of water service lines to the water mains. This shall include tapping the water main and installing a corporation cock, water service pipe and curb stop, all in accordance with Chapter 90 of this Code of Ordinances. A separate water service line shall be provided for each lot in the subdivision. Disinfection and testing of the newly constructed water distribution system, including water service lines, shall be accomplished before the system is placed into operation.

122.22 STORM DRAINAGE SYSTEM. The subdivider shall provide the subdivision with adequate drains, culverts, storm sewers, intakes and manholes to provide for the collection and transportation of all storm water. These improvements shall extend to the boundaries of the subdivision so as to provide for future extension to serve adjoining properties. Transportation of collected storm waters on the surface of the land is prohibited except for gutters of paved streets. Where street gutters are to be used for the surface transportation of storm water, the intakes shall be spaced: (i) to provide for a maximum time of concentration of twenty (20) minutes at the upper reach of the system, and (ii) at one-block intervals thereafter. Storm sewer lines shall be sized to accommodate runoff based on a storm frequency of five (5) years and a duration equal to the applicable time of concentration. The minimum size allowed will be fifteen (15) inch diameter. The slope of the lines shall be sufficient to maintain a velocity of two feet per second then flowing full. Storm sewer pipe shall be reinforced concrete in accordance with A.S.T.M. Specifications C76 with a minimum Class 3 thickness. Higher thickness shall be used when warranted by the depth of cover. All lots shall be provided with a public storm sewer within the street right-of-way at the front yard. This storm sewer will be either a RCP which is designed to carry the storm drainage from the street or an eight-inch Ø (minimum) SDR35 PVC that connects to the storm sewer system. The design and construction of this PVC storm extension line shall be done in accordance with the same standards used for wastewater piping. The developer will extend a 1½-inch Ø (minimum) building storm sewer service from the above public storm sewer to each lot. Each storm sewer service shall have a check valve installed (this valve is in addition to any check valve built into the sump pump). The storm sewer services shall be 160 psi rated polyethylene pipe (PE 3406) or Schedule 80 PVC (A.S.T.M. D1785).

122.23 DISPOSAL OF STORM WATER. <sup>02-906</sup> Where the amount and/or rate of discharge of storm water from a subdivision or property is increased as a result of subdividing and/or construction of improvements thereto, and where the increase in either the amount or rate of discharge has the potential for adversely affecting the well-being and/or causing damage to the property of the adjacent landowners, the subdivider or landowner making said improvements shall make provisions for

the safe transportation of said storm water to the nearest adequate storm drainage system or adequate natural water course. The Council may waive this requirement provided that the subdivider or landowner presents for the Council's approval sufficient data to illustrate that such adverse effects and/or damages are not likely to be sustained by adjacent landowners and written documentation from the adjacent landowners indicating their acceptance of the anticipated runoff.

122.24 CURB AND GUTTER. Curb and gutter shall be installed on all streets in the plat being dedicated for public use and shall be constructed of Portland cement concrete in accordance with the design standards and specifications on file with the Clerk. The grades of the completed curbs shall be in accordance with the applicable grade ordinance as adopted by the Council.

122.25 SURFACING. All streets being dedicated for public use shall be surfaced from curb to curb. Surfacing shall consist of asphaltic concrete or Portland cement concrete and shall be constructed in accordance with the design standards and specifications on file with the Clerk. Where a surface width in excess of twenty-five (25) feet is required, the cost of the additional surface width, which shall be assumed to be the center portion of the roadway surface, shall be paid by the City. On collector and thoroughfare streets where a higher standard of surfacing than is herein required is deemed necessary by the Council, the additional cost shall be borne by the City.

122.26 MARKERS. An iron rod not less than one-half (1/2) inch in diameter and twenty-four (24) inches in length shall be placed as follows:

1. Set in concrete three (3) feet deep at the intersection of all lines forming angles in the boundary of the subdivision and at all street intersections.
2. At lot corners and changes in direction of block and lot boundaries.

122.27 PLANS AND SPECIFICATIONS. The subdivider shall submit to the Council, for their approval, construction plans and specifications illustrating in detail the improvements that are proposed. A minimum of three (3) sets shall be submitted. Both the plans and specifications shall be certified by a registered professional engineer licensed to practice in the State.

122.28 APPROVAL OF GOVERNMENTAL AGENCIES. The subdivider shall submit to the Council evidence that the necessary approvals from all local, State and Federal agencies having jurisdiction in these matters have been obtained.

122.29 INSPECTION. The Council shall cause the installation of all improvements to be inspected to insure a compliance with the requirements of this chapter. The cost of said inspection shall be borne by the subdivider or landowner making the improvements and shall be the actual cost of the inspection to the City.

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