G. Intersection Improvements. Intersection improvements and traffic control devices shall be installed as warranted in accordance with the traffic impact analysis, where required by these regulations, subject to participation standards in section 6.

5.8.2 Types of Streets

A. Arterial street or major thoroughfare: Any street designated in the comprehensive plan as being a principal route more or less continuous across the City or areas adjacent thereto, or any route carrying or designated to carry fast moving or large volumes of traffic.

B. CollLadonia street: The phrase "collLadonia street" shall be a street which is continuous through several residential districts and intended as a connecting street between residential districts and thoroughfares or business districts.

C. Local street: A street exclusively or primarily providing access to abutting properties. A local street may be located within a residential, commercial, or industrial area.

D. Cul-de-sac: A local street having but one outlet to another street and terminated on the opposite end by a vehicular turnaround.

E. Dead end street: A street other than a cul-de-sac having only one outlet.

F. Frontage street: A local street lying parallel to and adjoining a major street right-of-way which provides access to abutting properties and protection from through traffic.

G. Alley: A public or private way designed primarily for vehicular travel to provide access to the rear or side property otherwise abutting on a street.

H. Loop street: A local street having only two (2) outlets onto one other street.

5.8.3 Design Standards

A. Pavement and right-of-way width: All streets shall be constructed on stabilized subgrade. Asphalt streets shall have crushed limestone flexible base. Design and construction of streets shall conform to the following schedule:

Subgrade stabilization to 6" depth:

Soil PI	Stabilization Method
0 - 10	3% Cement
11 - 16	Mechanical Compaction
17 +	6% Lime

Type Street	ROW	Pavement Width (Back of Curve)
Thoroughfare	80'-100'	49' (with curb and gutter)
CollLadonia	60'	38' (with curb and gutter)
Local	50'	31' (with curb and gutter)
Residential Estates	60'	22' (no curb and gutter)

Type Street	Reinforced Concrete Thickness	Asphalt Thickness	Flex.Base
Thoroughfare	8" (1)	3" HMAC	10"
CollLadonia	6" (1)	3" HMAC	8"
Local	5" (2)	2" HMAC	6"
Residential Estates	5" (2)	1-½" HMAC	6"

(1) Determine reinforcing from strength design based on expected traffic load. Minimum steel ratio = 0.0012.
(2) Minimum steel ratio = 0.0012

B. Vertical alignment: Grades of streets shall be connected by vertical curves of a minimum length expressed as a multiple of the algebraic difference between the rates of grades, expressed in feet per hundred feet, and the values shown.

multiple of	Design speed			
algebraic difference	30	40	50	60
Crest vertical curve	28	50	80	150
Saq vertical curve	35	50	70	100

C. Horizontal alignment: The center line curve of streets and alleys shall have a minimum radius as follows:

Classifications	**Minimum** center line radius (feet)
Thoroughfare	500
CollLadonia	300
Local (commercial or industrial)	300
Residential	150
Loop streets and alleys	75

The maximum deflection of alignment permitted without use of curve shall be three (3) degrees.

D. Reverse curves: Reverse curves on thoroughfares and collLadonia streets shall be separated by a minimum tangent of one hundred (100') feet.

E. Cul-de-sacs, Dead end streets;

1. The maximum length of a cul-de-sac shall be four hundred (400) feet.

2. Cul-de-sacs shall have a minimum right-of-way of fifty (50') feet and a minimum back of curve of forty (40') feet for single family and two family uses and a minimum right-of-way radius of sixty (60') feet and a minimum back of curve radius of forty-eight (48') feet for all other uses. A dead end street may be up to (400) feet long if a temporary cul-de-sac is provided according to the above standard.

F. Street intersections: Street intersections shall be perpendicular.

G. Partial or half streets: Partial or half streets shall not be authorized.

H. Street names: Names of new streets shall not duplicate names of existing streets.

I. Boundary streets:

1. New streets on the boundary of a proposed subdivision shall conform to the right- of-way width and construction requirements of this ordinance.

2. Half streets shall be built to complete existing half streets.

3. When the proposed subdivision abuts an existing right-of-way that does not conform to the requirements of this ordinance, the developer shall dedicate right- of-way sufficient to make the right-of-way conform to this ordinance.

4. When the proposed subdivision abuts an existing street that does not conform to, this ordinance, the developer may:

a) construct the street according to the standards of this ordinance;

b) place cash or other suitable security in deposit with the City of Ladonia to pay one-half the cost of constructing the street according to the standards, of this ordinance; or

c) construct the street according to the standards of this ordinance for a distance equal to one-half the length of the existing abutting street.

J. Curb and gutter: Except in Residential Estates Subdivisions, curb and gutter shall be installed by the developer on both sides of all interior streets. Provisions for curb and gutter shall be made on boundary streets in accordance with the paragraph entitled "Boundary Streets".

K. Street signs: The City shall install street signs, at the developer's expense, at all intersections within the subdivision. A fee for this service shall be paid prior to acceptance of the streets and utilities.

L. Laboratory testing: The City shall retain the services of a reputable commercial testing laboratory or will perform the necessary tests on subgrade soils, flexible base material, concrete, and other construction materials, to verify that specifications are being met. These laboratory tests will be made at the developer's expense and may include the following:

1. Moisture-density relationships

2. Gradation

3. Atterberg limits

4. In-place moisture-density

5. Concrete strength

6. Other as required.

M. Street Posts and Markers. The developer shall pay for the cost of purchasing and installing street posts and markers at each street intersection, which posts and markers shall be of the same type used throughout the City, and as specified in the City of Ladonia Addendum to the NCTCOG Standard Specifications for Public Works Construction.

N. Street Lighting. The subdivider shall provide at no expense to the City and as a part of the street improvements, street lighting in accordance with the following standards and such standards as designated in the Zoning Regulations and as specified in the City of Ladonia Addendum to the NCTCOG Standard Specifications for Public Works Construction.

O. Alleys.

1. Alleys shall be designed to allow fire department and waste collection vehicles to travel without impediment. A standard SU-20 design vehicle shall be able to negotiate all turns and intersections.

2. Access to residential property for required off-street parking shall be from the alley wherever paved alley access is available. Access from the alley shall not exclude another means of access from the front or side. No side lot or rear lot access to residential property shall be allowed from any arterial street as defined herein.

2. Alley drive approaches shall have a radius of five (5) feet to assist ingress and egress to the lot and provide motorists passing one another with additional paved area.

5.8.4 Traffic Impact Analysis

Whenever these regulations require a traffic impact analysis, the following elements shall be included:

A. General Site Description. The traffic impact analysis shall include a detailed description of the roadway network within one (1) mile of the site, a description of the proposed land uses, the anticipated stages of construction, and the anticipated completion date of the proposed land development. This description, which may be in the form of a map, shall include the following items: (a) all major intersections, (b) all proposed and existing ingress and egress locations, (c) all existing roadway widths and rights-of-way, (d) all existing traffic signals and traffic-control devices, and (e) all existing and proposed public transportation services and facilities within a one (1) mile radius of the site.

B. Proposed Capital Improvements. The traffic impact analysis shall identify any changes to the roadway network within one-half (0.5) mile of the site, proposed by any governmental agency. This description shall include the above items as well as any proposed construction project that would alter the width and/or alignment of roadways affected by the proposed development.

C. Roadway Impact Analysis.

1. Transportation Impacts.

a) Trip Generation. The average weekday trip generation rates (trip ends) and the highest average hourly weekday trip generation rate between 4 P.M. and 6 P.M. for the proposed use shall be determined based upon the trip generation rates contained in the most recent edition of the **INSTITUTE OF TRANSPORTATION ENGINEERS, TRIP GENERATION Manual**.

b) Trip Distribution. The distribution of trips to arterial and collLadonia roadways within the study area in conformity with accepted traffic engineering principles, taking into consideration the land use categories of the proposed development; the area from which the proposed development will attract traffic; competing developments (if applicable); the size of the proposed development; development phasing; surrounding land uses, population and employment; and existing traffic conditions identified.

2. Adequacy Determination. The roadway network included within the traffic impact analysis shall be considered adequate to serve the proposed development if existing roadways identified as arterials can accommodate the existing service volume, the service volume of the proposed development,

and the service volume of approved but unbuilt developments holding valid, unexpired building permits at level of service C.

D. Intersection Analysis.

1. Level of Service Analysis. For intersections within the roadway traffic impact analysis area described in subsection (A) herein, a level of service analysis shall be conducted for one day Tuesday through Thursday and Friday on all intersections, including site driveways within one (1.0) mile of a proposed site. The City may waive analysis of minor intersections within the one-mile radius. The highest average hourly peak volume between 4 P.M. and 6 P.M. shall also be recorded. The level of service analysis shall take into consideration the lane geometry, traffic volume, percentage of right-hand turns, percentage of left-hand turns, percentage of trucks, intersection width, number of lanes, signal progression, ratio of signal green time to cycle time (G/C ratio), roadway grades, pedestrian flows, and peak hour factor.

2. Adequacy Analysis. The intersections included within the traffic impact analysis shall be considered adequate to serve the proposed development if existing intersections can accommodate the existing service volume, the service volume of the proposed development, and the service volume of approved but unbuilt developments holding valid, unexpired building permits at level of service C.

E. Effect of Adequacy Determination. If the adequacy determination for roadways and intersections indicates that the proposed development would cause a reduction in the level of service for any roadway or intersection within the study area below the level of service required, the proposed development shall be denied unless the developer agrees to one of the following conditions:

1. the deferral of building permits until the improvements necessary to upgrade the substandard facilities are constructed, as shown in the City's Capital Improvements Program;

2. a reduction in the density or intensity of development;

3. the dedication or construction of facilities needed to achieve the level of service required; or

4. any combination of techniques identified that would ensure that development will not occur unless the level of service for all roadways and intersections within the traffic impact analysis study are adequate to accommodate the impacts of such development.

5.9 Drainage Facilities Standards

A. General Requirements.

1. Drainage facilities shall be designed and constructed at such locations, size and dimensions to adequately serve the development and the contributing drainage area above the development. The developer shall provide all the necessary easements and rights-of-way required for drainage structures including storm drains and open channels, lined or unlined.

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

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

4. The requirements set forth herein are considered minimum requirements. The developer and his engineer shall bear the total responsibility for the adequacy of design. The approval of the facilities by the City Engineer in no way relieves the developer of this responsibility.

5. No individual, partnership, firm, or corporation shall deepen, widen, fill, re-route, or change the course or location of any existing ditch, channel, stream, or drainage way, without first submitting engineering plans for approval by the city engineer. Such plans shall be prepared by a professional engineer, registered in the State of Texas, and experienced in civil engineering.

B. Design of Facilities.

1. Computations for storm drainage from watersheds less than fifty (50) acres may be based upon we rational method, using the Texas Department of Transportation's frequency curves for Fannin County. For larger watersheds, SCS and USACOE HEC-l methods shall be used.

2. Underground drainage structures for residential areas shall be designed for a five (5) year frequency rainfall, shopping centers and industrial developments for a ten (10) year frequency and downtown and central business districts for a twenty-five (25) year frequency rainfall.

3. Open channel drainage structures shall be designed for the one hundred (100) year rainfall and shall provide for one (1') foot of free board with sub-critical flow conditions.

4. The drainage system shall be designed and constructed to handle rainfall runoff that originates in and crosses the subdivision.

5. The drainage system shall be designed so that water shall not be greater than curb deep and shall not flow farther than one thousand (1,000') feet before reaching an inlet in thoroughfare, collLadonia, and local streets under design rainfall conditions. Curb inlets shall be installed at the upstream end of all valley gutters crossing thoroughfare and collLadonia streets.

6. Street crowns shall not be flattened or warped from one side of the street to the other side.

7. The developer shall pay for all costs of the drainage system.

8. Detention Facilities. Lakes, detention ponds, and retention ponds may be constructed in all areas provided they are approved by the City Engineer. Easements shall be provided to ensure protection of these areas for maintenance purposes.

9. Alternate Facilities. Other innovative drainage concepts will be considered if approved by the City Engineer.

C. Dedication of Drainage Easements

1. General Requirements. When a subdivision or development is traversed by a watercourse, drainage way, channel, or stream, there shall be provided a storm water or drainage easement conforming substantially to the line of such watercourse, and of such width and construction as will be adequate for the purpose. Wherever possible, it is desirable that the drainage be maintained by an open channel with landscaped banks and adequate width for maximum potential volume of flow.

2. Access Easements. The property owner must provide sufficient access on each side of and parallel to creeks or drainage ways for maintenance purposes. The access shall be above the base flood elevation and accessible to vehicles and equipment. Access must also be provided at a maximum 1200 foot spacing along streets or alleys. The location and size of the access easement shall be determined by the City Engineer. The maximum width of the access easement shall be fifteen (15) feet. Permanent monuments, the type and locations of which to be determined by the City Engineer, shall be placed along the boundaries of the access easement and private property.

This access easement shall be included in the dedication requirements of this section.

3. Drainage Easements

a. Where topography or other conditions are such as to make impractical the inclusion of drainage facilities within street rights-of-way, perpetual, unobstructed easements at least fifteen (15) feet in width, depending on slopes, for drainage facilities shall be provided across property outside the street lines and with satisfactory access to the street. Easements shall be indicated on the plat. Drainage easements shall extend from the street to a natural watercourse or to other drainage facilities.

b. When a proposed drainage system will carry water across private land outside the subdivision or development, **appropriate drainage easements must be secured by the developer.**

c. Drainage easements shall be provided where any type of drainage system, including swales are used to convey storm water across any lot or tract in the development from an adjacent lot or tract whether or not the lot or tract is within the development or off-site.

d. All areas within any subdivision located in the one hundred (100) year flood plain of any river, creek or tributary stream shall be dedicated as a drainage and utility easement. The form and wording of the easement shall be approved by the Planning and Zoning Administrator.

D. Grading. Site, street or development grading shall conform to the specifications in the Engineering Design Manual. All permeable surfaces within the development shall be graded to a smooth and uniform appearance that can be easily mowed with a small residential riding lawn mower.

E. The developer shall provide plans and specifications and design calculations for all drainage structures. For flows in excess of an eight-four inch (84") pipe, unlined, open channels with concrete pilot channel constructed may be used. All open channels, which are not concrete lined, shall be designed to prevent erosion. The types of methods used for prevention of erosion shall be specifically approved by the City Engineer.

5.10 Utility Standards

A. Easements

1. The property owner shall be required to furnish all easements and rights-of--way required to serve the development. Where reasonable, all utilities, both public and private, should be located within streets or alley rights-of-way. Notwithstanding the above developers may offer easements outside of street and alley rights-of-way. All utility facilities existing and proposed throughout the property shall be shown on the preliminary plat and accompanying development plans.

2. Easements shall be provided for both municipal and private utilities. Municipal easements for water, sanitary sewer and storm sewer shall be a minimum of fifteen feet in width. All municipal easements may be wider as determined by the City Engineer depending on the depth and the size of the utility. Private utility easements must be sized by the utility company. Proper coordination shall be established between the City's property owner and the applicable utility companies for the establishment of utility easements on adjoining properties.

3. When topographical or other conditions are such as to make impractical the inclusion of utilities within the rear of residential lot lines, perpetual unobstructed easements at least fifteen (15) feet in width shall be provided along selected side lot lines for satisfactory access to the street or rear lot lines. Easements shall be indicated on the plat.

4. Water, sewer or drainage easements shall not straddle lots unless approved by the City Engineer.

5. Electric, gas, telephone and cable TV easements shall meet the requirements of the respective utility company and shall not conflict with or be coincident with water or sewer easements.

B. Damage. The contractor and owner shall be responsible for all damage to existing public improvements caused during construction of new public improvements.

5.11 Public Lands Requirements

A. Reservation of Land. Preliminary plats and final plats shall reserve land for future public use as designated in the Comprehensive Plan and associated plans for future public facilities and utilities. These uses include, but are not limited to: parks,

recreation and open space areas, schools, libraries, police and fire stations, pump stations, water storage tanks, and lift stations. Land reserved shall be of a suitable size, dimension, topography, and character for the designated purpose.

B. Procedure for Reserving Land. All final plats and development plats shall provide for the necessary reservation of land for future public use. All plats submitted for approval shall indicate sites to the City for public use. Boundaries of land reserved for public use may be adjusted subject to the approval of the Council unless otherwise provided by agreement.

C. Parks, School Sites, Public Areas. Preliminary subdivision plats shall provide sites for schools, parks, or other public areas as set out in the City's Comprehensive Plan. A dedication of five percent (5%) of the total tract acreage shall be required and used as parkland. In lieu of the dedication, the subdivider may pay to the City an amount of $350 per residential lot or the value of five percent (5%) of the total tract acreage for non residential uses. Said value shall be determined by an independent certified property appraiser, to be selected by the City, in the event that subdivider and City cannot agree on the value of the property. It shall be the City's decision on whether dedication of acreage or cash payment or a combination thereof shall be required. The dedication and/or payment shall be made upon approval of the final plat and prior to the construction of any infrastructure improvements.

5.12 Underground Utilities

A. All subdivision and development plats shall demonstrate compliance with the following underground utility standards:

1. Except as otherwise herein provided, telephone lines, cable television utility lines, and all electric utility lines and wires shall be placed underground. In special or unique circumstances or to avoid undue hardships, the City Council may authorize exceptions from this requirement and permit the construction and maintenance of overhead electric utility lateral or service lines and of overhead telephone cable television lines and may approve any

plat or site plan with such approved exceptions, in accordance with the standards in § 3.10.

2. Final plats shall display signature approval by utility companies. No building permits shall be issues until such approval is obtained and recorded on the plat.

3. Where electrical service is to be placed underground, circuits for street and site lighting, except street lighting standards, also shall be placed underground.

4. Electrical, cable television and telephone support equipment (transformers, amplifiers, switching devices, etc.) necessary for underground installations in subdivisions shall be pad mounted or placed underground.

5. All underground utilities, whether publicly or privately owned, shall be backfilled and compacted according to the City's specifications. Utility companies and contractors shall obtain a street cut permit before disturbing any pavement in public right-of-way.

6. All public or privately owned underground utilities shall stub out all services from mains in all directions to the property lines in streets and in alleys where the services shall be stubbed out eighteen inches (18") inside the rear property line of platted lots and to the property line of unplatted property prior to commencing paving operations.

B. Nothing herein set forth shall prohibit or restrict any utility company from recovering the difference between the cost of overhead facilities and underground facilities. Each utility whose facilities are subject to the provisions of this ordinance shall develop policies and cost reimbursement procedures with respect to the installation and extension of underground service.

C. The Electric Utility Company may plan and construct overhead feeders and/or lateral lines on perimeters of subdivisions or property without obtaining an exception. Telephone and cable television lines may be constructed overhead where overhead electric utility lines are permitted.

D. Nothing in this section shall prevent provision of temporary construction service by overhead utility lines and facilities and no exception shall be necessary to provide such temporary services.

E. As used in this section, the terms "feeder lines," "lateral lines," and "service lines" shall have the following meanings:

1. Feeder Lines. Those electric lines that emanate from substations to distribute power throughout an area.

2. Lateral Lines. Those electric lines that emanate from feeder lines and are used to distribute power to smaller areas of electric consumers. These electric lines are normally connected to a feeder line through a sectionalizing device such as a fuse or disconnect switch.

3. Service Lines. Those electric lines, which through a transformer connect a lateral line to a customer's service entrance.

F. All installations regulated by the provisions set forth herein shall be in conformance with the intent of this section and shall conform to any regulations and/or specifications that the various public utility companies may have in force from time to time.

G. Nothing in this section shall be construed to require any existing facilities to be placed underground; provided, however, that where overhead lines exist on land that is to be platted, they shall be removed before the final plat is filed.

5.13 Provision of Amenities

Amenities shall be required where approved pursuant to a Planned Development District or as required to be developed under the Ladonia Zoning Regulations. Where these amenities are owned and maintained by property owners in common or through an association of property owners, or where the amenities are to be dedicated to the City and are to be maintained publicly or privately through agreement with the City, the City may require any or all of the following:

A. Plans and illustrations of the proposed amenities;

B. Cost estimates of construction, maintenance and operating expenses;

C. Association documents, deed restrictions, contracts and agreements pertaining to maintenance of the amenities, if appropriate; and

D. Provision of surety as required for maintenance and other expenses related to the amenities, if appropriate.

5.14. Protection of Drainage and Creek Areas

A. Definitions and Methodology for Determining the Floodway Management Area (FMA) - The definitions for "floodway" and "floodway fringe" shall correspond to those set forth by the Federal Emergency Management Agency (FEMA). For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist the local community in the aspect of flood plain management. Under this concept, the area of the 100 year flood is divided into a floodway and floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100 year flood may be carried without substantial increases in flood heights as defined by FEMA. The area between the floodway and boundary of the 100 year flood is termed the floodway fringe. The floodway fringe is the area, which can be used for development by means of fill according to FEMA and City engineering criteria.

For the purposes of this Ordinance, the Floodway Management Area (FMA) will correspond to the Floodway as defined by FEMA.

B. Areas Where an FMA is Required - All drainage areas or regulated floodways as referenced by the current panel number(s) on the Floodway and Flood Boundary Map (FIRM Maps) shall be included in the FMA. If FEMA does not specify a Floodway Zone in any of the above creeks or their tributaries, it shall be the developer's responsibility to establish and identify the FMA. The determination shall be made by a registered professional engineer and in accordance with the Flood Hazard Prevention Ordinance and approved by the City Engineer. Where improvements to a drainage area are required by other sections of this ordinance or other ordinances of the City for the purpose of safety or other reasons related to drainage, those sections or ordinances shall also be observed. The FMA is intended to apply to a creek or channel, which is to remain open, or in its natural condition. The creek shall remain in its natural state unless improvements are permitted by the City due to the pending development of properties adjacent to or upstream of the required improvements.

C. Ownership and Maintenance of the FMA - The area determined to be the FMA shall be designated on and as part of the final plat. Approximate locations shall be shown on zoning change requests and preliminary plats. The City, at its option, may place utility lines in the area designated as the FMA. The FMA may qualify under parkland dedication requirements or other open space requirements, if authorized in the City's Zoning Regulations or other ordinances. At the City's option, the FMA shall be protected by one of the following methods:

1. Dedication - Dedicated to the City of Ladonia; or

2. Easement(s) - Creeks or drainage ways in tracts which have private maintenance provisions, other than single-family or attached housing platted lots, can be designated as the FMA by an easement to the City on the final plat. Subdivisions with platted single-family or attached housing lots may designate the FMA by easement provided there is adequate maintenance provisions, but no lots or portions of lots may be platted in the easement unless specifically allowed by the City. The area designated as FMA may be identified by a tract number; or,

3. Recreational uses - Certain recreational uses normally associated with or adjacent to flood prone areas, except for uses involving structures, may be allowed in the FMA, such as golf courses. The uses allowed shall be in conformance with the Zoning Regulations and approved by the Planning and Zoning Commission and City Council.

Prior to acceptance of any drainage way as an FMA by the City, the area shall be cleared of all debris. Floodway Management Areas dedicated to the City shall be left in a natural state except those areas designated for recreational purposes.

D. Design Criteria - The following design criteria shall be required for development adjacent to the FMA:

1. Adequate access must be provided along the FMA for public or private maintenance. An unobstructed area a minimum of twenty feet (20') wide with a maximum 5:1 slope (five feet horizontal to one foot vertical), the length of the floodway shall be provided adjacent to one side or within the FMA. On the opposite side of the drainage area, an unobstructed area having a minimum width of five feet (5') shall also be provided, if possible.

2. Lots in residential zoning districts shall not be platted in the FMA. If lots back to an FMA, at least two reasonable points of access to the FMA, a minimum of twenty feet in width, shall be provided. Streets and alleys may qualify as access points. All areas of the FMA must be accessible from the access points. Lots used for attached housing may be platted in the FMA if the FMA is identified as an easement and is maintained as open space for use by the residents.

3. Public streets may be approved in the FMA by the Planning and Zoning Commission and City Council (if they conform to applicable engineering standards).

4. Whenever possible, public streets shall be constructed adjacent to the FMA to allow access for maintenance or recreational opportunities.

E. Drainage areas, which have been altered and are not in a natural condition can be exempted from an FMA and this section at the discretion of the City Council upon recommendation of the City Engineer.

F. All floodplain reclamation shall be according to the City's to the floodplain reclamation and preservation provisions contained in Sections XXX of the Zoning Ordinance.