LAND DEVELOPMENT PROCEDURES MANUAL

Volume 2: Design Guidelines

Effective: January 2024

LAND DEVELOPMENT PROCEDURES MANUAL
VOLUME 2: DESIGN GUIDELINES

CITY OF JACKSONVILLE, FLORIDA
2024

Approved and Adopted in Accordance with

Provisions of Chapter 654, Jacksonville Ordinance Code

(Code of Subdivision Regulations)

Effective January 2024

LAND DEVELOPEMENT PROCEDURE MANUAL REVISIONS

Revision Number	Sections Revised	Effective Date
28	All manual sections reorganized, all of Sections 1, 3, 4 and 7 revised, Appendix 1 Revised, Appendix 3 deleted	7/13/2021
29	Sections 1.7.1 and 7.1.5 revised	3/18/22
30	Reorganization of LDPM into 4 volumes. Updates from CSSC throughout Section 2.0 Roadway Design Criteria and Section 3.0 Traditional Neighborhood Design Section 1.1.11 Traffic Impact Study Requirements added	1/9/2024

For revision information prior to July of 2021 see Land Development Procedure Manual Addendum Sheet in Appendix 1

GENERAL STATEMENT OF LAND DEVELOPMENT PROCEDURES AND CRITERIA

The Land Development Procedures Manual (LDPM) has been produced by the Subdivision Standards and Policy Advisory Committee and the Context Sensitive Streets Standards Committee in conjunction with the Department of Planning and Development, the Department of Public Works, JEA, the Office of General Counsel, and the Private Sector in order to assist in the development of land within the City of Jacksonville. In addition, hereto, certain criteria have been incorporated pursuant to various elements of the 2030 Comprehensive Plan, adopted per Chapter 650 of the Jacksonville Ordinance Code and Chapter 163, Part II, Florida Statutes.

The LDPM includes four volumes as outlined below which are adopted and approved as provided in Chapter 654 of the Jacksonville Ordinance Code to be used by the Divisions within the Department of Planning and Development, the Engineering Division of the Department of Public Works, and JEA in review and approval of permit applications and site development plans.

Volume 1 Policies and Procedures

Volume 2: Design Guidelines

Volume 3: Standard Details

Volume 4: Standard Specifications

The information contained in the LDPM Volumes 1 through 4 will apply to all development and construction projects, both public and private, within the jurisdiction of the Department of Planning and Development of the City of Jacksonville.

LAND DEVELOPMENT PROCEDURE MANUAL
VOLUME 2: DESIGN GUIDELINES
TABLE OF CONTENTS

List of Figures

List of Tables

SECTION 1.0 – TRAFFIC ENGINEERING REQUIREMENTS

1.1 DRIVEWAY REQUIREMENTS AND ACCESS CONTROL

Pursuant to Resolution 2019-653-A, the City of Jacksonville ("COJ") is committed to applying the guidelines of Complete Streets.

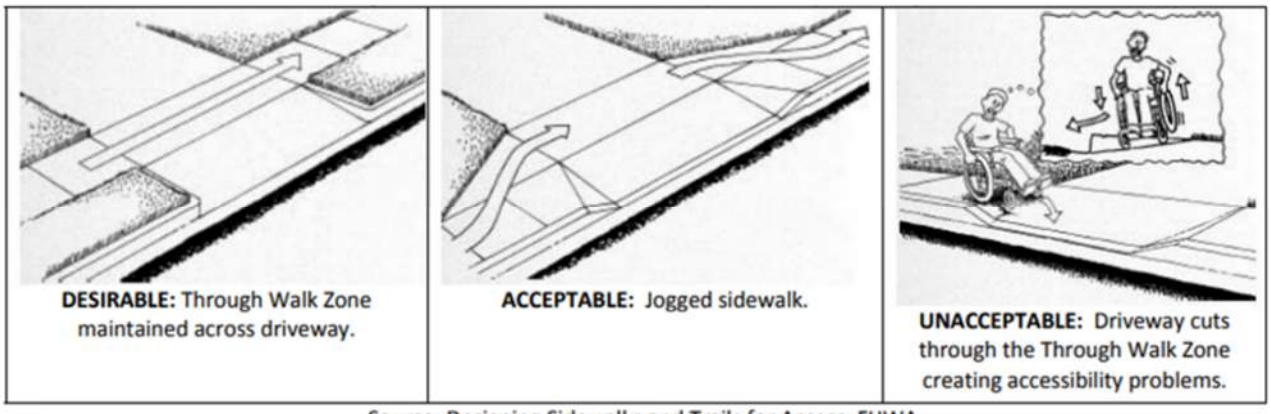
It is the intent of the City to grant owners of property abutting City-owned and maintained streets and highways the right of safe and adequate access to such properties while providing sufficient roadway capacity minimizing accident potential, and maintaining safe and comfortable bicycle facilities, sidewalks, and share-use paths across driveways; therefore, the City finds it necessary to limit the number, width, size, type, and location of driveways and to regulate the vehicular movements in and out of driveways in the best interest of the general public. The design of streets and frequency of driveway access shall be related to the context.

1.1.1 DRIVEWAY CLASSIFICATION

Driveways shall be classified according to the type of development they serve, the volume of traffic using the driveway, and the speed and classification of the servicing roadway.

Class I driveways primarily serve residential developments with peak hour traffic volumes of 30 VPH or less or average daily traffic volumes of 300 VPD or less and are intended for low-speed passenger vehicle use only. The following types of developments will generally require Class I driveways utilizing a flared design rather than a radial return so that the sidewalk maintains a flat surface. See **Figure 1.1-1** below.

1. All single-family residential dwellings
2. Townhomes
3. Multifamily developments of 30 or fewer units



Source: Designing Sidewalks and Trails for Access, FHWA.

Figure 1.1-1 Walk Zones through Driveway Connection Areas

Class II driveways serve developments with peak hour traffic volumes of 30 VPH or less or average daily traffic volumes of 300 VPD or less and are intended primarily for passenger vehicle use on roadways where the average speed is less than 40 mph. The following types of developments will generally require Class II driveways.

1. Convenience stores without diesel facilities

2. Gas stations without diesel facilities

3. Daycare facilities serving 150 or fewer children

4. Professional offices with an area of 8000 square feet or less

5. Retail stores with an area of 8000 square feet or less

6. Mini-warehouses

Class III driveways are intended for use when traffic volume exceeds 30 VPH or 300 VPD, the average speed is greater than 40 mph, and are designed to serve all legal vehicle types. The following type of developments will generally require Class III driveways.

1. Multifamily developments greater than 30 units with single family dwellings

2. Mall entrances

3. Shopping center main entrances

4. Schools and churches

5. Office complexes with an area greater than 8000 square feet

6. Multi-unit commercial developments

7. Industrial warehouses

8. Business parks

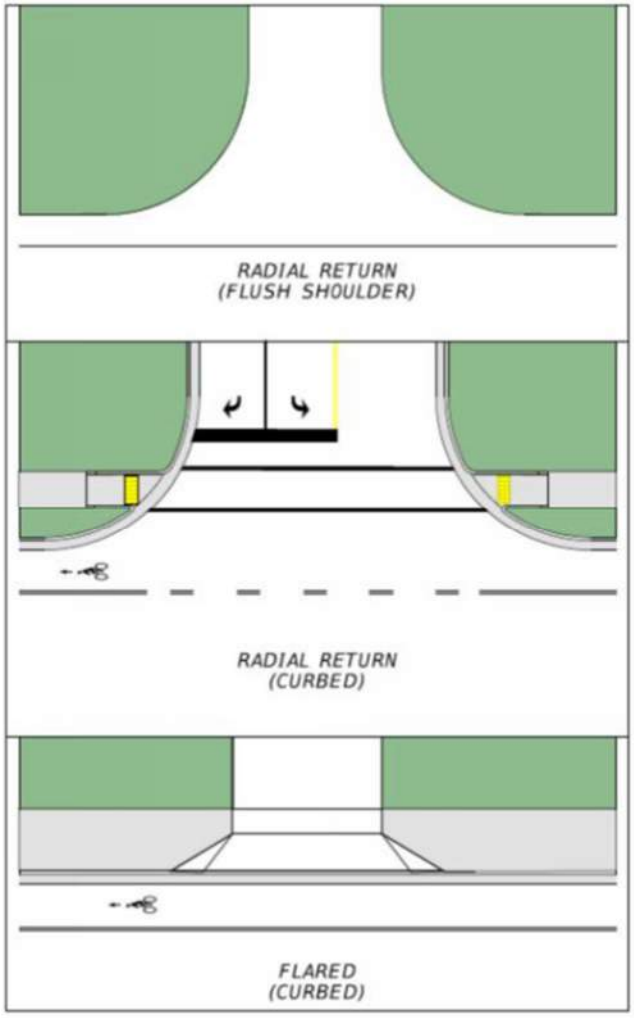
9. Any development with general truck and tractor trailer traffic

10. Any development with driveways within the limits of a signalized intersection

Driveway classes shall also be determined based on the speed of the adjacent roadway.

1.1.2 DRIVEWAY DESIGN AND ROADWAY TYPES

It is important to design roadways using a context sensitive design to ensure that pedestrians and cyclists can be accommodated while safely providing for motorized users, including large vehicles. There are two types of driveway designs: radial return and flared. The design is based on whether the road is curbed or has a flushed shoulder, as well the driveway category, and the posted speed limit. An example of each is shown in **Figure 1.1-2.**



Source: FDOT Design Manual, 2021

Figure 1.1-2 Flared and Radial Return Driveway Examples

These designs impact vehicles entering and exiting sites, with larger radial return type allowing for higher speeds. Other considerations for driveway design are:

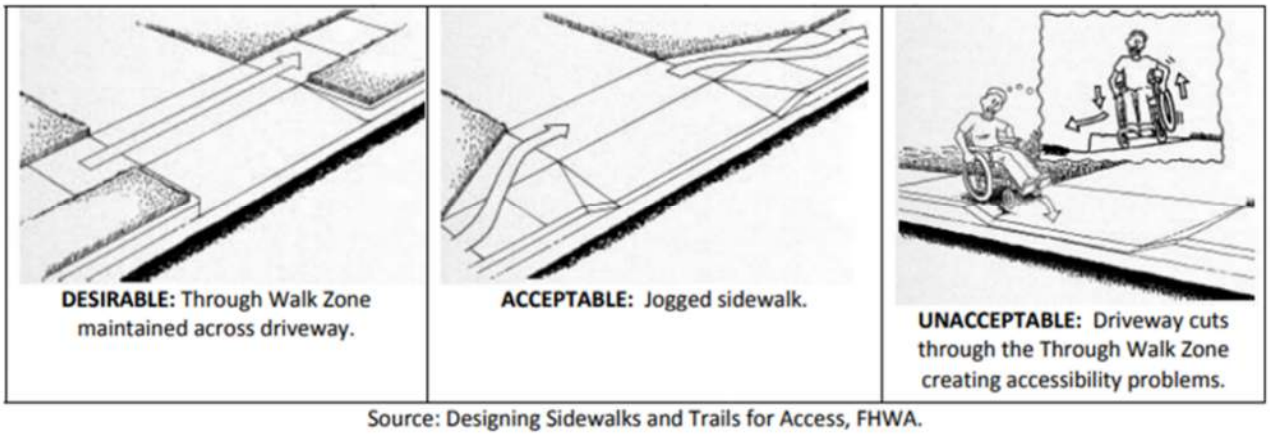
1. Context classification
2. Safety of drivers, pedestrians, and other wheeled units
3. Design speed of roadway
4. Driveway traffic volume
5. Entry and exit movements
6. Available right-of-way
7. Design vehicle

Radial Return Driveways (Flush Shoulder and Curbed)
Radial return driveways may only be used on high-speed roadways (40mph or higher) or in rural contexts, as per driveway classifications (see **Attachment 2-1**). Radial return driveways shall not be installed on curbed roadways with a speed limit of 35mph or less. For radial return driveways (flush shoulder and curbed), the driveway return radius shall not exceed the curb radius specified in Section 2.2.5 of the LDPM. The disadvantage of radial return driveways is that they may:

1. Disrupt continuous sidewalks and shared-use paths across driveways
2. Encourage higher speeds for vehicles
3. Decrease the safety and level-of-comfort for ADA passage across driveways
4. Prioritize vehicle movement over the safety and comfort of vulnerable roadway users

Flared Driveways
Flared driveways must be constructed on lower-speed roadways (posted speed limit <40mph) in urban contexts, as per driveway classifications Flared driveways must be installed on curbed roadways with posted speeds of 35mph or less. The advantages of flared driveways are as follows:

1. Eliminate the use of curb ramps, providing a higher level of comfort for nonmotorized passage across driveways
2. Encourage lower speeds for vehicles
3. Increase the level-of-comfort for ADA passage across driveways
4. Maintain the elevation of the sidewalk throughout the walk zone
5. May utilize "jogged" sidewalks to maintain grade elevation of existing nonmotorized facilities where sidewalk widths or right-of-way alone is insufficient.
6. May maintain the grade elevation and width of existing shared-use paths through the walk zone



Source: Designing Sidewalks and Trails for Access, FHWA.

Figure 1.1-3 Pedestrian access through driveway

Requirements for Flared Driveways (adjacent to curbed roadways with a posted speed of 35mph or less):

1. Driveways crossing sidewalks shall maintain the same grade and elevation as the adjacent sidewalk through the walk zone. The "walk zone" is the area where the projection of the sidewalk crosses the driveway.

2. The cross slope of the walk zone shall not exceed 2%.

3. The ramp portion of the driveway should be located within the furniture zone or utility strip when possible. The "furniture zone" or "utility strip" is the area between the face of the curb and the edge of the sidewalk.

4. The grades of the driveway must meet the grades shown in FDOT Index 522 "Concrete Flared Driveways".

5. In constrained conditions or locations without a utility strip the sidewalk shall be "jogged" to maintain its normal elevation. If there is not enough Public Right-of-Way for the jogged sidewalk, then the developer shall provide an easement to the City.

6. The walk zone may be reduced to 4' in constrained conditions unless there is a shared-use path.

7. If a driveway crosses a shared-use path, then the walk zone shall be equal to the full width of the shared-use path.

8. Exceptions to these requirements may be granted in writing by the City Traffic Engineer

For curbed roadways with a posted speed limit of 40mph or over, all Class-1 Driveways shall be flared.

For curbed roadways with a posted speed limit of 40mph or over, the developer shall select the driveway type based on the 2019 FDOT Access Management Guidebook.

1.1.3 DRIVEWAY SPACING REQUIREMENTS

Driveway location and spacing are carefully controlled for the purpose of minimizing conflict and to provide adequate site distance for entering and exiting traffic. Proper spacing helps identify which development and driveway serves and provides adequate spaces for utility poles and traffic signs.

Driveways shall not be located closer than ten (10) feet from the point of curve of a roadway radius return or closer than four (4) feet from a stop bar of a signalized intersection. In no case shall a driveway or any portion of a driveway be located within a signalized intersection on the signal side of the stop bar unless this driveway is fully controlled by the traffic signal. At high volume intersections or at intersections with high left turn volume, the Traffic Engineer may require driveways to be located as far as 250 feet from the intersection, such that turning movements into and out of the driveway will not take place within the left turn stacking or storage lane.

The recommended minimal spacing between driveways is as follows:

Class	Spacing (feet)
Urban Class I	Zero
Urban Class II	17
Urban Class III	75
Rural Class I	Zero
Rural Class II	75
Rural Class III	300

Driveway spacing will be measured along the right-of-way line from the edge of the driveway to the edge of the adjacent driveway and shall not include the width of driveway.

1.1.4 WIDTH AND NUMBER OF DRIVEWAYS PER DEVELOPMENT

The width and number of driveways for a parcel or development shall be determined by the type of development and the volume of traffic projected to use the driveway.

In general, each parcel or development will be permitted a single driveway or joint-use driveway providing access to a public street. As an exception, any additional driveway(s) may be permitted for large developments when it is shown that the additional driveway(s) is (are) essential to provide adequate access to the development and will not adversely affect the safety or level of service of the existing roadway. Driveways on corner lots shall be designed and located to discourage traffic using the driveway as a bypass to avoid the intersection and/or other obstacles within the public right-of-way.

The width of driveways will be measured perpendicular to the driveway at the right-of-way line and will not include the flares or transitions. The width of individual driveways and total width of all driveway connections shall conform to Section 656.1215(d) of the City Ordinance Code.

Class I driveways shall be a minimum of eight (8) feet wide for a one-way entrance or exit and a maximum of 24 feet wide for a two-way drive.

Class II and Class III driveways that are designed to be two-way which do not contain a landscape island shall have a minimal width of 24 feet and a maximum width of 36 feet.

Class II and Class III driveways may contain a landscape island 10 feet to 16 feet wide separating the two-way traffic. In such case, each travel way shall be a minimum of 16 feet wide and a maximum of 24 feet wide when measured from the inside edge of the island to the outside edge of the driveway. In no case shall the total width of a driveway containing a landscape island exceed 48 feet.

Landscaping located within an island shall be approved by the Traffic Engineering Division, Engineering Division, or their designee. Landscaping shall not block sight distance or pose a traffic hazard. Landscaping restrictions also pertain to subdivision and/or commercial signs.

When more than one driveway for a parcel or development is approved by the Traffic Engineer, the maximum combined width of all driveways through the perimeter landscape area shall be no more than 48 feet for properties with 100 feet or less of street frontage. For properties with more than 100 feet of street frontage, an additional 1 foot of driveway through the perimeter landscape area may be constructed for each 4 feet of street frontage in excess of 100 feet. In no event shall more than 50 percent of any street frontage be paved.

1.1.5 JOINT USE DRIVEWAYS AND INTERNAL CROSS EASEMENTS

Where a parcel or development does not contain adequate frontage to comply with the minimal spacing specified herein, or when driveway locations may be restricted by the Traffic Engineer, joint use driveways may be required, whereby two or more parcels or developments will be served by the same driveway. The City encourages the use of cross access easements and internal circulation roadways connecting adjacent developments when there are significant productions and attractions between adjacent developments to reduce the total number of trips on the public roadway.

Major developments such as shopping centers and office parks which contain outparcels that are adjacent to existing or proposed compatible developments will require provisions for internal access to such outparcels or internal connections to adjacent developments.

The developer shall be responsible for all arrangements and agreements with adjacent property owners when joint use driveways or internal cross easements are required by the City.

1.1.6 CROSS-ACCESS TO COMMERCIAL AND OFFICE USE PARCELS

When providing access to commercial and office use parcels, other than those within the commercial central business district ("CCBD"), or as excepted herein, the following provisions shall be observed:

1. Where a commercial or office use development abuts or contains a designated collector or higher functionally classified roadway, a cross-access drive, lane, or way ("cross-access") shall be constructed to connect the properties adjacent to the collector or higher functionally classified roadway in order to provide for interconnectivity of traffic flow through and along parking lots and access roads leading to and from adjacent commercial or office use developments without the need to access the collector or higher classified roadway.

    a. If the adjacent site is developed and, in the opinion of the Planning and Development Department, cross-access is feasible, the owner or developer shall design and build the appropriate cross-access to the property line of the adjacent parcel.

    b. If the adjacent site is developed, but in the opinion of the Planning and Development Department, cross-access is not feasible at this time, the owner or developer shall design and designate on the site plan the location of future cross-access, but will not be required to construct the cross-access at the time of initial site development. The owner shall commit, in writing, to construct and allow cross-access at such time as the City determines that cross-access is feasible and desirable.

    c. If the adjacent site is undeveloped, the owner or developer shall design and build the cross-access to the property line of the adjacent parcel in anticipation of future connection when that site is developed.

    d. The minimum width of a vehicular cross-access shall be 24 feet.

    e. Existing commercial or office use developments in place on March 1, 2019 that do not contain the interconnectivity as required by this section, shall be brought into compliance with this requirement under the following conditions provided that a determination is made by the Director of Planning and Development that such interconnectivity requirements do not impose an undue burden, as described below in part 3(d), on the affected property owners:

        (i) When a new driveway connection permit is required for the existing development; or

        (ii) When substantial enlargements or improvements to the existing development are undertaken. "Substantial" means within any three-year period, when the total cumulative renovation of existing development is equal to at least 50 percent of the assessed value of the lot improvements (including structures and parking and exterior areas but not the value of the land) on the start of the three-year period, according to the Property Appraiser, or the total square footage of a structure is expanded to 50 percent or greater, as well as any cumulative square footage expansions totaling 50 percent; or

        (iii) When a 25% or greater increase in vehicle trip generation is attributable to the new development, as compared to the existing development, is documented.

    f. Parcels zoned CCG -2 shall not be required to connect to parcels within a zoning district other

than CCG -2, but they shall be required to interconnect with each other. Similarly, parcels within a zoning district other than CCG -2 are not required to connect to a parcel zoned as CCG-2.

2. The construction or erection of any barrier or obstacle which would prohibit access to the cross- access drive from a site's major parking area or prohibit sharing access drives for interconnectivity with adjacent properties shall be prohibited. This provision is not to conflict with or exempt a developer from complying with landscape and tree protection regulations.

3. Specific exemptions to, or abatement of, this provision may be granted by the Director of Planning and Development, or his or her designee when one or more of the following conditions occur:

    a. Physical or regulatory constraints on a currently developed property prohibit, as determined in consultation with the City Engineer, the construction of a cross-access drive which meets the City's design and clear zone standards; or

    b. The parcel required to provide interconnectivity requests an abatement based upon the use of their property as particularly requiring security or privacy as a mandatory element of their business. When that use ceases, the requirement to provide the cross -access resumes, and the abatement ends; or

    c. The owner or developer can prove to the satisfaction of the Director of Planning and Development that there was a lease, mortgage, or other agreement, related to the real estate parcel in question, in existence prior to April 4, 2018, that prohibits the developer or owner from providing the cross-access. For purposes of this abatement, the abatement ends at the conclusion of such an agreement's full term.

    d. The Director of Planning and Development determines that an affected property owner otherwise subject to the provisions of this section would currently be subject to an undue burden if required to provide the interconnectivity. An "undue burden" shall be determined as follows:

        (i) In the opinion of the City's Traffic Engineer, the connection will create undue traffic conflicts;

        (ii) In the opinion of the Director, the connection will create undue harm to protected trees;

        (iii) In the opinion of the City's Engineer, the elevation change between sites creates an undue engineering burden, or creates undue utility conflicts;

        (iv) Any other burden expressed in writing by the Director stating the undue burden and the rationale for declaring the burden undue.

1.1.7 MEDIAN CROSSOVERS

Driveways which are located on divided roadways shall be aligned with an existing median or shall be offset from the centerline of the median crossing by a distance of 75 feet or more. The Traffic Engineer may require the removal/relocation of existing medians opening or the construction of new median openings to align with

proposed driveways when necessary for proper safety and traffic flow. All driveways located at median openings will require construction of adequate left-turn lanes unless such traffic movement is restricted or non-existent.

1.1.8 LEFT TURN STORAGE LANE

Left-turn storage lanes will be required at all driveways when the volume of left-turn traffic into the driveway and the volume of opposing through traffic is sufficient to affect the safety and capacity of the advancing traffic stream. Left-turn lanes may also be required by the Traffic Engineer when deemed necessary to provide adequate site distance or to align with opposing left-turn lanes.

In general, left-turn storage lanes shall be considered when the volume of left-turn traffic exceeds 30 vehicles per hour and the through traffic exceeds 200 vehicles per hour in either direction. However, local conditions may require modification of these thresholds depending on the type of development and existing traffic characteristics.

1.1.9 RESTRICTED DRIVEWAYS

The City Traffic Engineer may require new restrictions or one-way operation of a driveway when such operation is deemed necessary for safety and/or the present existing levels or service. The owner shall install and maintain all necessary traffic-control devices in a proper manner to assure the intended operation of restricted driveways.

1.1.10 PERMITS

A permit to work within the public right-of-way will be required for all driveways constructed on City-owned and maintained roadways.

Except for single-family dwelling units, all building plans submitted for permits shall show all existing and proposed driveways, including any required acceleration/deceleration or left-turn lanes. The City Traffic Engineer shall review all such building plans on both City and State roadways. A separate permit from FDOT will be required for all driveways on State roads.

Driveway permits will not be issued and access to a parcel will be denied unless a site plan showing the existing or proposed development is submitted or other documents submitted indicating the proposed usage of the driveway and parcel.

1.1.11 TRAFFIC IMPACT STUDY PROCEDURES

If a traffic impact study is required for new or existing development in the City of Jacksonville, as conditioned by a land use or zoning approval, or as requested by the City Traffic Engineer, the study shall be provided by the developer and performed, signed, and sealed by a professional traffic engineer registered in the State of Florida. No study shall be accepted without a traffic methodology meeting ("Traffic Methodology Meeting") held prior to commencement of the study. The Traffic Methodology Meeting shall be attended by the developer's professional engineer, the City Traffic Engineer, the Chief of Transportation Planning, and a Traffic Technician from the Development Services Division, in order to determine the study parameters. The developer's engineer shall schedule and conduct the Traffic Methodology Meeting.

1.2 SIDEWALKS

All new development and redevelopment projects are required to provide adequate pedestrian access via the construction or reconstruction of sidewalk infrastructure. The goal of this policy is to ensure that all modes of transportation are taken into consideration when designing any new project, whether residential, commercial, industrial or recreational. Furthermore, it is ensuring that a complete sidewalk network is provided throughout the city, while also recognizing that sidewalks may not be feasible in all circumstances due to unforeseen or uncontrollable situations.

1.2.1 GENERAL SIDEWALK REQUIREMENTS

Sidewalks shall be provided for all developments, including residential or non-residential infill lots, and along all new, reconstructed, and existing streets, to provide for safe pedestrian travel. Pursuant to the Comprehensive Plan, “development” is a very inclusive definition and is stated as "the act of building, engineering, mining or other operations in, on, over or under land, or the making of any material change in the use of any building or other land.”

Sidewalks shall be constructed in accordance with these Land Development Procedures Manual, the City Standard Details, the City Standard Specifications, and the City Context Classification Map.

Sidewalks may be required beyond property fronting existing right-of-way in order to provide pedestrian access to schools, parks, churches, shopping centers, and to connect to existing sidewalks. Off-site sidewalk requirements for residential subdivisions should generally not exceed more than five feet per lot, however, all off-site sidewalk improvements will be reviewed on a case-by-case basis as determined by the City’s Traffic Engineering Section and the Current Planning Section.

Table 1.2-1 includes the minimum sidewalk width requirements for new, reconstructed, and existing streets in each Development Area, unless other specified in 1.2.1 Residential Subdivision Sidewalk Options (See Sec. 654.133, Ordinance Code). Refer to the Development Area map located in the Future Land Use Element of the Comprehensive Plan for boundaries.

Table 1.2-1 minimum sidewalk width requirements for new, reconstructed, and existing streets

Development Area	Sidewalk Location	Required Sidewalk Width (feet)
Downtown	Both sides of street	8
Urban Priority Area	Both sides of street	6
Urban Area	Both sides of street	6
Suburban Area	Both sides of street	6
Rural Area	Both sides of street	5

When standard sidewalk width cannot be attained due to demonstrated right-of-way constraints, provide the greatest sidewalk width possible, but not less than five feet.

Safe and exclusive pedestrian access shall be provided between existing bus stops and identified future bus stops and individual building lots.

When the Florida Department of Transportation constructs or reconstructs a roadway, they are required to provide a shared-use path or a sidewalk with a buffered/protected bike lane or separate bike lane, if right-of-way is available. If right-of-way is unavailable, construction or reconstruction will be reviewed on a case-by-case basis as determined by Public Works and the Planning and Development Department.

Exemptions from sidewalk requirements.
Required sidewalk widths by Development Area, shall be provided within existing city or state road right-of-way for all proposed development and re-development of property fronting along city or state road right- of-way except as follows:

1. A sidewalk will not be required where a sidewalk already exists as long as it meets ADA Standards and General Sidewalk Requirements. ADA standard curb ramps, curb cuts, and detectable warnings are

required at all intersections where one or more of the rights-of-way of the intersecting streets contain sidewalks.

2. Installing sidewalks may not be required when construction of sidewalks by the City or State is funded and provided for in the Capital Improvements Program, Downtown Community Redevelopment Plan, JTA Mobility Works, or Better Jacksonville Plan, and when construction is scheduled to begin within two years. A sidewalk bond shall be posted by the developer in case the sidewalk construction by the City or state is cancelled or delayed.

1.2.1 RESIDENTIAL SUBDIVISION SIDEWALK OPTIONS

There are two options for providing sidewalks along residential local subdivision streets. Residential local subdivision streets are local streets within platted subdivisions that provide access to residential lots and provide connectivity to the City of Jacksonville local, collector, or arterial roadway facilities.

Option A: Provide five-foot (5') wide unobstructed sidewalks on both sides of all local streets, except as follows:

1. Sidewalks are not required on a cul-de-sac street with less than 15 lots. (Note: corner lots shall be included in the lot count)

2. Cul-de-sacs streets and minor roads that serve between fifteen (15) Lots and thirty (30) lots may provide a five-foot (5') wide sidewalk on one side.

Notes:

1. Cul-de-sac bulb circumference area shall not require a sidewalk, however a separate ADA Standard curb cut ramp must be provided regardless of available in lieu of driveway aprons.

2. Cul-de-sacs that lead to parks or clubhouses shall have a sidewalk on at least one side of the street regardless of the number of lots.

Option B: Provide a six-foot (6') wide unobstructed sidewalk on one side of the street for all local streets, as long as the sidewalk establishes good interconnections and is located on the side of the street that will serve the most residential lots.

The subdivision entrance road shall provide a six-foot (6') wide sidewalk on both sides of the collector or trunk road and the sidewalks shall connect to external sidewalks if the same exist. If external sidewalks adjacent to the subdivision do not exist, a minimum six-foot wide sidewalk shall be installed at least along the frontage of the subdivision, and perhaps further pursuant to staff review.

Sidewalks may not be required within proposed subdivision right-of-way that directly abuts preserved wetlands and retention ponds unless a pedestrian connection is deemed necessary and if pedestrian movements are accommodated on the other side of the street.

Sidewalk construction must be consistent with the historical design prevalent on the blocks. New and reconstructed sidewalks are required to use hexagonal concrete pavers, hexagonal stamped concrete, or other historically unique materials and patterns specific to the block. If stamped concrete is used, it must be constructed in such a manner that it accurately reproduces the style of the original material and is consistent in its application throughout.

1.2.2 SIDEWALK DESIGN REQUIREMENTS

Where buildings are located along-side of the right-of-way, sidewalk width shall be increased by (3) feet.

Permanent obstacles such as utility pole signs, mailboxes, drainage structures, etc., shall not be located within a sidewalk unless a minimum of four (4) feet clearance can be obtained within the sidewalk width.

When the projected volume of pedestrians on a sidewalk is unusually high, the Traffic Engineer may require an increase in sidewalk width.

To provide proper pedestrian/vehicle separation and adequate space for traffic signs, poles, utilities, etc., planting strips shall be located between the edge of pavement and sidewalk. For urban, suburban, and rural sections, the minimum width of a planting strip shall be five (5) feet, which measures from the back of the curb to the edge of the sidewalk. When trees will be located within the planting strip, the minimum width shall be increased to eight (8) feet. Sidewalk grades; cross slopes; and fencing or railings (where drop off hazards are present), shall be consistent with the current FDOT Design Manual.

For sidewalks on roadways without curb and gutter, a minimum clear zone betweenthe edge of pavement and the sidewalk shall be provided in accordance with the clear zone requirements in the FDOT Design Manual, Construction and Maintenance for Streets and Highways.

Design, Construction and Maintenance for Streets and Highways.
As an alternative to providing sidewalks within the approved right-of-way, a shared use/multi-use path may be provided subject to approval by the Planning and Development Department, based upon the presence of nearby paths, if the location is part of an established plan for shared use/multi-use paths, or if the location is an important link between existing bicycle and pedestrian facilities.

1.2.4 PEDESTRIAN, SHARED-USE PATH, TRAIL, & BIKE CROSSINGS

Sidewalks, shared-use path, trails, and bike crossings shall be designed and located to minimize traffic conflicts and to provide adequate sight distance for all road users (i.e. pedestrians, bicyclist, and motorist).

ADA detectable curb ramps and detectable warnings shall be located at all pedestrian, shared-use path, and trail crossings.

Bike-crossings for two-way cycle tracks are similar to the markings of a high-emphasis pedestrian crosswalk. Green-colored pavement markings may be used when the need to enhance the conspicuity of bicycle-pedestrian-vehicular conflict areas is demonstrated. The FDOT Design Manual, where examples are provided, will be used as reference for green-colored pavement markings.

Active Warning Devices (Rectangular Rapid Flashing Beacons, HAWKs, etc.) at pedestrian crossings, shared-use path crossings, trail crossing, and bike crossings may be required per minimum levels of demand as determined by the City Traffic Engineer.

1.2.5 SIDEWALK DEVIATIONS (CONSTRUCTION WAIVER, DEFERRALS, VARIANCE)

A sidewalk deviation may take the form of a construction waiver, a deferral, or a variance. The Planning and Development Director may require a transportation study to substantiate the deviations from the general sidewalk requirements.

Construction Waiver and Payment into the Sidewalk Fund (In-Lieu Sidewalk Program Application)
This Program is applicable to all development within the City. If the Developer is unable to construct sidewalks, upon City approval, a contribution to In-Lieu Sidewalk Program shall be paid as a substitute to constructing a sidewalk. The failure to construct a sidewalk shall not cause or contribute to a safety hazard as determined by the City. Closing critical gaps in the sidewalk network and being the first to initiate development in an area or along a

corridor are valid reasons to provide sidewalks and contribute to an effective countermeasure for the safety of pedestrians. The In-Lieu Sidewalk Program is not to be used as an option to reduce project costs. Consistent with Section 654.137(a), Ordinance Code, an In-Lieu Sidewalk Program Application may not be granted solely based on economic hardship or if it would have the effect of nullifying the intent and purpose of these regulations.

Upon submission of an official Application (see **Attachment 2-2**), each request will be reviewed by the City Bicycle and Pedestrian Coordinator, Development Services, Right of Way and Stormwater Maintenance Division, and Traffic Engineering to assess compliance with the below criteria. The City Engineer shall review recommendations and comments prior to making a final determination. If the applicant qualifies, they will receive written notice approving their In-Lieu Sidewalk program Application with payment amount. If the applicant does not qualify, a written explanation shall be provided. If a payment is requested, it must be submitted payable to the City of Jacksonville. **Once the Tax Collector Department receives the payment, approval for Civil Plans will be completed**. The review process can take up to 15-business days.

Prior to applying for the In-Lieu Sidewalk Program, alternative options of accommodating sidewalks shall be considered and documented including but not limited to:

1. Meandering alignment

2. Conveyance to the City of an easement

To qualify for the In-Lieu Sidewalk Program payment option a project must meet one of the following criteria:

1. EXCEPTIONAL SPECIMEN TREE -Requires the removal of or will adversely impact the health of a significant tree or an exceptional specimen tree as defined by Section 656.1203 (bb) (3), Ordinance Code -Hardwood tree with a Diameter Breast Height (DBH) of 24 inches or greater.

2. RIGHT-OF-WAY (ROW) -Contains significant right-of-way constraints and an easement is not a feasible alternative.

3. DRAINAGE -Requires significant drainage modifications. Note: A certain level of drainage improvements shall be expected when installing sidewalks. Installing drainage pipe is considered the minimum standard of making required site improvements. In some instances installing drainage pipe to replace a drainage ditch may be required and should be considered in the preliminary design. As such, installing drainage pipe to replace an existing drainage ditch does not qualify as a significant drainage modification.

4. REGULATORY HARDSHIP - A regulatory hardship means an official action issued, in writing, by a governmental agency that prevents the applicant from sidewalk installation requirements. Such official governmental action may include but is not limited to: a recommendation of denial of any permits or other required regulatory approvals such as building permits, environmental permits, administrative final orders, etc.

5. CAPITAL IMPROVEMENT PROGRAM, DOWNTOWN COMMUNITY REDEVELOPMENT PLAN, JTA MOBILITY WORKS, & BETTER JACKSONVILLE PLAN - When included as part of these documents, installing sidewalks may not be required when construction of sidewalks by the City or State is funded and provided in any of these two lists and when construction is scheduled to begin within two years. Existence of a sidewalk does not necessarily alleviate the need to pay into the In-Lieu Sidewalk Program.

6. NO PEDESTRIAN ACCESS - Building the sidewalk, in an existing non-residential area or residential area, would not improve or add to any existing or future pedestrian access. The most common instance of this is a non-residential development located directly adjacent to the end of a dead-end street where building a sidewalk toward the dead end road does not provide pedestrian access to any building entrance, parking lot, or other activity area. In this case, sidewalk will not be required to be built between the dead end of the street and proposed development site.

7. APPROVED DRAWINGS: Approved engineering drawings did not include sidewalks.

Deferrals
Pursuant to Sec. 654.137(d)(2), Ordinance Code, deferrals are available only for residential infill lots. See Sec. 654.137(d)(2) for the criteria. A "residential infill lot" is a single-family residential lot that is undeveloped or underdeveloped and is generally bypassed and underutilized within areas that already have infrastructure, utilities, and public facilities, and typically the same type and scale as adjacent uses.

Variance
A Variance may be granted by the Department for sidewalk width or sidewalk location for good cause shown.

1.3 STREETSIDE LANDSCAPING

1.3.1 STREETSIDE LANDSCAPING DEFINITION

Streetside landscaping shall include the installation of any tree, bush, shrubbery, groundcover (except sod or grass), irrigation system or any fixed object such as rocks, boulders, planters, fountains or soil mounds which are installed or planted in a median strip, utility strip or landscape island within the right-of-way of a city-owned and maintained roadway. This section shall not apply to existing natural vegetation within existing rights-of-way or to any protected trees or other items covered by the Landscape Ordinance 88- 668-387.

1.3.2 STREETSIDE LANDSCAPING MAINTENANCE AND PERMITS

Except under special arrangements or in certain designated districts, the City does not maintain streetside landscaping. Maintenance shall be the responsibility of the developer, property owner, Home Owners' Association or others as indicated in the permit. Prior to installing or planting any streetside landscaping, a plan shall be submitted for approval and permitting showing the location, size, and type of plants, as well as any other landscaping features.

1.3.3 STREETSIDE LANDSCAPING DESIGN CRITERIA

All streetside landscaping shall be designed to provide adequate site distance for pedestrians, bicyclists, and vehicular drivers entering, exiting, or traveling within the right-of-way.

Urban sections shall contain no tree or other landscaping closer than four (4) feet from the face of the curb. For roadways containing no curb and gutter, landscaping shall not be placed within the recovery zone as specified in the FDOT Manual on Minimum Standards for Road Construction (Florida Greenbook).

All shrubbery, bushes, groundcover and landscape berms located within a median or landscape island shall not be higher than two (2) feet from the pavement surface. Landscaping items located within the utility strip or adjacent to the outside edge of pavement shall not be greater than 2.5 feet in height when located within the line of sight required to maintain adequate sight distance at all intersections, horizontal curves, driveways and pedestrian crossings.

All trees used in streetside landscaping shall have a minimum trunk diameter of 4 inches and shall have an unobstructed clear height of seven (7) feet from the sidewalk or roadway surface to the bottom of the branches. Trees that have a drip line which protrudes over the roadway surface shall have an unobstructed clear height of 18 feet from the roadway surface to the bottom of the branches.

1.4 SUBDIVISION IDENTIFICATION SIGNS

1.4.1 SUBDIVISION IDENTIFICATION SIGNS – OUTSIDE OF CITY RIGHT-OF-WAY

Subdivision identification signs shall be governed and comply with Chapters 320, 326 and 656.416 of the City Sign Ordinance. In addition to the provisions of the above sections, all subdivision identification signs, movements, gates, fences, landscape furniture and any other fixed objects located within a City-owned and maintained right-of-way shall be designed and constructed to provide adequate sight distance for pedestrians, bicyclists and vehicular drivers.

1.4.2 SUBDIVISION IDENTIFICATION SIGNS – WITHIN CITY RIGHT-OF-WAY

Application for permit for a development identification sign shall be made to the Chief, Building and Zoning Inspection Division. Permit may be issued only to a licensed sign contractor who has posted the $5,000 bond required by Section 326.106 for sign installation and also the $5000.00 bond required for work in public space, as required by Section 744.110.

Applications for such permits shall have been reviewed and approved by the City Engineer, Traffic Engineer, and prior to issuance. Sign installation shall be inspected by representatives of both the Building and Zoning Inspection Division and City Engineer to assure compliance with terms of permit.

Sign shall conform to maximum area or height prescribed by Section 656.416 (Zoning Code) for the Zoning District in which it is located, except when a variance has been granted by the Planning Commission; however, notwithstanding the provisions of the Zoning Code or variances thereto, signs in public space shall not exceed 100 square feet in area. For this purpose, area shall mean face area of the entire structure upon which the sign is placed.

Sign shall be constructed of masonry, non-corrodible metal, pressure-treated wood, or other permanent materials. Signs located in street right-of-way or other public space shall not be illuminated, other than subdivision identification signs which may be indirect lighting only, as approved by Traffic Engineer.

Wording of sign shall be as approved by Director of Planning and Development and shall be limited to development identification only with no advertisement, corporate logos, or other information.

Sign shall be removed by owner in not more than 60 days upon notice by the Director of Public Works.

1.5 ROADWAY LIGHTING STANDARDS

1.5.1 ROADWAY LIGHTING STANDARDS - INTENT

To provide for the safety of vehicular and pedestrian traffic, it is the policy of the City of Jacksonville to require adequate street lighting for all new residential and commercial subdivision streets. The purpose of this section is to relate the design criteria and processing requirements to street lighting.

1.5.2 ROADWAY LIGHTING DESIGN CRITERIA

ILLUMINATION CRITERIA

Roadway Function	Average Maintenance fc	Uniformity Avg/Min	Uniformity Min/Max
Local	0.4	10:1	10:1
Collector	0.6	8:1	10:1
Arterial	1.0	6:1	10:1

LAYOUT AND SPACING
Streetlights shall be placed at all critical locations, such as intersections, curves of less than 35 mph design speed, pedestrian crossing, high-volume driveways (50 mph or greater) and at all areas of the roadway at which traffic hazards exist or at which lighting is necessary for vehicular, bicycle, or pedestrian safety. In addition to the above locations, streetlights shall be equally spaced between critical locations to obtain the required illumination criteria.

DESIGN RESPONSIBILITY
Unless indicated otherwise, the Traffic Engineering Division will be responsible for the layout ofapproved JEA fixtures to accomplish the specified illumination criteria. They will forward this layout to JEA for the electrical design.

However, the developer may elect to design the street lighting plan as a part of the development plans when the location of streetlights are critical to the development. In this case, the street lighting plan shall be submitted as a part of the two-set plan submittal and shall include the necessary calculations demonstrating compliance with the design criteria. Following approval, the Traffic Engineering Division will forward to JEA for electrical design. The street lighting plan and associated calculations shall be prepared by a registered Professional Engineer in the State of Florida with experience in the design of street lighting systems.

JEA EQUIPMENT STANDARDS
JEA street and area light options can be viewed at the link below:

https://www.jea.com/Engineering_and_Construction/Electric_Development/Street_and_Area_Lights/

SPECIAL STREETLIGHTING
In certain locations, the City may accept non-standard or special street lighting within the public right-of- way design; installation and maintenance including all operational cost are the responsibility of the developer/owner. Non-standard and special street lighting shall comply with the design criteria specified above.

1.5.3 ROADWAY LIGHTING AS-BUILT REQUIREMENTS
As-builts shall be submitted for review and approval (see **Attachment 2-3A, B, and C**).

SECTION 2.0 – ROADWAY DESIGN REQUIREMENTS

2.1 GENERAL ROADWAY DESIGN REQUIREMENTS

The following standards and criteria have been established for a context sensitive approach to the construction of new, reconstructed, and resurfacing of City roadways and intersections. Portions have been excerpted from The American Association of State Highway and Transportation (AASHTO) guidelines ("A Policy on Geometric Design of Highways and Streets" – Guide for the Development of Bicycle Facilities), Florida Department of Transportation (FDOT) Standards (Manual of Uniform Minimum Standards for Design, Maintenance and Construction for Streets and Highways FDOT Design Manual), Institute of Transportation Engineers (Designing Walkable Urban Thoroughfares: A Context Sensitive Approach), and National Association of City Transportation Officials (NACTO) guides.

Where unusual and/or extraordinary conditions are encountered, a variance from the Standards may be granted by the City Engineer. Such a variance shall be obtained in writing and submitted with the plans for approval. Design of arterial and collector facilities will be reviewed on a case-by-case basis; however, minimum right-of-way requirements shall be a set forth in Chapter 654 Code of Subdivision Regulations. In no case shall a design be less than the minimum standards and criteria established by AASHTO.

2.1.1 DESIGN CLASSIFICATION

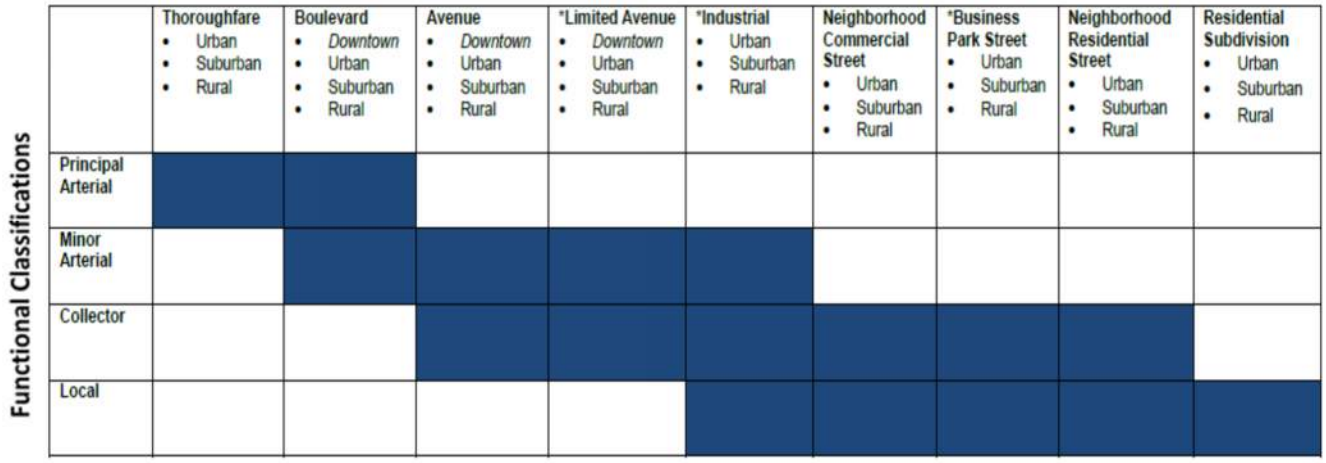
The Design Classification System is different than, but related to, the Functional Classification System. Functional Classification focuses on traffic movements, whereas Design Classification considers a roadway's land use context and incorporates all modes of transportation in designing a street or a road.

All new, reconstructed, and resurfaced roadways will be assigned a context sensitive Design Classification by the Planning and Development Department, Transportation Planning Division. In some situations, segments of the same road or street may be assigned different Design Classifications. The Design Classifications are in accordance with the engineering typical sections at the end of this section.

Figure 2.1-1 depicts how the existing Functional Classification System relates to the Design Classification System. Table 2.1-1 describes each Functional and Design classification. A roadway will have both a Functional Classification and a Design Classification. Road corridors and truck routes each have a classification that guides the lane configuration, the right of way, bike lanes, shared use paths, and sidewalks. Typical sections for each design classification, including bicycle facilities and truck routes, are shown on Plates 114 through 129.

Figure 2.1-1 Relationship between Functionally Classified Roadway Types and Design Classifications

City of Jacksonville Context Sensitive Street Design



Notes:

1. This table only applies to roads under the City of Jacksonville's jurisdiction.
2. Nine context sensitive cross-sections were developed to account for the variation across the city.
3. Downtown streets are located within Mobility Zone 10/Downtown DRI/CBD/CRA boundaries as amended
4. The Limited Avenue typical roadway section should be used on a case-by-case basis to replace Neighborhood Commercial Streets, Boulevards, or Avenues where volumes traffic and right-of-way allows.
5. If roadway is on the Truck Route, it shall conform to the design standards established in Section 3 of the Land Development Procedures Manual

Table 2.1-1 Functional and Design Classification Roadway Type and Descriptions

Functional Classification	Description*
Principal Arterial	A highway that serves major through movements of traffic between activity centers and a substantial portion of trips entering and leaving the area. It also connects highways with major traffic generators. Service to abutting land is very subordinate to the function of moving through traffic.
Minor Arterial	A facility that connects and augments the Principal Arterial system. Although its main function is still traffic mobility, it performs at a lower level and places more emphasis on land access than does the Principal Arterial.
Collector	Surface street providing land access and traffic circulation within residential, commercial and industrial areas. Collector streets connect local roadway networks to the larger city-wide arterial road network.
Local Road	Roadway which provides direct access to residential, commercial and industrial properties.

*Pursuant to the 2030 Comp Plan

Design Classification	Description**
Thoroughfare P-119	A higher speed multi-lane roadway designed to primarily carry though traffic. May serve as a high-ridership transit corridor.
Boulevard P-120	A medium speed roadway designed to carry both through and local traffic. May be multi-lane or two-lane and serve several transit routes.
Downtown Boulevard P-121	Any Boulevard located in Mobility Zone 10, shall be designated a Downtown Boulevard.
Avenue P-122	A low-to-medium speed roadway designed to serve as primary pedestrian and bicycle route and may serve local transit routes.
Downtown Avenue P-123	Any Avenue or Boulevard located in Mobility Zone 10, shall be designated a Downtown Avenue.
Limited Avenue P-124	Any Neighborhood Commercial Street, Boulevard, or Avenue with frequent curb cuts and where one travel lane in each direction provides sufficient capacity (typically less than 21,000 vehicles per day).
Neighborhood Commercial Street P-125	A low speed street designed to serve commercial and residential as well as a primary pedestrian and bicycle route and may serve local transit routes.
Neighborhood Residential Street P-126	A low speed street designed to serve as a primary pedestrian and bicycle route and may serve local transit routes.
Residential Local Subdivision Street P-127	A low speed street designed to serve as a primary pedestrian and bicycle route. A cul-de-sac, loop road, or a road that does not connect thoroughfares or serve major traffic generators.
Industrial P-128	A low speed street designed to serve local industrial traffic and located in an industrial park. These streets are not designated truck routes. The lanes are 12', there is no on-street parking, and they have sidewalks and multiuse paths on one or both sides of the road.
Business Park P-129	A low speed street designed to serve local business park traffic and located in a business park. These streets are not designated truck routes. The lanes are 11', there is no on-street parking, and there are bicycle lanes and sidewalks on both side of the roads.

** ITE *Manual of Transportation Engineering Studies* provides guidance in regard to travel speeds

Different typical section standards apply to designated truck routes (Plates 115-118). Truck routes were established by Sec. 804.1604, Ordinance Code, City of Jacksonville Regulated Truck Route System Map for Preferred Truck Routes (Blue) and Restricted Roads (Red). Gray refers to non-regulated truck route network. Refer to Appendix for engineering typical sections for use on new, resurfaced, and reconstructed truck routes.

2.2 ROADWAY DESIGN, DESIGN VEHICLES, AND CURB RADII REQUIREMNTS

All curb radii shall conform to current AASHTO requirements, based on the design vehicle assigned in Table 2.2-1. Curb radii greater than 30 feet are discouraged. Designing for the most vulnerable street user is necessary rather than the largest design vehicle. Infrequent challenges (i.e., emergency vehicles) must not dominate designing a safe street for pedestrians and bicyclists.

Table 2.1-1 outlines the recommended physical curb radius based on a street's design classification. The lower number of the Intersection Physical Curb Radius Range (in feet) is the standard. Using a higher number in the range will need approval from the City Engineer. Curb radii lower than the range may also be considered and approved by the City Engineer.

The presence of or planned bicycle facilities and on-street parking, increases the effective turning radius which allows for a decrease in the physical curb radius. For an example of how the presence of on-street parking and bicycle lanes increases the effective turning radius refer to Figure 3.3.

Table 2.2-1 Roadway Design Requirements by Design Classification

Design Classification	Posted Speed	Design Vehicle*	Intersection Physical Curb Radius Range (ft) with approval from City Engineer
Thoroughfare	Greater than 35 mph	WB-40**	20-30
Boulevard	Greater than 35 mph	WB-40**	15-30
Downtown Boulevard	Less than 35 mph	SU-30**	15-30
Avenue	Greater than 35 mph	SU-30**	15-30
Downtown Avenue	Less than 35 mph	SU-30**	15-30
Neighborhood Commercial Street	Greater than 25 mph	P***	10-30
Neighborhood Residential Street	Less than 25 mph	P***	10-30
Residential Local Subdivision Street	Less than 25 mph	P***	10-30
Industrial	Less than 35 mph	WB-40**	15-30
Business Park	Less than 35 mph	WB-40**	15-30

* P Passenger Car
* SU-30: Single Unit Truck
* BU-30 Intercity Bus
* WB-40: Intermediate Semi-Trailer

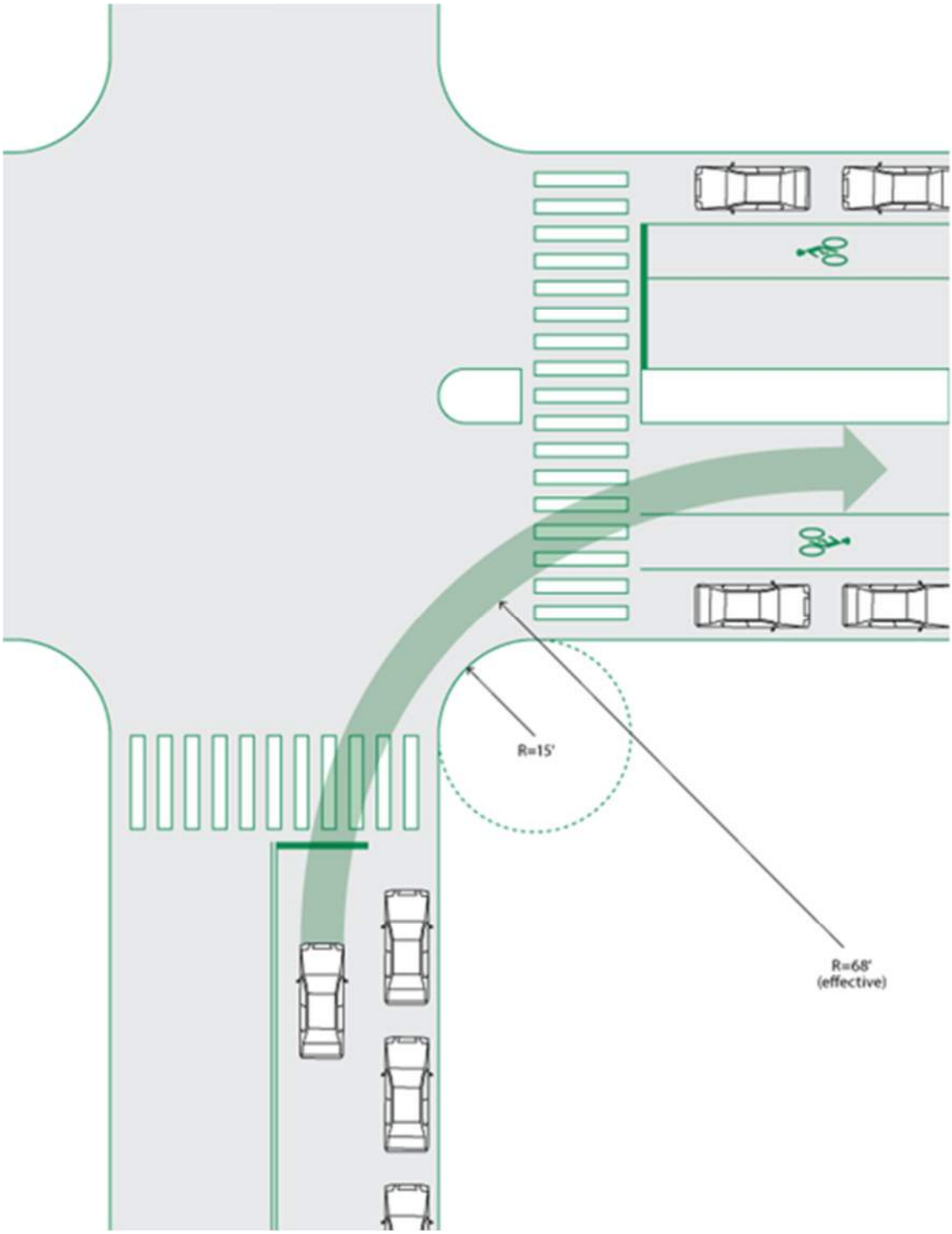


Figure 2.2-1: Physical Curb Radius vs. Effective Turning Radius

This is an example of how the presence of on-street parking and bicycle lanes increases the effective turning radius (NACTO Design Guides). Image does not show buffer between bike lane(s) and parking lane, therefore actual typical section design standard does not change.

2.2.1 ROADWAY DESIGN SPEEDS

Table 2.2-2 Roadway Design Speed by Roadway Type

Roadway Type	Desirable	Minimum
Urban Collector	40	30
Urban Local	30	30
Rural Collector	50	40
Rural Local	50	30

2.2.2 STOPPING-SIGHT DISTANCE

Stopping-sight distance shall be based on height of eye of 3.50 feet and height of object 0.50 feet above road surface.

2.2.3 ROADWAY LEVEL OF SERVICE

Roadways should be designed for minimum level of service "D" based on projected 20-year ADT or minimum level of service "D" based on projected 20-year 30 HV, whichever is the more critical (restrictive). A traffic study may be required.

2.2.4 BRIDGES

Bridges shall be constructed of precast concrete, prestressed concrete, or cast-in-place concrete.

Bridge design shall conform to the design criteria of the latest edition, AASHTO Standard Specifications for Highway Bridges.

The design load shall be HS-20-44 (AASHTO) or the controlling axle configuration of the six (6) legal load limits in the State of Florida, whichever produce the greater stresses.

Materials and methods of construction shall conform to the FDOT Standard Specifications, latest edition.

All new or reconstructed bridges shall contain pedestrian facilities at a minimum in accordance with 654.133, *City Ordinance*. A shared-use path may be acceptable per Sec.654.133(d), *Ordinance Code*. For State and other entity owned roads, coordination will be required with the City of Jacksonville.

2.2.5 ROADWAY ALIGNMENT

ROADWAY TYPICAL SECTION

All roadway typical sections shall conform to the *City Standard Details*. Any deviations from these Standard Details will not be allowed without the approval of the City Engineer in coordination with the Planning and Development Department, Transportation Division. Such deviations may be requested with written justification. Any reference to FDOT shall mean the “Florida Department of Transportation.”

MINIMUM RIGHT-OF-WAY WIDTHS AND PAVING WIDTHS

Right-of-way (ROW) width shall provide for adequate drainage facilities, utilities, required number of lanes for proper handling of vehicular traffic, and sidewalk, shared-use path, or two-way cycle track when required as shown in Table 2.2-3.

Refer to the end of this section for Typical Sections for all right-of-way widths. Other widths may be used when approved in writing by the City Engineer, with oversight and majority approval from CSSSC.

Table 2.2-3

Context Classification	Min. ROW (in feet)	Min. Lane Width (in feet)
Truck Route		
Rural	60’	11’
Suburban	60’	11’
Urban	60’	11’
Urban Priority	80’	11’
Thoroughfare	90’	11’
Boulevard	68’	11’
Downtown Boulevard	100’	11’
Limited Avenue	38	11’
Avenue	68’	11’
Downtown Avenue	82’	11’
Neighborhood Commercial Street	72’	11’
Neighborhood Residential Street	52’	11’
Residential Local Subdivision Street	44’	12’
Industrial	48’	12’
Business Park	50’	11’

Roadway sections proposed to be constructed without curb and gutter will require prior approval by the Planning and Development Department, Transportation Planning Division. The request for waiver should be made at the pre-application stage.

RETURN RADII REQUIREMENTS
For all driveways, the recommended return radius shall be consistent with the physical curb radius based on a street’s design classification and the associated AASHTO design vehicle, as specified in Table 2.2-1.

Point of Measurement

1. Guttered Sections - back of curb or gutter (parkway side).

2. Non-guttered Sections - edge of pavement.

2.2.6 ROADWAY SHOULDERS

Rural local roadways should desirably have a 6-foot shoulder, and rural collectors should desirably have a 10-foot shoulder. Where right-of-way is limited, the shoulder widths may be reduced to a minimum of 2 feet for locals and 6 feet for collectors. Where significant bicycle and/or pedestrian traffic is expected, consideration should be given to adding a shared-use path (e.g., U.S. Bicycle Route, etc.).

When a bicycle facility, pursuant to 3.7, does not exist, paved shoulders shall be marked (with bike symbol markings) only when all the following are met:

1. Design speed ≤ 45mph,

2. Shoulder width ≥ 5-feet,

3. Shared-use path is not present along corridor

The standard shoulder cross slope shall be 0.06 foot/foot away from the traveled way. In the case of an adverse super elevated section, the maximum break in cross slope between shoulder and traveled way shall not exceed 0.08. A variance may be provided on a case-by-case basis when adding paved shoulders during a resurfacing project. The minimum shoulder cross slope shall be 0.02 foot/foot. On bridges, the shoulder cross slope shall match the cross slope of the adjacent lane. A minimum transition length of 50 feet should be provided for the shoulder cross slope approaching a bridge.

2.2.7 ROADWAY CLEAR ZONES

On rural local streets the clear zone shall be 6 feet, and on rural collectors the clear zone shall be 11 feet. Where hazards are within the clear zone, guardrail or barrier wall shall be provided at least 6 feet off the traveled way.

For urban sections the clear zone is 4 feet from face of curb. On urban local streets the clear zone may be reduced to 2.5 feet under unusual conditions.

2.2.8 ROADWAY VERTICAL ALIGNMENT

All streets shall have grades less than 8 percent. Streets with curb and gutter shall have grades equal to or greater than 0.3 percent. Design speed and safe stopping distance shall govern the design.

VERTICAL CURVES

Vertical curves will be required at changes in grade with an algebraic difference of 2% or more in relation to design speed as established in the Florida Greenbook. No vertical curve will be required for any change in grades with an algebraic difference less than 2%. Length of vertical curve shall provide for minimum safe stopping sight distance.

SUPERELEVATION

Minimum superelevation rates shall be as shown in Table 2.2-4:

Table 2.2-4 Minimum Super Elevation Rates

Functional Class	Maximum Rate, e
Rural Collector	.08 foot/foot
Urban Collector	.04 foot/foot
Rural Local	.08 foot/foot
Urban Local	.04 foot/foot

Where superelevated curves carry through intersections, the maximum superelevation rate shall be .04 foot/foot. In local subdivision-type streets, superelevation should not be used. Instead, curve radii and minimum design speeds should be utilized.

SUPERELEVATION TRANSITION

Minimum lengths of superelevation runoff shall be as established by AASHTO. The tangent should include 60 percent to 80 percent of the total transition length. These criteria will also control tangent lengths required between reverse curves.

2.2.9 HORIZONTAL CURVES

The minimum centerline radii for local residential subdivision roadways shall be 80 feet. All other roadways, including those that serve as a local residential collector shall meet the requirements contained in Chapter 3 of the latest edition of the FDOT Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (Florida Greenbook).

2.2.10 INTERSECTIONS

All intersections within proposed project limits shall be designed to comply with the latest edition of at least one of the following guidance documents: Improving Intersections for Pedestrians and Bicyclists (FHWA); Don't Give Up at the Intersection (NACTO); Designing Walkable Urban Thoroughfare (ITE); or The Florida Greenbook and FDOT Design Manual (FDOT).

2.3 ROADWAY SECTIONS

2.3.1 ROADWAY PAVEMENT REQUIREMENTS

The following criteria are considered the minimum acceptable standards and may not apply to all situations. The City Engineer may require greater pavement thickness when the existing conditions and/or future traffic demands warrant.

When, in the judgment of the City Engineer, conditions warrant additional testing to assure compliance with the specifications, the developer's registered professional will be advised in writing that additional tests will be required and the extent of such additional tests.

2.3.2 TWO-LIFT PAVEMENT SYSTEM REQUIREMENTS

A two-lift pavement system is required for all new local streets. The two-lift system shall include a base course (first lift) and a final wearing asphalt surface (second lift). A tack (prime) coat shall be required between each lift of asphalt. All infrastructure and the base course shall be constructed, as shown on an approved development plan, in accordance with applicable subdivision regulations. The wearing surface course application, on local streets, shall be delayed in each phase of single and multi-family residential developments until either:

1. Eighty percent (80%) of the units in that phase have received a certificate of occupancy; or

2. Twenty-four (24) months have passed since the first certificate of occupancy was issued in that phase.

2.3.3 ROADWAY PAVEMENT SUB-BASE REQUIREMENTS

The sub-base for all roadways shall have a minimum depth of 12 inches and a minimum limerock bearing ratio in accordance with Section 104.2.3 of the City Standard Specifications.

Where the existing soils to be used in the roadway sub-base have the required bearing value, no additional stabilizing material need be added; but the native material shall be mixed and compacted to 98 percent of maximum density as determined by the AASHTO T-180 compaction test.

1. Stabilizing Materials - The stabilizing material, if any is required, shall be high-bearing value soil, limerock, or other material which meets Section 104.2 of the City Standard Specifications and the approval of the City Engineer.

2. Construction - The construction of the sub-base, including compaction, shall conform to the City Standard Specifications, Section 104.3, latest edition.

3. Testing - Tests for the sub-base bearing capacity shall be located no more than 500 feet or for each different type of soil. Tests for compaction shall be located no more than 300 feet apart. Both tests shall be staggered to the left, right, and on the centerline of the roadway.

2.3.4 ROADWAY PAVEMENT BASE COURSE REQUIREMENTS

The minimum basecourse thickness shown in **Table 2.3-1** are applicable for both flexible and Portland cement concrete surface courses.

Table 2.3-1 Roadway Pavement Basecourse Requirements

Type of Development	Minimum Thickness	Minimum Density
Residential	6 inches	100% Mod Proctor AASHTO T-180
Industrial	8 inches	100% Mod Proctor AASHTO T-180
Commercial	8 inches	100% Mod Proctor AASHTO T-180

ROADWAY PAVEMENT BASE COURSE MATERIALS AND CONSTRUCTION

Limerock, bituminous or crushed concrete material shall conform to the City Standard Specifications, Sections 104, 105 or 106, respectively, latest edition, for base course materials, including construction methods.

ROADWAY PAVEMENT PRIME AND TACK COAT REQUIREMENTS

All bases shall be primed in accordance with the City Standard Specifications, Section 110, latest edition. Tack coat material and construction methods shall conform to City Standard Specifications, Sections 110 through 115, latest edition.

ROADWAY BASE TESTING

Tests for base thickness and compaction shall be located no more than 300 feet apart and shall be staggered to the left, right and on the centerline of the roadway.

2.3.5 SURFACE COURSE FOR FLEXIBLE PAVEMENTS

Surface courses for flexible pavements shall be Type S-I or Type III Asphaltic Concrete and shall meet the minimum thickness requirements in **Table 2.3-2**.

Table 2.3-2 Flexible Pavement Minimum Surface Course Thickness

Type of Development	Type-S-1	Type III
Residential	1 1/4”	1 1/4”
Industrial	1 1/2”	2”
Commercial	1 1/2”	2”

FLEXIBLE PAVEMENT MATERIALS AND CONSTRUCTION

Asphaltic Concrete Type S-1 or Type II, including prime and tack coats, shall conform to the City Standard Specifications, Sections 113 and 114, latest edition, for materials and method of construction.

2.3.6 SURFACE COURSE FOR PORTLAND CEMENT CONCRETE PAVEMENTS

Sub-base requirements for Portland Cement concrete pavements shall be the same as those for flexible pavements. Minimum pavement thickness requirements are shown in **Table 2.3-3**.

Table 2.3-3 Cement Concrete Pavement Minimum Thickness

Type of Development	Minimum Thickness
Residential	5”
Industrial	6”
Commercial	6”

PORTLAND CEMENT CONCRETE PAVEMENT MATERIALS AND CONSTRUCTION

Portland Cement concrete pavement, including joints, shall conform to the City Standard Specifications, Sections 130 and 135, latest edition, for materials and method of construction.

2.4 LEFT TURN, ACCELERATION/DECELERATION LANES

When left turn and/or acceleration/deceleration lanes are required, the entire area which encompasses the existing pavement, from the beginning of the taper to the end of the taper, shall be resurfaced in accordance with City Standards, unless otherwise waived by the City Engineer. The intersection shallalso be restriped.

2.5 DETAILS

2.5.1 MEDIANS

The construction of unpaved medians within roadways requires approval of the City Engineer. Where constructed, they shall be surrounded by a suitable curb. Adequate drainage facilities shall be provided within the median to prevent erosion and protect the structural integrity of the adjacent pavement during the five-year design storm. Where landscaping is provided, the design must provide for adequate sight distance. Maintenance of landscaping shall be the responsibility of the Homeowners' Association, abutting property owners, or other designated entity. The minimum median width shall be 12 feet unless otherwise approved by the City Engineer.

2.5.2 DRIVEWAYS

Driveways shall be constructed to the same standards as the adjacent roadway except that no stabilization shall be required under driveways. If concrete driveways are constructed, minimum thickness shall be 5 inches for residential driveways and 6 inches for industrial and commercial driveways. No wire or rebar reinforcement is allowed in driveways installed in the City Right-of-Way. Fiber reinforced concrete is acceptable, but not required.

2.5.3 SIDEWALKS

Sidewalks shall be constructed of 2500 psi Portland Cement Concrete. Materials and methods of construction shall conform to the City Standard Specifications, latest edition. Standard thickness for residential sidewalks shall be 4 inches, except at driveways, where the minimum thickness shall be 5 inches at residential driveways and 6 inches at industrial and commercial driveways. No wire or rebar reinforcement is allowed in sidewalks installed in the City Right-of-Way. Fiber reinforced concrete is acceptable, but not required.

Sidewalks shall be included along the roadway, when required by Section 654.133(c) of the "Subdivision Regulations", or as provided for in the City Standard Specifications and/or Details. Upon request by the person, firm or corporation for acceptance of the subdivision unit for maintenance, the person, firm or corporation shall have:

1. Completed all sidewalk requirements; or

2. Furnished a good and sufficient performance bond from a bonding company acceptable to the City in the amount of 100 percent of the total cost of uncompleted sidewalk improvements.

3. Sidewalks for each lot shall be constructed at the time that the driveway isconstructed.

4. Common area sidewalk must be constructed at the time roadway improvements are made.

2.5.4 CONCRETE CURB, GUTTER, WHEELCHAIR RAMPS AND SIDEWALKS

1. All details of concrete curb, gutter, curb and gutter, and sidewalks shall conform to the applicable City Standard Details, latest edition. Any deviation from these Standard Details will not be allowed without written approval from the City Engineer.

2. All details of curb ramps and accessible parking shall conform to the applicable FDOT Standard Plans, latest edition. Any deviation from these Standard Plans will not be allowed without written approval from the City Engineer.

3. Materials and installation shall conform to the applicable City Standard Specifications, latest edition.

2.5.5 SUBMITTAL DATA AND INSPECTION

1. Design analysis shall be required for flexible or rigid pavements that vary from the established City Standards.

2. Test reports prepared by a qualified independent testing laboratory shall be furnished prior to requesting City acceptance of streets for maintenance on the following:

    a. Limerock Bearing Ratio Tests on sub-base.

    b. Compacting test on sub-base and base.

    c. Compressive strength tests of concrete for Portland Cement concrete pavements.

    d. Asphalt shall be tested by the Marshall Stability Method.

2.5.6 CLEARING ROADWAY RIGHTS-OF-WAY

All roadway rights-of-way shall be cleared and grubbed in accordance with City Standard Specifications, Section 102, latest edition, and the Landscape and Tree Protection Regulations, unless plans for selective clearing and grubbing are submitted and approved by the City Engineer.

2.5.7 GRASSING AND MULCHING REQUIREMENTS

All roadway rights-of-way within the development, except those listed below, shall be grassed prior to final acceptance using one of the following methods.

1. One row of sod shall be placed behind the curb.

2. The disturbed areas from the back of the curb to the right-of-way line shall be seeded and/or mulched; or

3. Alternate stabilization measures may be installed subject to the approval of the Director of Public Works.

All areas disturbed by the Developer along the roadway rights-of-way outside of the development, except those listed below, shall be sodded, seeded and/or mulched prior to final acceptance.

Medians, landscape areas around entrance features and all other areas for which enhanced landscaping is proposed are not required to be grassed prior to final acceptance. In lieu thereof, such areas shall be delineated and included in the Developer's Warranty, Indemnification and City of Jacksonville Acceptance Agreement in Section I. GRASS AND SOD AGREEMENT (**Attachment 1-13**).

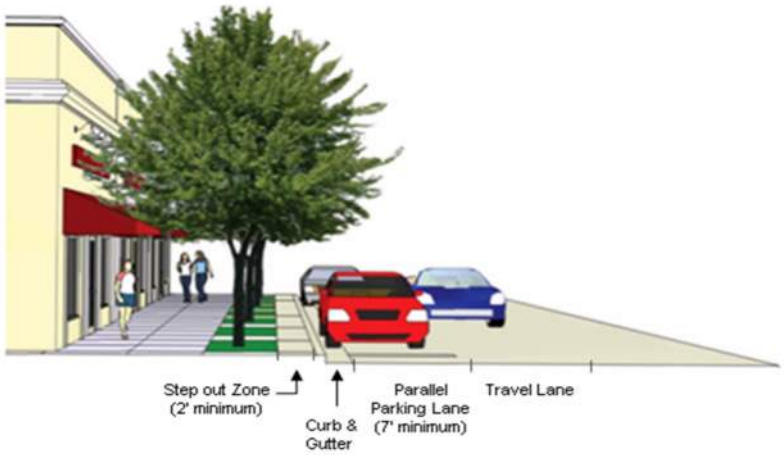
The owner of a lot (Developer, Builder or Homeowner) shall be responsible for maintaining stabilization on all lots/property owned by that party after final acceptance so as to ensure that the curb and streets remain free of silt and erosion.

2.5.8 ON-STREET PARKING

On-street parking means parking located within the public right of way. The appropriateness of on-street parking on a roadway varies based on context. **Table 2.5-1** and **Figures 2.5-1**, **2.5-2** and **2.5-3** below outline the minimum dimensions for on-street parking. Refer to Section 656.607 of the Ordinance Code for more details.

Table 2.5-1 Minimum dimensions for on-street parking

Parking Angle	Curb Width	Stall Depth	Stall Width	Stall Length	Car Parking Overhang	Step Out Zone
60° (angled – head-in or back-in)	9.8	20.0’	8.5’	22.0’	2.0’ min.	N/A
0° (parallel)	22.0	7.0’ minimum, 8.0’ preferred on functionally classified roadways	7.0’ minimum, 8.0’ preferred on functionally classified roadways	22.0’	N/A	2.0’



Source: Jacksonville Design Guidelines and Best Practices Handbook (Section 1: Commercial Development)
Figure 2.5-1 Parallel parking diagram

Source: Jacksonville Design Guidelines and Best Practices Handbook (Section 1: Commercial Development)
Figure 2.5-2 Angled parking diagram

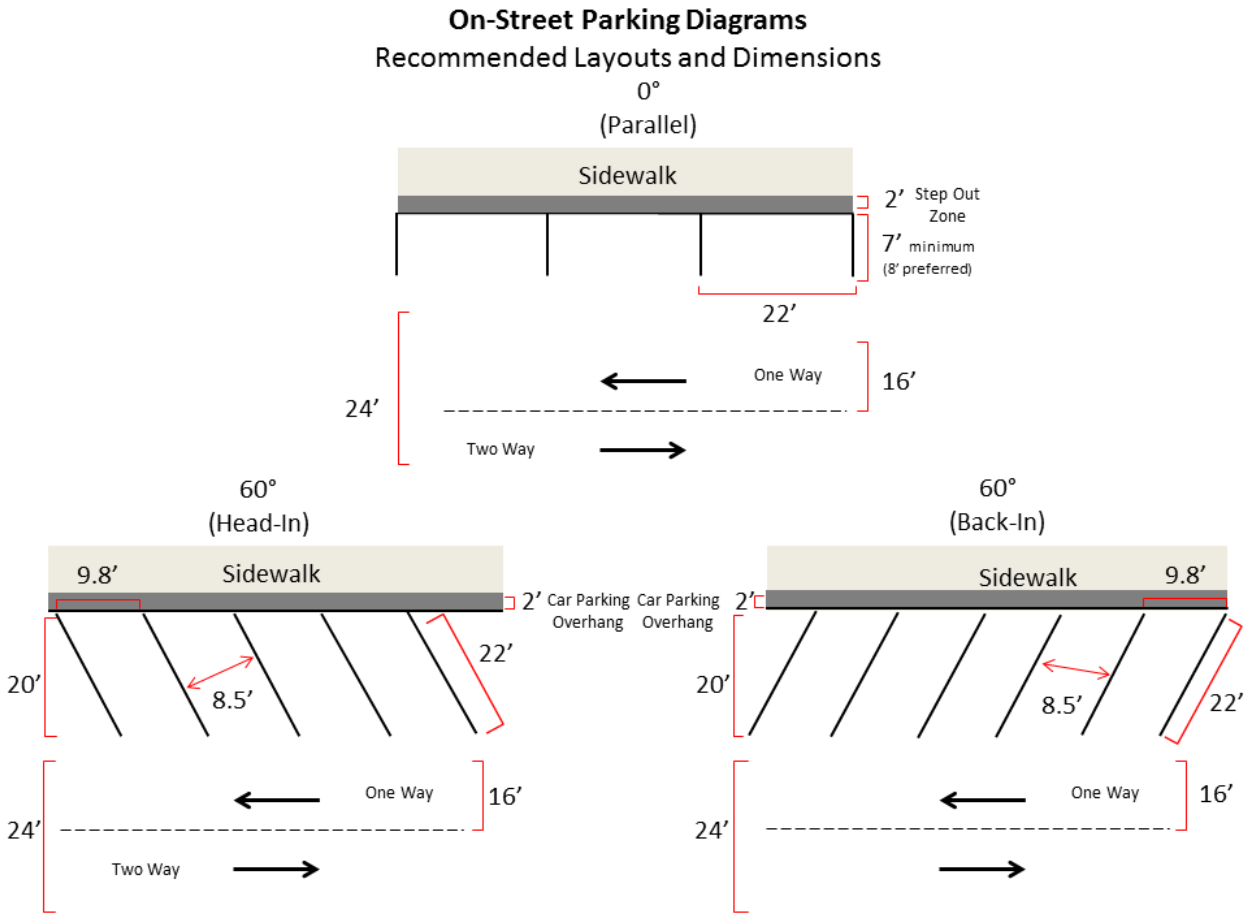


Figure 2.5-3 On-street parking diagrams

Definitions

Step Out Zone: A strip of land adjacent to a curb where parallel or angled on-street parking exists. It is designed to create a clear space for pedestrians to exit a vehicle without having to step into a planting strip.

Car Parking Overhang Zone: A strip of land adjacent to a curb where angled on-street parking is exists. It is designed to provide space for the front or rear of a vehicle to hang over the curb. This area should be clear of all obstructions.

Stall Depth: Distance from face of curb to end of parking stall stripe, measured perpendicular to the curb (see **Figure 2.5-4**)

Stall Width: Distance between the two stripes of a parking stall, measured perpendicular to the stripes (see **Figure 2.5-4**)

Stall Length: Distance from back of curb to end of parking stall stripe, measured parallel to parking stall stripe (see **Figure 2.5-4**)

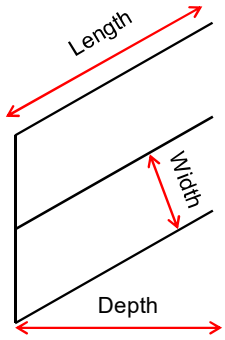


Figure 2.5-4 Dimension diagram

2.6 BICYCYLE PARKING STANDARDS

Bicycle parking should be convenient to users, secure from theft, safe for bicyclists and other road users, intuitively designed, and accommodating to a variety of bicycle types. The following standards describe location, design, placement, and installation of bicycle parking that will ensure these requirements are met consistently throughout the City of Jacksonville. These standards cover short-term parking solutions and long-term bicycle parking solutions in new office and housing developments in the form of lockers, shower facilities, and secure cages or bicycle rooms. Bike parking is required for all new developments and redevelopments (including additions, and renovations). A new or reconstructed parking garage is required to provide bicycle parking facilities for 5% of the number of vehicular parking spaces provided.

2.6.1 LOCATION

Bicycle parking should be located as close, or closer, to the entrance of the building it serves than the nearest car parking space. In general, multiple buildings should not be served by a large, distant bicycle parking area, but instead by smaller parking areas near active entrances. Locate bicycle parking within 50 feet of major destinations and transit stations. Bicycle parking areas should be well lit and visible from the sidewalk so that users can find them, to deter theft, and to ensure bicyclists' safety while locking/unlocking their bicycles. A clear zone should be provided around the bicycle parking area to avoid moving vehicles, parked car doors, transit vehicle boarding areas, and pedestrian right-of-way, and to allow for bicycle maneuverability between the parking area and any nearby landscaping, buildings, or street furniture. Bicycle parking should not impede pedestrian flow on the sidewalk and should not be placed directly in front of doors or disabled parking spaces.

2.6.2 DESIGN

There are a variety of styles of bicycle racks available; however, some designs do not provide the security from theft, ease of use, and prevention of bicycle damage as well as others. A bicycle rack should:

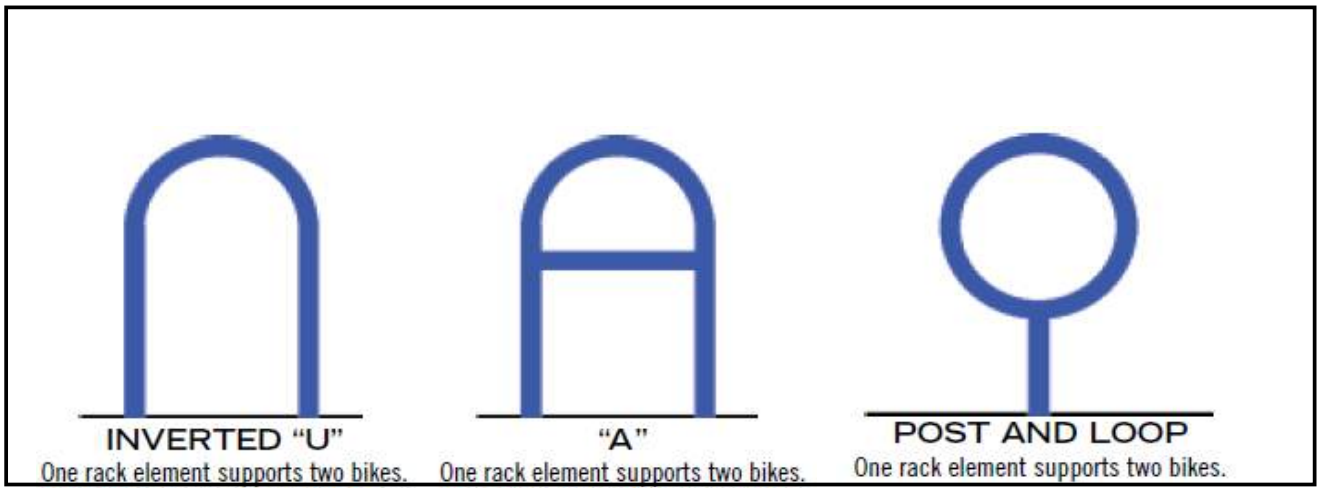
- Support the bicycle upright by its frame in two places
- Prevent the wheel of the bicycle from tipping over
- Enable the frame and one or both wheels to be secured by a lock
- Support different styles of bicycles
- Allow front-in and back-in parking: A U-lock (**Figure 2.6-1**) should be able to lock the frame and either the front or rear wheel to the rack
- Not require the user to lift the bicycle onto the rack
- Be located so that bicycles can reasonably be safeguarded from damage
- Resist being cut or detached using common hand tools
- Have a finish that requires minimal maintenance (e.g. galvanized steel)
- Include no sharp edges or moving parts
- Adhere to the Americans with Disabilities Act standard as follows: if the protruding edge of the rack is between 27 inches and 80 inches above the sidewalk surface, it may overhang a maximum of 4 inches. (This applies only to relatively tall racks designed to protrude horizontally from the base).

Figure 2.6-1 U-lock

The bicycle rack designs below are recommended best practice for racks in both the public and private right-of-way. “Artistic” designs may be allowed, subject to meeting the guidelines specified in Section 656.609 of the Zoning Code and subject to approval by the City of Jacksonville Bicycle/Pedestrian Coordinator.

Some bike rack designs that are approved by the Association of Pedestrian and Bicycle Professionals (APBP) are shown in **Figure 2.6-2**. Wave, schoolyard/comb, and wheel-well style bike racks are not recommended.

 RECOMMENDED Bicycle Rack Designs



Source: APBP Bicycle Parking Guidelines, 1st edition, www.apbp.org, used with permission form the copyright holder

Figure 2.6-2 Bicycle rack designs approved by the Association of Pedestrian and Bicycle Professionals

LONG TERM BICYCLE PARKING STANDARDS AND SHOWER FACILITIES

Long-term bicycle parking. Long-term bicycle parking consists of individual bicycle lockers or racks contained in a locked room (such as a private room accessible from the sidewalk) that is meant for individuals (i.e. employees at a business) expecting to park for more than a few hours.

BICYCLE LOCKERS

A bicycle locker is a fully enclosed space for one bicycle, accessible only to the owner of the bicycle. A bicycle locker must be equipped with an internally mounted key-actuated or electronic locking

mechanism, and not lockable with a user-provided lock. Groups of internal-lock bicycle lockers may share a common electronic access mechanism provided that each locker is accessible only to its assigned user. Bicycle lockers shall be constructed of molded plastic/fiberglass, solid metal or perforated metal and be at least 2 feet by 6 feet. Lockers shall be maintained by owner.

RESTRICTED-ACCESS BICYCLE ENCLOSURE
A restricted-access bicycle enclosure is a covered or indoor locked area containing within it one bicycle rack space for each bicycle to be accommodated and accessible only to the owners of the bicycles parked within it.

Long-term bicycle parking facilities for tenant and occupant use shall be conveniently accessibly by pedestrians from the street and shall be at least as convenient and close to building entrances as the nearest non-disabled automobile parking space. Tenant and occupants shall not be charged for bicycle parking.

2.6.3 PLACEMENT

A bicycle footprint is generally 6 feet by 2 feet. Each rack should be placed so that no objects obstruct users from entering/exiting the parking area, locking/unlocking their bike, and unloading/loading any cargo. A sidewalk should be at least 9 feet wide for proper bicycle rack spacing, leaving at least 5 feet width of sidewalk clear of obstructions. Generally, bicycle racks should be installed in the furniture zone and parallel, perpendicular, or angled to the curb line. There should be at least 5 feet of clearance between any bicycle rack and a driveway or curb cut.

For racks installed parallel to the curb line, there should be at least 3 feet of space (4 feet when next to on-street parking) between the curb and the rack. Multiple racks should have at least 6 feet in between them (8 feet preferred), as measured from the center of each rack. See **Figure 2.6-3**.

For racks installed perpendicular to the curb line, there should be at least 5 feet of space between the curb and the center of the rack. Multiple racks should have at least 4 feet in between them (5 feet preferred). See **Figure 2.6-4**.

For racks installed angled to the curb line, there should be at least 3 feet of space (4 feet preferred) between the curb and the edge of the rack. Multiple racks should have at least 30 inches in between them by the nearest edges. Angle for the rack to a perpendicular line from the curb should be between 45 and 60 degrees. See **Figure 2.6-5**.

Bicycle racks may be placed outside the furniture zone in areas that do not obstruct the pedestrian through-zone, such as in an alcove of a building. Racks should be placed at least 2 feet from any objects (3 feet preferred). Multiple racks installed in this way should follow the spacing described above for end-to-end or side-by-side arrangements. See **Figure 2.6-6**.

In areas where demand for bicycle parking is greater than what can be accommodated by sidewalk racks or where sidewalk space is limited, bicycle corrals can be installed in an on-street parking space, typically providing parking for 8 to 12 bicycles. Bicycle corrals are typically intended to serve a nearby business with a high volume of bicycle traffic. Bicycle corrals consist of rows of racks surrounded by a painted or other type of boundary, with flexible delineators and a wheel stop at the end where vehicle may back into the adjacent spot. Racks within a bicycle corral may be installed perpendicular to or angled towards the curb. Angled installations may be more aesthetically pleasing but require more length to maintain the minimum recommended spacing between racks (36 inches). On the other hand, perpendicular installation leaves about one foot less of a buffer between the rack and the roadway. **Figure 2.6-7** is a diagram for installing bicycle corrals in a parallel parking layout. **Figure 2.6-8** is a diagram for installing bicycle corrals in an angled parking layout.

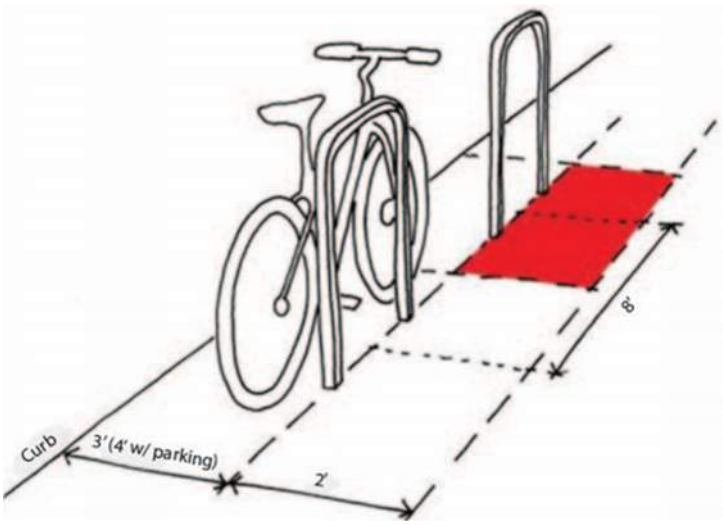


Figure 2.6-3 Bicycle rack spacing when installed in furniture zone parallel to curb (adapted from City of Portland Bicycle Rack Permit)

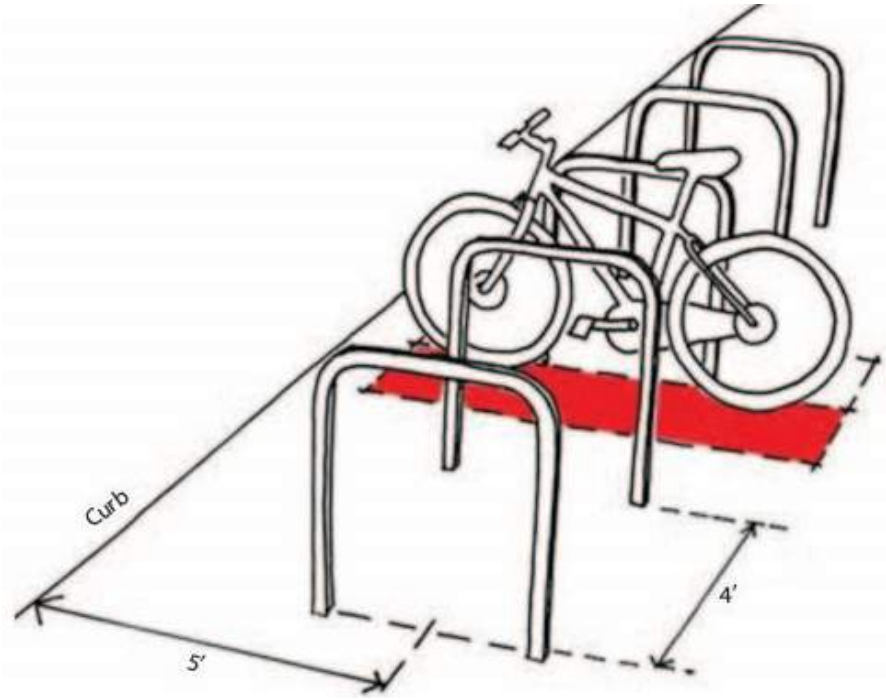


Figure 2.6-4 Bicycle rack spacing when installed in furniture zone perpendicular to curb (adapted from City of Portland Bicycle Rack Permit)

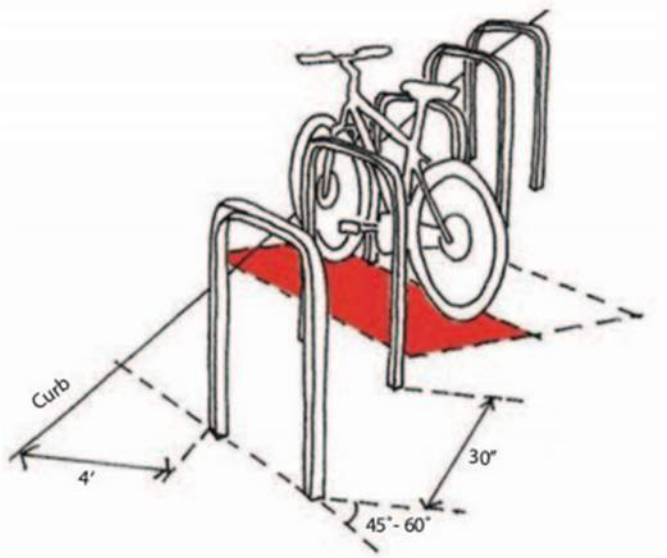


Figure 2.6-5 Bicycle rack spacing when installed in furniture zone at an angle to the curb (adapted from City of Portland Bicycle Rack Permit)

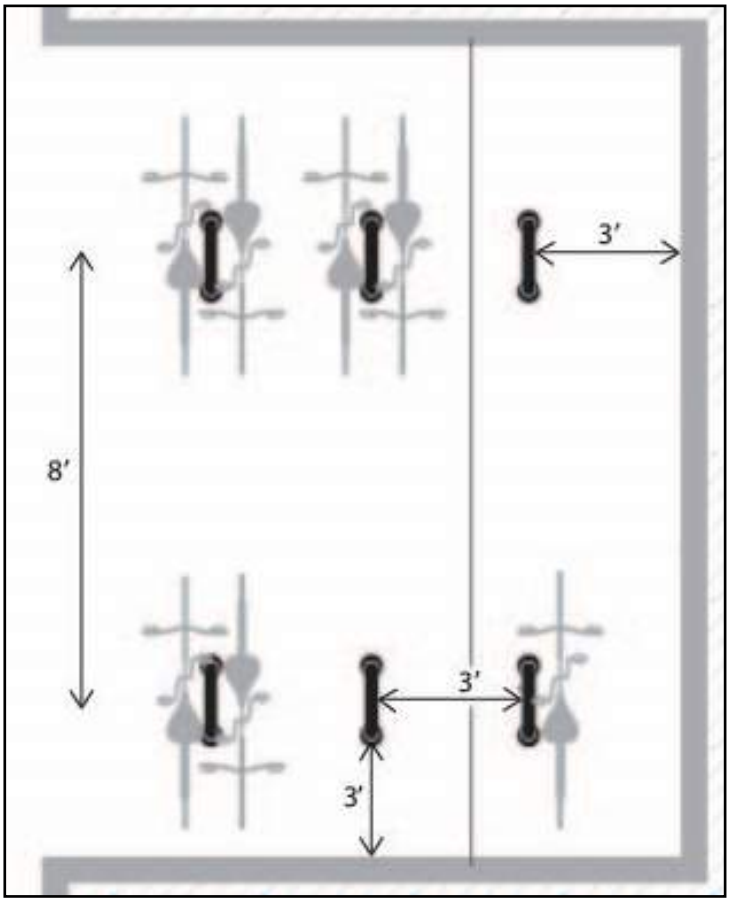


Figure 2.6-6 Bicycle rack spacing outside of furniture zone (adapted from APBP Essentials of Bike Parking, page 8, www.apbp.org, used with permission from the copyright holder)

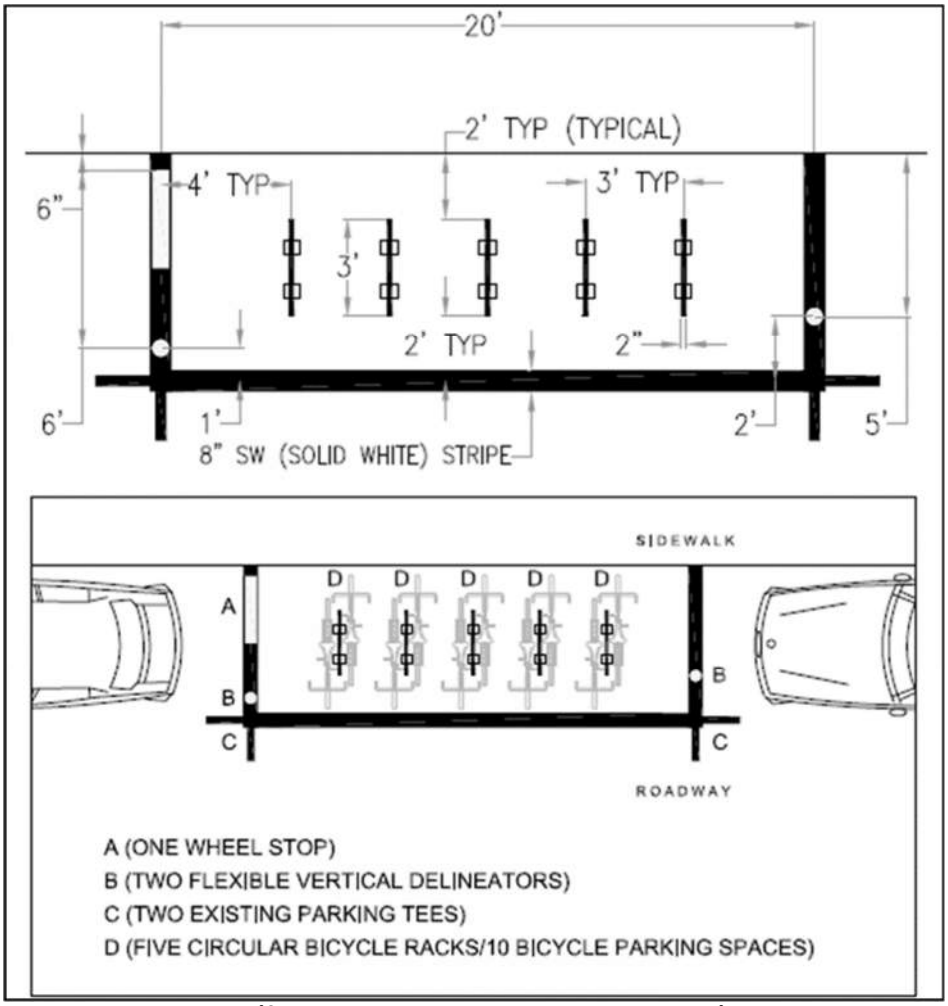
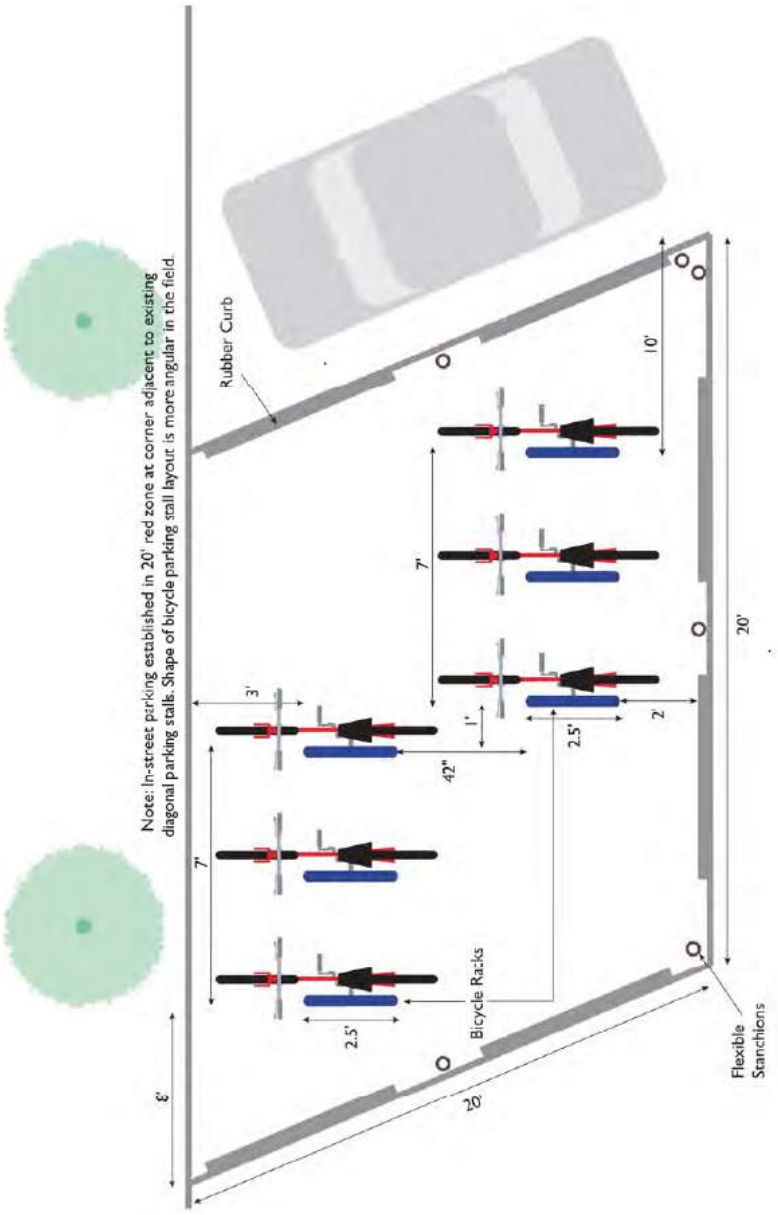


Figure 2.6-7 Bicycle corral diagram (from SFMTA Bicycle Parking Guidelines)



Source: APBP Bicycle Parking Guidelines, 2nd Edition page 52, www.apbp.org, used with permission from the copyright holder

Figure 2.6-8 Bicycle corral diagram, angled parking layout

2.6.4 INSTALLATION

For security, bicycle racks should be installed in concrete. Asphalt is acceptable for bicycle corrals. There are two primary types of bicycle rack installation: surface mount and cast in place. Either is acceptable, but some rack models only allow for one type of installation.

Surface mount is used when racks are being installed onto an existing concrete slab. Anti-tampering bolts and other hardware should be used to prevent theft of the whole rack. Some locations where theft may be an issue can benefit from security fasteners such as concrete spikes or tamper-resistant nuts on wedge anchors, which are

shown in **Figure 2.6-9**. Drill any holes at least three inches from concrete edges or joints. If an asphalt substrate is all that is available in the rack location, concrete footings should be poured before surface mounting if possible. If concrete footings cannot be poured, use anchor techniques specific to asphalt.

Cast-in-place is the best option for security purposes but may be impossible if the rack installation location already has a slab poured or if the chosen rack type does not provide a cast-in-place option. Cast-in-place installation is appropriate for either asphalt or concrete.

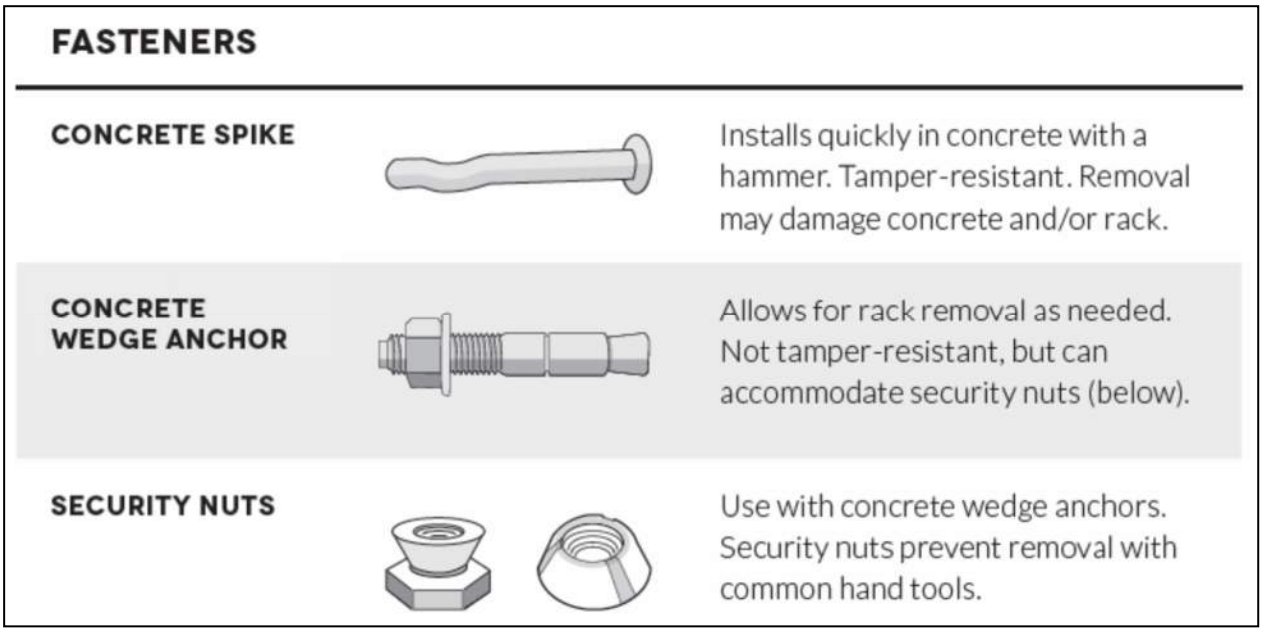


Figure 2.6-9 Examples of concrete fasteners (from APBP Essentials of Bike Parking, page 8, www.apbp.org, used with permission from the copyright holder)

2.7 BICYCLE FACILITIES STANDARDS

Bicycle facilities are required on all new or reconstructed streets. Streets to be resurfaced will be assigned a Design Classification prior to resurfacing and shall include bicycle facilities in accordance with their Design Classification when existing pavement width is sufficient. If the pavement width is insufficient, the City of Jacksonville's Planning and Development Department, Transportation Division with the Public Works Department will determine the feasibility of a road diet or widening or reconstruction of the frontage zone to create space for bicycle facilities and/or a shared-use path.

In some instances, the available roadway width may require a bicycle facility other than what is recommended by its Design Classification. When providing the required bicycle facilities, the options in order of priority are:

1. Shared-use path
2. 7-foot buffered bicycle lane
3. 6-foot buffered bicycle land
4. 5-foot bicycle lane

Two-way Cycle Track
The lane widths for separated bicycle facilities are as follows: 12 feet preferred; 10 foot minimum. Use wider lanes where higher volumes are expected. One-Way facilities: 7 feet preferred; 6 feet minimum. Where right-of-way is constrained, a two-way cycle track may have a reduced width only upon written approval from the Bicycle/Pedestrian Coordinator.

When roadway pavement is continuous to the face of guardrail or barrier, the minimum bicycle lane width is 5 feet. When a bicycle lane is placed between a through lane and the adjacent right turn lane, bus bay, or parking lane please refer to the 2020 FDOT Design Manual: 223 Bicycle Facilities, unless otherwise defined in Section 2.0 of this manual.

Five-foot bicycle lanes are the minimum, but 4-foot bike lanes may be allowed on low-speed streets and in constrained conditions, with approval from the Bicycle/Pedestrian Coordinator. Depending on the context of the street and land use, a bicycle boulevard with additional traffic calming features may be a better option.

Shared lane markings
The requirements for shared lane markings as referenced in typical standards shall be consistent with Section 223.3 of the FDOT Design Manual.

Colored pavement markings
Intersection bicycle box and two-stage bicycle turn box, will be used in accordance with the current FDOT Design Manual: Bicycle Facilities and FHWA Interim Approval IA-20 Two-Stage Bicycle Turn Boxes and IA-18 Bicycle Boxes. NACTO may be used as a guide as long as it meets federal approval. In addition, all bike lanes, including cycle tracks, shall be considered for the application of green paint conforming to FHWA Interim Approval 1A-14.

Colored pavement markings will be considered and implemented in accordance with FHWA guidelines through the City of Jacksonville resurfacing program for bike lanes. High bicycle traffic volumes and crash data should support the design.

Shared use path
A shared use path may be substituted for a bicycle lane when the roadway design speed is greater than 35 mph and all the following conditions are met:

1. Separation can be maintained between bicycle and motorized traffic through intersections [and]

2. Conflict points are minimal and mitigated.

In some cases, it may be possible to fit a shared-use path into the same space required for a sidewalk and buffered bicycle lane. In other cases, additional width may be required. Refer to FDOT 2020 Design Manual: 224 Shared-use Path for design criteria, or unless otherwise determined in Section 2.0 of this manual. If a shared-used path is substituted for a bike lane, other safety design features shall be used such as, but not limited to, green paint, wayfinding route signage, and detectable warning pads. Consideration for specific traffic signalization for bicycle facilities and/or shared-use path shall be considered on a case-by-case context sensitive approach. Depending on the context of the road and land use, both a shared-use path and bicycle lane may be required.

Widths range from a minimum 10 feet to 14 feet, with a standard width of 12-feet.

Refer to Section 2.6 for additional information on bicycle facility types and design standards and Appendix for typical sections.

SECTION 3.0 – TRADITIONAL NEIGHBORHOOD DESIGN

3.1 Traditional Neighborhood Development General Characteristics

The roadway design standards in this section are to support Traditional Neighborhood Developments (TND). TND refers to the development or redevelopment of a neighborhood or subdivision using traditional town planning principles. TND projects should include a network of well-connected streets and blocks, a range of housing types; public spaces; and other uses such as civic buildings, stores, schools, and places of worship; all within walking distance of residences.

3.2 TND Roadway Design Principles

TND roadways should include urban, pedestrian-focused streets, and features such as reduced lane widths, reduced intersection spacing, on-street parking, and other design features that are pedestrian-, bicycle-, and low speed vehicle-friendly.

3.2.1 TND Design Speeds

Design speeds of 20 to 35 mph are desirable for TND roadways. Alleys may have design speeds as low as 10 mph. A goal of TND roadway design is to establish design speeds that create a safe and comfortable environment for pedestrians and bicyclists, and that are appropriate for the surrounding context. As traffic speeds rise, pedestrian fatalities rise at a much higher rate.

3.2.2 TND Design Vehicles

The Design Vehicle is the largest vehicle that is accommodated without encroachment onto curbs (when present) or into adjacent travel lanes. For TND roadways, the selected Design Vehicle controls horizontal and vertical alignments, lane widths, and curb radii at intersections. To keep crosswalks short, curb radii on TND roadways should be no larger than what is needed to accommodate the design vehicle.

3.2.3 TND Design Volumes

High volume roadways can hinder bicycle and pedestrian mobility while also disrupting healthy urban development. While vehicular capacity should be a factor in the design of TND roadways, the overriding goal is to provide safe and comfortable opportunities for pedestrians and bicyclists. Roadways surrounding TND developments should be designed to accommodate motorists who wish to avoid delays due to traffic congestion.

3.3 TND Roadway Design Elements

3.3.1 Travel Lane Widths

TND roadway travel lanes are typically 10’ wide. In order for drivers to maintain appropriate driving speeds, lane widths should create some level of discomfort when driving too fast. In low-speed urban environments, lane widths are typically measured to the curb face instead of the edge of the gutter pan. Consequently, when curb sections with gutter pans are used, the travel lane and parking lane widths include the width of the gutter pan.

3.3.2 Medians

TND roadway medians are typically landscaped with raised curbs. Medians used in low-speed urban thoroughfares provide for access management, safety, pedestrian refuge, landscaping, lighting, and utilities. To provide for pedestrian refuge, TND roadway medians should be not less than 6 feet wide.

Landscaped medians can enhance the street or help create a gateway entrance into a community. Medians can be used to create tree canopies over travel lanes for multi-lane roadways, contributing to a sense of enclosure.

3.3.3 Turn Lanes

Turn lanes should generally be avoided on TND roadways, as they tend to allow through vehicles to maintain higher speeds through intersections; lengthen crosswalks; and take up roadway space that could be used for wider sidewalks, landscaping, or other placemaking features.

3.3.4 On-Street Parking

Design standards for TND on-street parking are as noted in Section 2.5.8 of the Land Development Procedures Manual, entitled "On Street Parking." In TND developments, on-street parallel or angle parking provides a buffer for the pedestrians, helps to calm traffic speeds, and is important for the success of those retail businesses that line the street.

3.3.5 Intersections

For pedestrian safety and comfort, crosswalks in TND developments should be as short as possible. To keep crosswalks short, curb radii at intersections should be no larger than what is needed to accommodate the design vehicle, which is the largest type of vehicle that will frequently turn at each corner. On TND roadways, vehicles that are larger than the design vehicle will occasionally encroach into an opposing travel lane.

To accommodate vehicles larger than the design vehicle, including emergency vehicles and delivery trucks, it may be advisable at certain intersections to design curbs that can be safely mounted without causing significant physical damage.

A smaller curb radius may be acceptable at intersections where parking lanes and bike lanes would provide for an effective turning radius that would be greater than the curb radius.

When executing a crossing or turning maneuver after stopping at a stop sign, stop bar, or crosswalk, it is assumed that the vehicle will move slowly forward to obtain sight distance (without intruding into the crossing travel lane), stopping a second time as necessary. When curb extensions are used, or on-street parking is in place, the vehicle can be assumed to move forward on the second step movement, stopping just shy of the travel lane, increasing the driver's potential to see further than when stopped at the stop bar. The resulting increased sight distance provided by the two-step movement allows parking to be located closer to the intersection, but not less than 20 feet from a crosswalk.

3.3.6 Pedestrian Considerations

Sidewalks

Sidewalks shall be provided on both sides of all TND roadways except alleys. Sidewalk widths shall be 6' in residential areas, and up to 20' in mixed use and commercial areas. The minimum traversable area on sidewalks shall be at least 4 feet.

Additional TND design standards for sidewalks are generally as noted for urban development areas in Section 1.2 of this document, entitled "Sidewalks".

Curb Ramps

It is important for persons using the sidewalk that the location of the curb ramps be as uniform as possible. Detectable warnings are required at all curb ramps and flush transitions where a sidewalk meets a roadway.

Typical curb ramp width shall be a minimum of 4 feet with 1:10 curb transitions on each side when pedestrians must walk across the ramp. Ramp slopes shall not exceed 1:12 and shall have a firm, stable, slip resistant surface texture. Ramp widths equal to crosswalk widths are encouraged.

Curb ramps at marked crossings shall be wholly contained within the crosswalk markings, excluding any flared sides.

Typical curb ramps within Traditional Neighborhoods are perpendicular to the curb or street edge at all locations. If diagonal ramps must be used, any returned curbs or other well-defined edges shall be parallel to the pedestrian flow. The bottom of a diagonal curb ramp shall have a 48-inch minimum clear space within the crosswalk.

3.3.7 Bicycle Considerations

Design standards for bicycle facilities in TND developments are generally as noted in Section 2.7 Bicycle Facilities.

Bicycle parking standards in TND developments are generally as noted in Section 2.6 Bicycle Parking Standards.

3.3.8 Landscaping

Planting strips are required for all TND Roadway Types, except for Alleys. Additional landscaping standards for TND developments are generally as noted in Section 1.3 Streetside Landscaping.

3.4 TND Roadway Types

The TND roadway design guidelines in this section are intended to promote neighborhood mobility for both motorized and nonmotorized traffic. New freeways, arterials, and major collector roadways should not be planned to run through a designated TND.

3.4.1 Alleys

New alleys in Jacksonville shall be privately owned and maintained. Alleys are intended to minimize driveway cuts across sidewalks, to provide space for utilities above and below ground, and to provide emergency access, trash collection, access to residential garages, and service access to commercial buildings. Alleys may also function as part of a drainage system.

For consistency with City of Jacksonville fire code requirements, the standard for new alleys provides a single paved 12’ travel lane, with 6’ pavers on each side. Alleys will not include curbs.

3.4.2 Neighborhood Street-1

Neighborhood Streets are used primarily in residential areas, or in other areas where residential uses may be compatible with non-residential uses. They accommodate on-street parallel parking on one side, and feature two general travel lanes for automobiles, bicycles, and occasional local transit or freight vehicles. In lieu of bike lanes, shared lane markings (sharrows) may be provided. Design elements such as intersection bulb-outs can help to moderate vehicle speeds on Neighborhood Streets.

For Neighborhood Streets, sidewalks and planting strips are required on both sides. The minimum sidewalk width is 6’. Planting strips shall be 9’ – 12’ side.

If access to residential garages is from Alleys, then a City Standard Raised Curb shall be provided along the outer edges of the travel lanes.

If access to residential garages is from the street, then the curb type to be provided may be either a Drop Curb or a Miami Curb, subject to the approval of the City Traffic Engineer.

3.4.3 Neighborhood Street-2

Neighborhood Streets are used primarily in residential areas, or in other areas where residential uses may be compatible with non-residential uses. They accommodate on-street parallel parking on both sides, and feature two general travel lanes for automobiles, bicycles, and occasional local transit or freight vehicles. In lieu of bike lanes,

shared lane markings (sharrows) may be provided. Design elements such as intersection bulb-outs can help to moderate vehicle speeds on Neighborhood Streets.

For Neighborhood Streets, sidewalks and planting strips are required on both sides. The minimum sidewalk width is 6'. Planting strips shall be 9' – 12' side.

If access to residential garages is from Alleys, then a City Standard Raised Curb shall be provided along the outer edges of the travel lanes.

If access to residential garages is from the street, then the curb type to be provided may be either a Drop Curb or a Miami Curb, subject to the approval of the City Traffic Engineer.

3.4.4 Two-Lane Avenue

The cross-section for a Two-Lane Avenue provides for both residential and nonresidential travel. Sidewalks and planting strips are required on both sides. Minimum sidewalk widths are 6' in TND residential areas, and may range up to 20' in TND areas where there is commercial activity. Planting strips shall be 7' – 20' wide. Angle or parallel parking lanes are required on both sides of a Two-Lane Avenue. Parking lanes buffer pedestrians from moving traffic, while also providing vehicular access to adjoining land uses. A raised or landscaped 15' – 60' median is optional on a Two-Lane Avenue. Bike lanes are required if the Design ADT is > 1,600 vehicles per day. Otherwise, bike lanes are optional, and shared lane markings (sharrows) may be provided. A bike lane may be located on either side of a parallel parking lane.

A City Standard Raised Curb shall be provided along the outer edges of the travel lanes. A City Standard Median Curb shall be included where a raised median is provided.

3.4.5 Four-Lane Avenue

The Four-Lane Avenue provides a good level of mobility for all users. Sidewalks and planting strips are required on both sides. Minimum sidewalk widths are 6' in TND residential areas and may range up to 20' in areas where there is commercial activity. Planting strips shall be 7' – 20' wide. To provide refuge for crossing pedestrians, raised or landscaped medians 15' – 60' wide are required. Angle or parallel parking lanes are required on both sides of a Four-Lane Avenue. Parking lanes buffer pedestrians from moving traffic, while also providing vehicular access to adjoining land uses. A bike lane may be located on either side of a parallel parking lane.

A City Standard Raised Curb shall be provided along the outer edges of the travel lanes. A City Standard Median Curb shall be included where a raised median is provided.

Table 3.4-1 TND Roadway Design Requirements by Roadway Type

Roadway Type	Posted Speed Limit	Design Vehicle*	Curb Radius (ft)
Alley	NA	NA	NA
Neighborhood Street-1	20	P*	10’ – 25’
Neighborhood Street-2	20	P*	10’ – 25’
2 Lane Avenue	25	P* or SU-30**	10’ – 25’
4 Lane Avenue	25	P* or SU-30**	10 – 25’

* P: Passenger Car ** SU-30: Single Unit Truck

NOTE: If the Design Vehicle is larger than shown above, then the City Traffic Engineer may require a larger curb radius.

Table 3.4-2 TND Roadway Right of Way and Lane Widths

	Right of Way Width	Lane Width
Alley	24’	12’
Neighborhood Street-1		10’
Neighborhood Street-2		10’
2 Lane Avenue	80’ – 176’	10’
4 Lane Avenue	100’ – 196’	10’

Table 3.4-3 Dimensions of Proposed TND Typical Section Elements

Typical Section Element	4 Lane Avenue	2 Lane Avenue with median*	2 Lane Avenue without median*	Neigh-borhood Street 2	Neigh-borhood Street 1	Alley
Sidewalk	6 - 20	6 - 20	6 - 20	6	6	0
Planting Strip	7 - 20	7 - 20	7 - 20	9 - 12	9 – 12	0
Curb (at Planting Strip)	1.5	1.5	1.5	1.5	1.5	6
Parking Lane	8	8	8	7	7	0
Bike Lane	5	0 – 5**	0 – 5**	0	0	0
Buffer	2	0 – 2**	0 – 2**	0	0	0
Travel Lane	10	10	10	10	10	12
Curb (at Landscaped Median)	1.5	1.5	0	0	0	0
Landscaped Median	15 -60	15 -60	0	0	0	0
Right of Way	117-216	83 -196	65 – 133	67-73	60-66	24

Figure 3.4-1 TND Alley

Figure 3.4-2 TND Neighborhood Street-1

Figure 3.4-3 TND Neighborhood Street-2

Figure 3.4-4 TND 2-Lane Avenue with Median

Figure 3.4-5 TND 2-Lane Avenue without Median

Figure 3.4-6 TND 4-Lane Avenue with Median

SECTION 4.0 – COMMERCIAL DEVELOPMENT GUIDELINES

To be developed

SECTION 5.0 – DEVELOPMENT DRAINAGE REQUIREMENTS

5.1 GENERAL

5.1.1 DEVELOPERS RESPONSIBILITY

All storm runoff in the development must ultimately be disposed of in a manner which will not cause damage to upstream or downstream property owners. The developer shall respect the rights of adjacent property owners with regard to overloading the stream or creating an excessive rise in water level in the receiving body of water. The development will be under pre/post development discharge restriction unless an analysis (which may include existing studies, master plans or permitting rules criteria) of the existing receiving system is performed to prove no adverse impact.

Once a project begins (issuance of site permit or notification from the developer) a formal 6-month inspection report will be required to be submitted to the city. Formal inspection reports will be required to be submitted every 6-months until construction is complete.

All new developments shall provide for stormwater treatment. Treatment volume shall be based on current St. Johns River Water Management District (SJRWMD) rules or the Master Stormwater Management Plan (MSWMP) special basin criteria to achieve pollution loading targets. In those areas where no special basin criteria are adopted, the City reserves its right to participate in all SJRWMD permitting, administrative and judicial appellate procedures; however, a SJRWMD issued permit, which is administratively and judicially final, will be accepted as demonstrating compliance with SJRWMD rules.

Additional requirements apply to drainage basins with known ongoing drainage problems (restricted basins). Boundary maps of these basins can be found in Appendix 2. The restricted basins and their respective requirements are as follows:

1. Volumetric Pre/Post Basins (post development discharge volume must not exceed the pre-development discharge volume between the hours of 10 and 17 design storm event):
    a. Sandlewood Canal / Hogpen Creek
    b. Cedar River / Wills Branch
    c. Pablo Creek

2. Half CFS Basins (discharge within the basin is limited to 0.5 cfs per acre):
    a. Atlantic Boulevard at Girvin Road (northeast quadrant)
    b. Christopher Creek
    c. Doctors Branch
    d. Orange Picker Road and Mandarin Road
    e. Moncrief Creek

5.2 DRAINAGE INFORMATION REQUIRED

5.2.1 MASTER DRAINAGE MAP

The registered professional shall include in the site development plans a Master Drainage Map showing all existing and proposed features. The map is to be prepared on a 24-inch by 36-inch sheet on a scale not to exceed 1 inch = 200 feet unless otherwise approved by the City Engineer. Listed below are the features that are to be included on the drainage map:

1. Drainage Area
   a. All areas draining to or through the proposed development.
   b. All areas tributary to existing structures.
   c. All areas tributary to proposed structures.

2. High water data on existing structures upstream and downstream from the development.

3. Notes indicating sources of high water data.

4. Notes pertaining to existing standing water, areas of heavy seepage, or springs.

5. Vicinity and location map.

6. Limits of construction.

7. Existing ground contours drawn to a 1 foot interval or elevations based on NAVD datum (1988). Greater contour intervals may be approved where steeper slope dictates.

8. Existing drainage channels and structures with their size, elevations, and slopes.

9. Proposed drainage channels and structures with their size, elevations, and slopes.

10. Time of concentration paths.

11. Land use with the appropriate soil type and CN's or runoff coefficients.

12. Site topography shall extend a minimum of 100 feet beyond the boundaries of the development to the greatest extent possible. Existing City topographic contour maps, or other reliable sources, may be utilized to provide necessary topographic mapping to establish the entire drainage basin beyond 100 feet.

13. Location and size of existing and proposed easement and right-of-way.

14. Show the 100-year flood plain or flood-prone areas (current FIRM map).

5.2.2 LOT GRADING

LOT GRADING PLAN

The registered professional shall include in the site development plans a Lot Grading Plan including the following:

1. Elevation of each lot corner proposed and minimum proposed floor elevation based on NAVD datum (1988). Also, show proposed centerline pavement elevations (nearest 0.1 feet) in front of approximately every other lot corner and centerline intersections and center of cul-de-sacs.
   a. In cases where natural ground slopes equal or exceed 0.8%(*) and where filling or cutting is not required, specific rear lot corner elevations may be waived and directional flow arrows be used instead.
   b. In cases where drainage divides occur between the front and rear of lots, minimum typical standard swale slopes may be used to maintain integrity of drainage divides in lieu of specific elevations.
   c. All residential subdivision lots to have a minimum continuous slope of 0.5%, and be compliant with the Florida Building Code.

(*) May be reduced to a lesser value in Ortega and Kershaw Sands.

2. Proposed sidewalk location.

LOT FILLING

CASE "A" (Adjacent Property Not Owned By Developer):

When filling & adjacent property draining away the minimum setback from the property line shall be 1 foot.

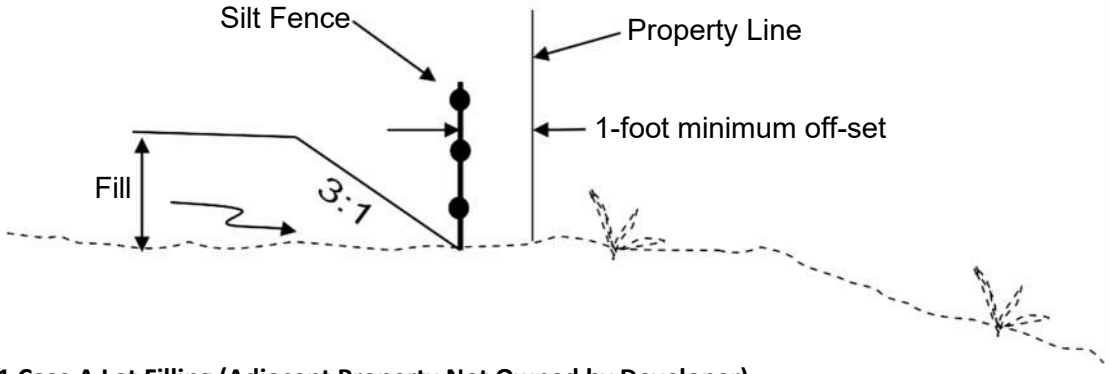


Figure 5.2-1 Case A Lot Filling (Adjacent Property Not Owned by Developer)

Note: This is one acceptable means to handle this condition, however other engineering options can be considered.

CASE "B" (Adjacent Property Not Owned By Developer):

When filling 0-4 feet & adjacent property draining to site the minimum setback from the property line shall be 1 foot and a swale/yard drain system shall be constructed with a minimum swale slope of 0.3% and one drainage inlet placed every 3rd lot line unless approved otherwise.

Min. 10’ private easement for shallow swales/piped & yard drain system

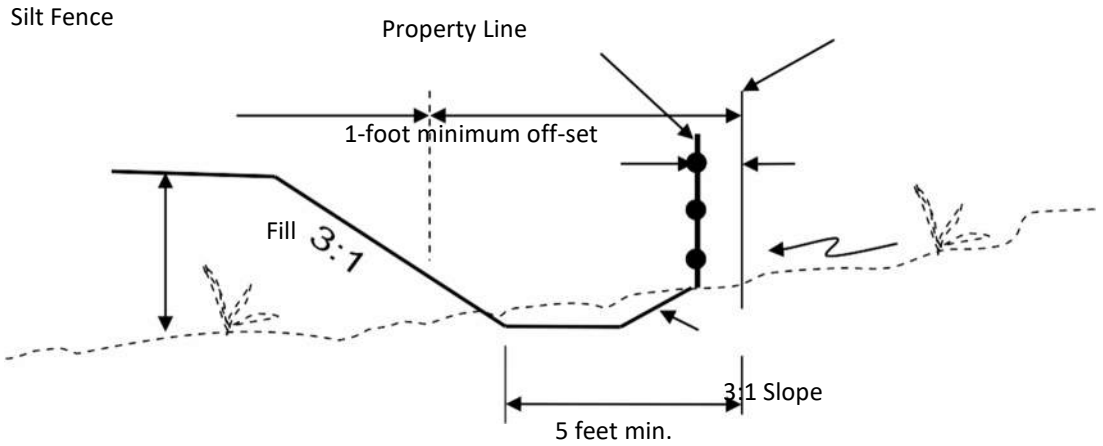


Figure 5.2-2 Case B Lot Filling (Adjacent Property Not Owned by Developer)

CASE “C” (Adjacent Property Owned by Developer or Temporary Construction Easement):

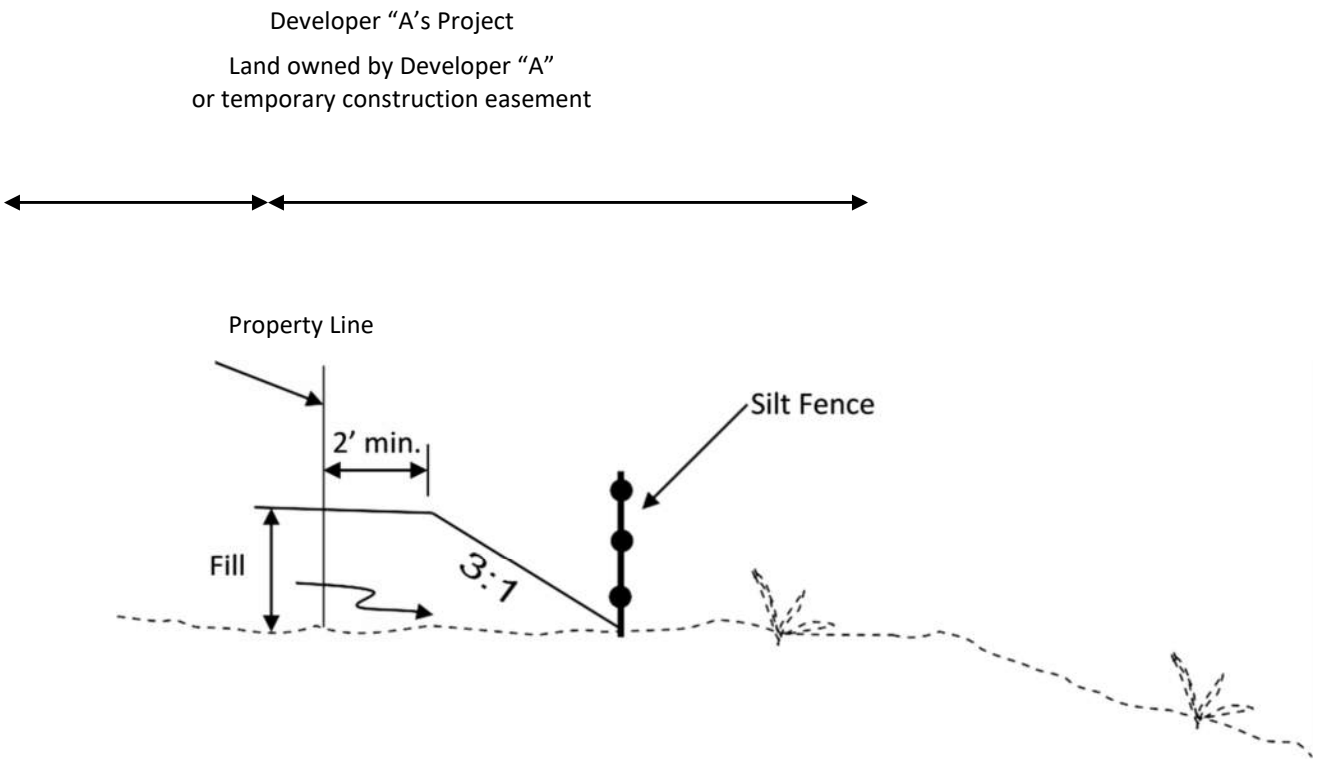


Figure 5.2-3 Case C Lot Filling (Adjacent Property Owned by Developer or Temporary Construction Easement)

CASE “D” (Adjacent Property Owned by Developer):

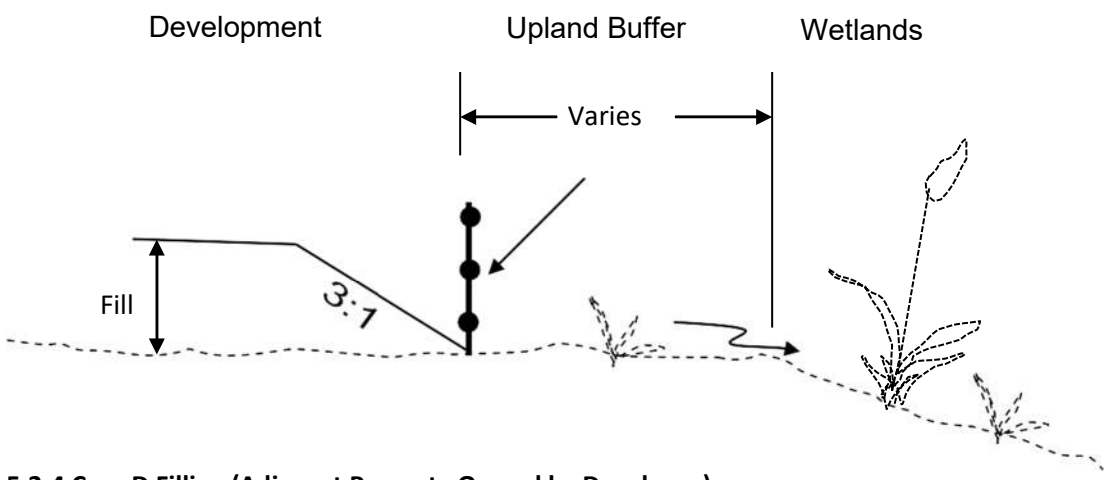


Figure 5.2-4 Case D Filling (Adjacent Property Owned by Developer)

SOIL INVESTIGATION REQUIREMENTS
A soil investigation report shall be submitted with the site development plans and shall include:

1. Test borings to a depth (min. 4' below proposed edge of pavement) and spacing (max. 500' along centerline) showing existing water table and estimated water table during periods of normal rainfall and without drainage improvements that may lower the groundwater.

2. In special cases additional borings to determine the soil classifications predominant to the area may be required by the City Engineer.

3. Soil borings for pond designs shall be in accordance with 5.8.3.2(j).

5.2.3 OBSTRUCTION OF DRAINAGE

No obstruction to existing drainage will be permitted unless approved by the City Engineer. This includes flow in streams or ditches, overland flow, underground flow, flow in pipes, or flow in flood plains.

5.2.4 MAINTENANCE OF DRAINAGE PLAN

Plans submitted for review shall include a proposed “Maintenance of Drainage” plan which identifies the site-specific method to maintain stormwater drainage patterns during the construction phase of a project. A Plan Reviewer will examine all commercial and residential projects for compliance with the Maintenance of Drainage requirements. In addition, staff form the Development Services Division will also routinely inspect construction sites for compliance. Again, the city will not prescribe specific methods to achieve this objective and the individual method to achieve and maintain full compliance will be the responsibility of the owner or person in charge of the project.

5.2.5 FLOOD ZONE AND FLOOD-PRONE AREAS

1. Flood Zones

    a. Any site (including residential lots) adjacent to a stream or river must be evaluated to

assure that no blockage occurs in the flood plain.

b. In the event a 100-year flood zone, as shown on current FIRM MAPS or delineated by the best available data, is to be filled, 1) adequate storage area must be provided to hold the same quantity of water that the flood area did prior to filling; 2) certain channel and improvements downstream must be made to compensate for any storage denial; or 3) a combination of No. 1 and 2 unless otherwise approved by the CityEngineer.

2. Flood-Prone Areas

a. Adequate drainage must be provided to accommodate storm water if flood-prone areas are filled. This could be in the form of alternate water storage areas, improvements, or combination of these or other basin changes.

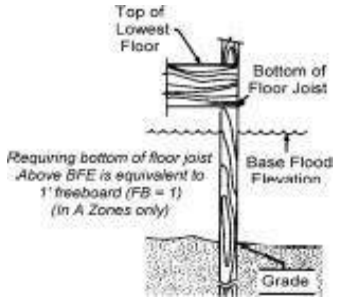
b. Approval from any local, State of Florida, or U. S. government agency is required and copies forwarded to the City within ten days after commencement of construction on the affected area.

c. All design must be in conformance with Chapter 652 of the Ordinance Code, "Damage Prevention Regulations".

5.2.6 FREEBOARD REQUIREMENT

Where base flood elevations have been established, buildings and structures (other than accessory structures specified in Chapter 652, Ordinance Code) shall be elevated to or above the base flood elevation plus two (2) feet.

NOTE: In A Zones the lowest floor is measured from the top of the floor. In V Zones, the elevation requirement is measured from the bottom of the lowest horizontal structural member. If the illustration to the right were for a V-Zone building, the freeboard would be measured from the bottom of the floor joist.



Where base flood elevations have not been established, construction (per 652.406) shall be elevated to the depth number specified on the FIRM plus two (2) foot prior to the placement of fill. If no depth number is specified, the lowest floor including the basement, shall be elevated, at least three (3) feet above the highest adjacent natural grade prior to the placement of fill. This replaces the current

requirement, of “shall be elevated to the depth number specified on the FIRM, in feet, above the highest adjacent natural grade prior to the placement of fill. If no depth number is specified, the lowest floor including the basement, shall be elevated, at least two (2) feet above the highest adjacent natural grade.”

Where the Special Flood Hazard Area is immediately adjacent to a “floodway” a more stringent base flood elevation is shown in the Flood Insurance Study. Where flood studies have produced floodways that provide a flood elevation based upon the floodway encroachment, these elevations are listed in the “With Floodway” column in the Floodway Data Table in the community’s flood insurance study. These higher elevations shall be used as the BFE for that area, and then the freeboard requirement stated above shall be applied.

5.2.7 DOWNSTREAM IMPROVEMENTS

The Public Works Department shall require that drainage systems downstream of a proposed development have the capacity or hydraulic gradient to accept the proposed developments discharge, or that the proposed development improves the downstream drainage system. Accordingly, the City Engineer may require the developer to analyze the downstream drainage system. Based on this analysis and easement requirements, the following criteria shall apply asapplicable.

1. There is no peak discharge requirement for direct discharges to the St. Johns River or Intracoastal Waterway.

2. If there are no known* flooding problems, approval of off-site stormwater discharge shall be based on:

    a. Downstream off-site easements will not be required if the development provides a demonstration of no downstream flooding by maintaining existing peak discharge(s) and stage-discharge relationship(s) immediately downstream of the site discharge location(s) and demonstrate no upstream flooding by considering upstream inflow(s); or

    b. Maintenance of existing peak discharge(s) at the site discharge location(s) and route the design storms (5, 25, and 100-year, 24-hour) through a recorded easement or man-made channel obtained into publicly maintained rights-of-way or receiving waters defined as the following:

    - FEMA FIS extent of coverage, including flood profiles and/or FIRMS (least squares regression for interpolation);

    - The 25-year, 24-hour storm flood stage for wetlands; or

    - Natural streams (as identified on "Drainage Basins in Duval County, Florida," Stone and Largen, WRI 82-4069 USGS, 1983), or agreed to by the City Engineer.

3. If there are known* flooding problems, approval of off-site stormwater discharge shall be based on:

    a. Maintaining existing peak discharge(s) and stage-discharge relationship(s) at the site discharge location(s) as well as the timing, duration, and volume of existing off-site discharge(s) in volumetrically sensitive basin as defined by SJRWMD; or the City

    b. A demonstration that peak discharge(s) and volume release(s) from the site will not increase flood stages or velocities off-site; or

    c. Providing improvements along entire discharge path (in recorded easements, unless approved otherwise by the City Engineer) to the receiving waters as defined in B. 2.

*Known flooding problems are those which pose an imminent threat to public safety and/or property including loss of human life, blockage of evacuation and/or emergency vehicle routes, and/or flooding of homes, buildings, or roadways as evaluated by the following criteria:

1. Home/building flooding for any storm;

2. Roads being overtopped by flood stages based on the appropriate design event and over topping of the roadway of greater than one foot based on the 100 year, 24-hour event; or

3. Greater than one foot per 50 feet of head loss across a stormwater conveyance structure for the appropriate design events;

i.e., 5 year for local roadways draining less than 40 acres; 25 year for local roadway draining 40 acres or more; 50 year for box culvert crossings; and 100 year for bridges and evacuation routes.

5.2.7 ADJACENT PROPERTY

5.2.8 DRAINAGE AT PROPERTY ENTRANCES

The following information is required:

1. All driveway entrances and exits to private property must be graded so as to prevent water entering from public streets.

2. Show all existing and proposed entrances and exits.

3. Show existing and proposed parking layouts.

DOWNSTREAM OWNER

Increased concentrated storm water runoff shall not be directed onto adjacent property without the written consent of that property owner. If any drainage structure is to be placed on the description describing the required easement and any restriction imposed by the agreement must also be submitted. Note: If proposed runoff is to be drained into state roads or railroad property, a letter from that agency indicating approval of such must be submitted prior to drainage approval.

Sheet drainage: Sheet drainage into public right-of-way is normally not acceptable. Increased sheet drainage onto adjacent private property is not acceptable without the owner's permission.

UPLAND OWNER

All water must be accepted from all upland owners. Such water must be accepted according to then present land conditions. When the development constructs a drainage system to accept the private off- site upstream drainage, unless accepted by the City as part of a master plan, the property owner, the Homeowners Association or other acceptable entities as approved by the City Engineer, shall maintain the system.

5.2.9 VALLEY GUTTERS

The use of valley gutters is generally unacceptable. However, they will be acceptable across cul-de-sacs of no more than 150 feet in length or as approved by the City Engineer.

5.3 DESIGN METHODS AND EQUATIONS

5.3.1 DESIGN METHODS

The registered professional may use SCS method for determining runoff for any site — no acreage restriction. The rational method may be used only for sites that are 10 acres or less.

5.3.2 DESIGN STORM FREQUENCY

1. For rivers, the 100-year frequency storm shall be used.

2. Major outfalls - For canals, waterways, natural drainage streams and culverts of major outfalls, the 25-year frequency storm shall be used.

3. Subdivisions - For suburban, subdivision, or medium density areas, the 5-year frequency storm with a minimum time of concentration of 20 minutes shall be used.

4. Urban Areas - When utilizing the rational method for urban areas, the 5-year frequency storm with a minimum time of concentration of 10 minutes shall be used.

Note: The times of concentration above apply only to hydrology (pond design), not to hydraulics (pipe and ditch design) (FDOT Storm Tabs). In hydraulic calculations, a minimum time of concentration of 10 minutes shall be used.

5.3.3 COEFFICIENT OF RUNOFF

Coefficient of runoff used in the design of drainage facilities shall be in accordance with sound engineering practices. The following is a list of typical rational coefficients for various types of developments:

Table 5.3-1 Runoff Coefficients by Landuse

TYPE OF DEVELOPMENT	% RUNOFF
Swamps	10%
Low Hammocks	15%
Natural Ground	20%
Grassed Recreation Areas	30%
Subdivisions	40%
Gravel	50%
Apartments	60 to 70%
Industrial/Commercial Area	80 to 100%

5.3.4 RAINFALL INTENSITY

The rainfall intensity -i- in inches per hour for a given time of concentration. The chart entitled, "Jacksonville, Florida, Intensity, Duration and Frequency of Rainfall, U.S. Weather Bureau Gage Records, 1896-1953: 58 years, Revised 1974", shall be used to determine the factor -i-.

Rainfall intensity for time of concentration less than 120 min. shall be calculated by:

$$i = \frac{145}{(t + 20)^E}$$

Table 5.3-2 Rainfall Intensity Based on Storm Frequency

For time of concentration greater than 120 min., FDOT intensity duration curves for Zone 4 shall be used.

Storm Frequency	E
1 year	1.000
2 year	0.969
5 year	0.930
10 year	0.900
15 year	0.884
25 year	0.863
50 year	0.837
100 year	0.799

5.4 DRAINAGE DESIGN CRITERIA

5.4.1 GENERAL DESIGN CRITERIA

The minimum acceptable pipe velocity is 2.5 fps flowing full. If this is a physical impossibility, an absolute minimum hydraulic velocity of 2.0 feet per second for full flow should be obtained. The maximum velocity shall be kept below 15 fps. The maximum allowable velocity at the point of discharge is 6 fps unless energy dissipation is provided. If the outfall discharges into a still body of water, submergence of the outfall by at least 2/3 of the diameter may be considered as energydissipation.

5.4.2 PIPE AND OPEN CHANNEL DESIGN CRITERIA

Design of pipe and open channels shall be calculated by application of the Manning Formula and the Continuity Equation.

$$V = \left(\frac{1.486}{n}\right) * R^{\frac{2}{3}} * S^{\frac{1}{2}}$$

$$Q = A * V$$

V = Velocity of flow in feet per second (fps)

A = Cross-section area of flow (square foot)

R = Hydraulic radius; area of flow divided by wetted perimeter in feet (a/WP)

S = Slope of hydraulic grade line (feet per foot)

Q = Rate of runoff in cubic feet per second cfs

n = Manning's coefficient of flow

The maximum allowable velocity for earth-lined ditches is 2.5 fps.

5.4.3 MANNING COEFFICIENTS

Table 5.4-1 Manning Coefficient for common conveyance

Type Culvert	"n"
15" to 30" RCP & Concrete Lined Pipe	0.013
36" to 48" RCP & Concrete Lined Pipe	0.012
54" and larger RCP (including concrete box culverts)	0.011
HDPE Pipe (all sizes)	0.012
CMP Asphalt Coated - 15" diameter	0.013
CMP Asphalt Coated - 18" diameter	0.014
CMP Asphalt Coated - 21" diameter	0.015
CMP Asphalt Coated - 24" diameter	0.016
CMP Asphalt Coated - 30" diameter	0.017

CMP Asphalt Coated - 36" diameter	0.019
CMP Asphalt Coated - 42" diameter	0.020
CMP Asphalt Coated - 48" diameter	0.020
CMP Asphalt Coated - 54" diameter	0.021
CMP Asphalt Coated - 60" diameter	0.022
CMP Asphalt Coated - 66" diameter	0.024
CMP Asphalt Coated - 72" diameter	0.026
CMP Asphalt Coated - 78" diameter and larger	0.027
Concrete Paved Open Channels	0.013
Earth Lined Open Channels-Good Condition	0.030
Earth Lined Open Channels-Average Condition (Design)	0.040
Earth Lined Open Channels-Poor Condition	0.045

5.4.4 PIPED DRAINAGE SYSTEM DESIGN

5.4.4.1 STORM SEWER TABULATION

The plan submittal shall contain FDOT storm sewer tabulations as shown on **Attachment 2-3**.

5.4.4.2 STORM SEWER ALIGNMENT

All storm sewer layouts shall avoid abrupt changes in directions or slope and shall maintain reasonable consistencies in flow velocity. Where abrupt changes in direction or slope are necessary, provisions shall be made to handle the resulting head loss and erosion.

The maximum vertical distance between inflow invert and outlet invert shall be 8 feet. The maximum deflection angle between inflow pipe and outlet pipe shall be 90 degrees. If conditions arise which make the above criteria impractical to utilize, the City Engineer may waive the standard, provided the registered professional submits a special structural design for the drainage structure.

5.4.4.3 MINIMUM STORM SEWER PIPE SIZE

The minimum pipe size shall be 15 inches round or 15 inches elliptical equivalent.

5.4.4.4 MAXIMUM STORM SEWER PIPE LENGTHS

The maximum length of pipe to be used without an access structure shall be:

Table 5.4-2 Maximum allowable pipe distance between structures

PIPE SIZE	MAXIMUM LENGTH (FEET)
15" pipe	250
18”	300
24” THRU 36”	400
42” and larger pipe (including all box culverts)	500

5.4.4.5 STORM SEWER MAXIMUM HYDRAULIC SLOPE

The maximum hydraulic gradient shall be that slope which produces a velocity of 15 feet per second. When hydraulic calculations do not consider minor energy losses, the elevation of the hydraulic gradient for the design storm condition should be at least 1.0 feet below the gutter or ground elevation. As a general rule, minor losses should be considered when the hydraulic gradient velocity exceeds 6 feet per second or lower on critical systems. If all minor losses are calculated, it is usually acceptable for the hydraulic gradient to reach the gutter elevation.

For major drainage crossings, a maximum 1-foot rise in the hydraulic gradient shall be allowed at the entrance to the structure provided there are no adverse impacts to adjacent property. A maximum 0.1-foot rise shall be allowed 500 feet upstream of the structure.

5.4.4.6 MINIMUM PHYSICAL SLOPE

The minimum slope for all culverts shall be that which will produce a minimum velocity of 2.5 feet per second when the culvert is flowing full. Short (150 feet or less) equalizer pipes may be proposed flat.

5.4.4.7 MINIMUM PIPE COVER

The minimum cover on a culvert shall be no less than 12 inches. Beneath a vehicular travelway, the distance shall be measured from the outside bell of the culvert to the top of the base at any point.

5.4.5 STORM SEWER INLETS

5.4.5.1 STORM INLET CAPACITY

The capacity of City standard curb inlets shall be 4.0 cfs per throat unless otherwise approved by the City Engineer.

5.4.5.2 STORM INLET SPACING

The maximum distance surface water will be allowed to run in the gutter prior to discharge into an inlet shall be 500 feet.

5.4.5.3 STORM INLET LOCATIONS

1. Where inlets are located on returns, a return profile may be included in the site development plans.

2. Other than at intersections, inlets should be located as near as possible to common lot lines.

3. Inlets shall be recessed from the roadway as shown on Plate D-202.

4. Ditch Bottom or Grate Inlets.

5. Ditch bottom or grate inlets shall conform to the City Standard Details.

5.4.5.4 STORM DRAINAGE STRUCTURES

1. General - All structures shall be in accordance with City Standards.

2. Conflict Manholes - Where it is necessary to allow a sanitary line or other utility to pass through a manhole, inlet or junction box because of no reasonable alternative, the utility shall be cast iron, steel, or other suitable material and maintained in the upper half of the storm sewer opening.

5.4.6 DRAINAGE EASEMENTS

Easement width for pipe shall be 20-foot minimum for 4 feet of cut or less and 2 feet additional width for each additional foot of cut below 4 feet. The pipe shall be located in the center part of any easement. The City may require unobstructed easements or rights of way along rear or side lot lines where necessitated by maintenance requirements.

This criteria does not apply for private easements for shallow rear yard swales and/or yard drains with small/shallow pipes.

5.5 ROADSIDE DITCHES AND SWALES

Within 60-foot rights-of-way, roadside ditches are to be no more than 3 feet in depth or 10 feet in top width. The maximum allowable velocity shall be 2.5 feet per second. In rights-of-way greater than 60 feet, the depth may be greater than 3 feet as long as the roadside shoulder is increased to a minimum of 10 feet.

1. Shape

    a. Roadside ditches greater than 3 feet deep.

        i. 2:1 maximum front slope
        ii. 2:1 maximum back slope or

    b. Roadside ditches 3 feet or less.

        i. 2:1 maximum front and back slope

5.5.1 ROADSIDE DITCH AND SWALES GRASSING REQUIREMENTS

All ditches or swales shall be grassed and mulched in accordance with the latest City Specifications. Sod will be used at locations designated by the City Engineer.

5.5.2 ROADSIDE DITCH CROSSINGS

5.5.2.1 DRIVEWAY CROSSINGS

1. Placement - Driveway crossing pipe shall be placed in the ditch line of the proposed roadway ditch with an invert elevation equal to the proposed ditchgrade.

2. Size Schedule - A schedule showing the size and type crossing needed to gain entrance to each site shall appear in the site development plans.

    a. This may be accomplished by a note as to type and size needed appearing in the profile portion of the plan and profile sheet. A driveway culvert that is 32 feet or more in length will require drainage design (sizing) calculations that have beensigned and sealed by a registered professional and require installation by a licensed underground utility contractor.

    b. A check is to be made to insure that the proposed ditch section has adequate depth to insure minimum cover.

5.6 DRAINAGE OUTFALL DITCHES AND CANALS

5.6.1 DRAINAGE RIGHTS-OF-WAY WIDTHS

To determine the required right-of-way or easement width over a ditch; determine the width of the top of the ditch, add 5 feet to one side and 20 feet to the other side for equipment access and consider extra radius or extra width at sharp turns to allow equipment turning. The total equals the minimum width required. When the top width of a ditch exceeds 100 feet, 35 feet should be added to each side.

5.6.2 DRAINAGE DITCH SIZES

All ditches shall be sized using accepted engineering practices. In all cases sufficient engineering data giving drainage area, velocity, and depth of flow is to be included in the drainage analysis.

5.6.3 DRAINAGE DITCH VELOCITIES

Unless unstable or highly erosive soil conditions indicate a lower design velocity, the maximum allowable velocity shall be 2 feet per second. Erosion protection may be required when the velocity exceeds 2 feet per second or the ditch slope exceeds 2 percent.

5.6.4 DRAINAGE DITCH SLOPE

The minimum required to provide for design flow.

5.6.5 ANALYSIS OF EXISTING OUTFALLS

Where an existing outfall is being utilized and the capacity to handle any additional runoff is in question, data to support the design shall be included in the drainage analysis.

5.6.6 CROSS SECTION DESIGN CRITERIA

5.6.6.1 GRADING ADJACENT TO CROSS SECTION

Areas adjacent to the ditches and canals shall be graded in such a manner as to preclude the entrance of excessive runoff except at locations where erosion protection is provided. Such locations shall be piped.

5.6.6.2 CROSS SECTION MAXIMUM SIDE SLOPES

The maximum side slope allowed shall be 2:1 or as soil conditions allow with the top ditch bank rounded off.

5.6.7 DITCH PROTECTION

5.6.7.1 DITCH ALIGNMENT CHANGES

Appropriate erosion protection shall be provided at changes in either or both horizontal or vertical alignment.

5.6.7.2 GRASSING AND MULCHING OR SOD

All ditches and earth embankments are to be grassed and mulched per City Standard Specifications. Sod may be required in some extreme circumstances. The Contractor is responsible for grass until a good stand has been rooted. An asphalt membrane to hold grass and mulch material will be acceptable. Topsoil or a mulch blanket may be required.

5.6.8 UTILITY CROSSINGS

Where it is necessary for a utility to cross a drainage right-of-way, the following minimum requirements shall be adhered to:

1. Aerial crossing - minimum of 1.0-foot clearance above design high water.

2. Underground - minimum of a 2.5-foot clearance below the design invert of the canal.

3. Utilities shall be adequately permanently marked to protect against accidental damage during maintenance operation.

4. No supports for aerial crossings shall be allowed in the confines of the canal cut unless authorized by the City Engineer.

5. Conduit material for crossing shall be submitted for approval by the City Engineer.

5.7 DEPENDENCE ON FUTURE DEVELOPMENT

When development is accomplished in phases, each individual unit constructed must provide the drainage improvements necessary for that unit. All runoff from each individual unit must be handled to a point of positive outfall. No design of an individual unit shall be dependent upon the ultimate installation of a future unit. When circumstances dictate, the developer must agree to accept the public water and provide temporary easements.

5.8 DETENTION / RETENTION BASINS (STORMWATER MANAGEMENT FACILITIES)

5.8.1 STORMWATER MANAGEMENT FACILITY GENERAL REQUIREMENTS

Detention/retention basins may be incorporated into a drainage system for the following reasons:

1. The outfall system is inadequate to handle post-development flows and revisions to the outfall are not practical.

2. Peak flow attenuation as required by state agencies.

3. Stormwater treatment facilities.

4. Amenity to the proposed development.

5.8.2 STORMWATER MANAGEMENT FACILITIES – TOTAL RETENTION

All detention/retention facilities must have a positive discharge except as approved by the City Engineer. If total retention is allowed, the basin must recover to its design low water stage within 72 hours. To provide the City with assurances, a double ring infiltrometer test must be performed at the same elevation as the bottom of the basin and a safety factor of 4 shall be applied to the design.

5.8.3 STORMWATER MANAGEMENT FACILITIES DESIGN CRITERIA

5.8.3.1 GENERAL DESIGN METHODOLOGIES

The registered professional may use SCS method for determining runoff for any site — no acreage restriction. Rational method may be used only for sites that are 10 acres or less.

5.8.3.2 DETENTION BASIN DESIGN CRITERIA

The site development plans must be accompanied by a complete detention analysis showing:

1. Overall drainage layout including all drainage areas contributing to the detention basin.

2. Calculations showing inflow, discharge, storage capacity, minimum and maximum design water depth and detention time, capacity of the receiving system, tailwater conditions at the outlet structure.

3. The drainage basin lag time shall be incorporated into the inflow hydrograph for drainage basins in excess of 40 acres.

4. The outflow hydrograph shall reflect the varying pond discharge from design low water to design high water.

5. Inflow

Table 5.8-1 Design storms for wet detention design

METHODOLOGY USED	DESIGN STORM (Developed Conditions)
Rational Method	
- Inflow	100-year storm
- Contributing pipe system	5-year storm
SCS Method	
- Inflow	25-year storm
- Contributing pipe system	3-year

6. Outflow

    a. The maximum allowable outflow rate shall be based on the runoff rate for existing conditions using the 100-year rational or 25-year SCS design storm

    AND

    b. The outflow rate shall not exceed the capacity of the downstream drainage system based on the appropriate inflow-outflow design storm for that system as defined herein.

Example: Downstream Drainage System

i. Subdivision - five-year Rational or 3-year SCS design storm. The outflow rate shall not exceed the capacity of the downstream system based on a 5-year design storm inflow into the detention pond.

ii. Major Outfalls - 25-year Storm(a) Subdivision - five-year Rational or 3-year SCS design storm. The outflow rate shall not exceed the capacity of the downstream system based on a 5-year design storm inflow into the detention pond.

The outflow rate shall not exceed the capacity of the downstream system based on a 25-year design storm inflow into the detention pond.

7. Storage Required

The storage required shall be that volume necessary to store the difference between the 100-year rational or 25-year SCS storm developed-condition runoff and the 100-year rational or 25-year SCS storm existing-condition runoff. Additional restrictions apply in certain restricted drainage basins, see Appendix 2.

8. Exceptions

When downstream conditions will not accept runoff from the appropriate storm-existing conditions or other special instances, the development will be required to provide a drainage system which will not increase flooding downstream.

9. Design storms for detention basin design:

    a. Rational Method

Table 5.8-2 Rational Method design storms

Duration (hrs. min)	100 Year Rainfall (in)	25 Year Rainfall (in)	5 Year Rainfall (in)
0- 5	0.850	0.720	0.60
0-15	2.116	1.686	1.30
0-30	3.183	2.700	2.10
0-40	3.778	3.050	2.35
1- 0	4.373	3.400	2.60
1-30	5.080	3.950	2.95
2- 0	5.593	4.500	3.30
3- 0	6.309	5.000	3.80
4- 0	6.821	5.500	4.03
6- 0	7.556	6.000	4.50
8- 0	8.091	6.330	4.83
12- 0	8.870	7.000	5.50
24- 0	10.310	8.500	6.50

See **Attachment 2-4**.

b. SCS methods shall use the Type II Florida Modified Distributions with rainfall amounts from the St. Johns River Water Management District Technical Publication SJ88-3.

10. Soil Investigation

a. Soil borings shall be made to a depth which equal to the design low water, seasonal high water table, or the pond bottom if dry.

b. Soil types, estimated seasonal high water table elevation to be included and illustrated as a part of the detailed storm water management facility construction plans.

c. No less than 1 boring per acre or fraction thereof of storm water management facility water surface at design low water elevation, or as specified by the City Engineer.

d. If the analysis of the basin utilizes infiltration to achieve either peak flow attenuation or recovery time, a double ring infiltrometer test shall be performed at the bottom of the proposed basin. A safety factor of 2 shall be used for design calculations.

11. Flooding of a private commercial site to satisfy attenuation requirements is allowed with Owner's (Client) permission. The limits of flooding shall be shown in the plans along with the following statement signed by the Owner (Client):

I (*type or print owner's name*) hereby acknowledge that the property to be developed is subject to flooding during the following design storm(s), to the limits shown shaded on these plans, and to the following elevations:

5 year (or 3 yr., as designed)elevation _____

100 year (or 25 yr., as designed) elevation __

(Owner's Signature) _____

12. Small projects which satisfy the St. Johns River Water Management District's criteria (Chapter 40C-42 of the Florida Administrative Code) proposing less than 4,000 sq. ft. of vehicular use paving and less than 9,000 sq. ft. of impervious area total, and are not within a Restricted Drainage Basin, the following design criteria shall apply if the site discharges to a City right of way in the pre-developmentcondition:

    a. Post development discharge must be to a City right-of-way or Water of the State.

    b. Attenuation (pre vs. post) requirement may be limited to the 3-year SCS or 5-year Rational method.

    c. There shall be no minimum freeboard required within the stormwater management facility.

    d. Innovative methods for attenuation shall be considered.

    e. The permeability rate in the Soils Survey of City of Jacksonville, Duval County, Florida, may be used to determine recovery time — the minimum rate must be used.

13. Previously Developed Sites Within Restricted Basins

    a. No credit for existing impervious surfaces shall be given for sites constructed within a drainage basin that is restricted to 0.5 cfs per acre discharge.

5.8.3.3 STORMWATER TREATMENT DESIGN CRITERIA

When basins are designed to provide stormwater treatment only, the design criteria shall be the same as a detention basin design with the following exceptions:

1. If the basin is constructed below adjacent land, a 5-year rational storm or a 3-year SCS storm may be used for the analysis.

2. If the basin is constructed above the adjacent land, then a 100-year rational or 25-year SCS storm shall be used.

5.8.3.4 OFFLINE DETENTION OF TREATMENT BASIN

If an offline basin is used to provide peak flow attenuation or stormwater treatment, the basin may be analyzed on the same design storm as the contributing system provided the basin is constructed below adjacent land and the project is less than 40 acres.

5.8.3.5 REAR LOT TREATMENT FACILITIES

When a swale is constructed to provide stormwater treatment at the rear property line, no analysis is required provided the top of berm is 2 feet wide and is set at an elevation 1/2 foot higher than the treatment volume. The maximum side slope for these swales shall be 3:1.

5.8.3.6 STORMWATER FACILITY BASIN GEOMETRY

It is intended the stormwater basin has a minimum V-shaped cross-section (minimum design low water depth of 8 feet) aligned along the line of flow from the point of entry to the storm water management facility to the point of exit. Larger storm water management facilities may require flat bottoms where appropriate transitions at the points of entrance and exit shall be designed.

Where the guidance produces a larger-than-required basin, individual design will be necessary. In all cases, the basin shall be located in such a manner as to cause the least amount of damage if the design storm is exceeded.

1. Sides Slope - Side slopes are not to be steeper than a maximum of 4:1 and shall be used on all man-made basins. Where natural basins are existing, the criteria will be set on an individual basis. Side slopes steeper

than 4:1 may be approved by the City Engineer provided permanent bank stabilization and fencing is constructed.

2. Protection - All exposed or disturbed soil is to be mulched and grassed to achieve a good stand of grass in accordance with current City Standard Specifications.

3. Depth - Basins which will not drain dry within 72 hours after the design storm shall have a minimum depth below the design low water stage of 8 feet. Side slopes of 4:1 or flatter shall be used between the design low water and the basin bottom.

4. Illustrative Example Sketch - A cross-sectional drawing to a scale of each and all storm water management facilities included in the overall drainage layout are to be part of the site development plans.

5.8.3.7 WATER ELEVATION AND OVERFLOW

1. Water elevation must be controlled by an appropriate concrete drainage structure.

2. The minimum difference in elevation between the design low water of the basin and the lowest contributing roadway inlet grate shall be 2 1/2 feet unless approved by the City Engineer. If a wet treatment system is utilized for water quality, the water elevation at 60 hours shall be utilized.

3. A 1-foot minimum freeboard is required at all points around a storm water management facility for all storm events, except for the 100-year rational or 25-year SCS storm events. However, if the basin is constructed higher than the adjacent land, the 1 foot minimum freeboard is required for all design storms.

4. All basins shall have an emergency overflow which will direct the water to a suitable drainage system.

5. The aerial extent of the basin shall be shown and labeled on all plans as top of basin. Where applicable, this shall include the area within the 1 foot of freeboard.

6. Pumps used in stormwater basins shall not be allowed except as authorized by the City Engineer. In cases where public waters are involved, the pumps shall be maintained by the property owner or Home Owners' Association.

7. The basin shall be designed to return to its low water elevation in accordance with criteria as set forth by the St. Johns River Water Management District.

5.8.3.8 OWNERSHIP OF STORMWATER MANAGEMENT FACILITIES

1. All stormwater management facilities are to be owned and maintained by either:

    a. The surrounding property owners or;

    b. other group as approved by the City.

2. Rights-of-way or easements must continue through all storm water management facilities. Littoral zones and wetland mitigation areas shall not be located within City easements. Such rights-of-way or easements shall include a hold harmless agreement and a 15' minimum access easement to control structures via land. The area within the access easement shall have a maximum slope of 15:1.

3. Annual reports in compliance with the SJRWMD stormwater permits, are required from the maintenance entity of all stormwater treatment facilities.

4. All rear-lot drainage systems shall be included as a part of the ongoing development's stormwater management certification requirements. An access easement shall be dedicated to the City of Jacksonville and the appropriate State Agency for access to rear- lot drainage systems for inspection by the City of Jacksonville or such State Agency.

5.8.3.9 HOLD HARMLESS AGREEMENT

A "hold harmless" agreement must be executed and approved by the City General Counsel's office which will relieve the City of any responsibility for maintaining the storm water management facility and of any liability for any damage caused by flooding from the storm water management facility, including but not limited to blockage, dam failure, and excess flow; drowning or any other personal damages. The agreement shall be shown on the final plat. See **Attachment 1-7A**.

5.9 SUBSURFACE DRAINAGE

5.9.1 GROUNDWATER

In accordance with the test boring data obtained pursuant to paragraph 2.3.1D and considering anticipated groundwater changes due to drainage improvements, underdrain shall be installed in accordance with City Standard Details in all cases where the groundwater table is closer than 20 inches below the lowest finished gutter or edge of pavement of any roadway. The "iron-oxide" lens in the soil may be used as an indicator of the usual high predevelopment groundwater elevation.

Should underdrain quantities be adjusted in the field during construction, as concurred therein by the City's on-site representative, the registered professional shall revise the site development plans accordingly and submit revised signed and sealed plans to the City Engineer for the record, with note on plans showing date of site meeting and the City's representative in attendance.

5.9.2 UNDERDRAIN SIZE

The size of the underdrain required shall be determined using accepted engineering practices. The minimum size acceptable is 6 inches in diameter.

5.9.3 UNDERDRAIN SLOPE

The minimum slope shall be 0.002 ft/ft.

5.9.4 UNDERDRAIN TYPE

Only Type I underdrain shall be used. Type II and Type III (partial wrap and no wrap) shall not be permitted.

5.9.5 UNDERDRAIN FABRIC

Underdrain fabric shall be a minimum of 6 ounces.

5.10 DRAINAGE MATERIALS CRITERIA

5.10.1 DRAINAGE MATERIALS - GENERAL

Reinforced concrete pipe is required under paved travel surfaces within City rights-of-way. Profile wall pipe 24" or less (Polypropylene 60" or less) is also allowed under paved travel surfaces within City rights- of-way. Other materials as listed below will be allowed within City rights-of-way other than under travel surfaces, pursuant to the following criteria and at the discretion of the City Engineer.

5.10.2 DRAINAGE STRUCTURES (MATERIALS)

Pipe, inlets, manholes, junction boxes, headwalls, etc., shall be constructed in accordance with the City Standard Specifications.

1. Materials
    a. Reinforced Concrete Pipe - RCP
    b. Corrugated Steel Pipe - CMP
    c. Corrugated Aluminum Pipe – CAP
    d. Structural Plate and Arch (Steel or Aluminum) – SPSP and SPAP
    e. Aluminized Steel Type 2 Pipe - CASP
    f. Fiber Reinforced Concrete Pipe - FRCP
    g. Underdrains - UD
    h. Spiral-Ribbed – SRSP, SRASP and/or SRAP
    i. Profile Wall Pipe (Polyethylene) HDPE
    j. Corrugated Polypropylene Dual Wall (smooth interior) – PP (ADS HP Storm)

2. Specifications
    a. Reinforced Concrete Pipe - All reinforced concrete pipe used shall be Class III Wall "B" except where requirements under R/R, etc., call for otherwise. (Comply with ASTM C-76 Standard Specifications.)
    b. Corrugated Steel Pipe - All steel pipe shall have a full bituminous coating and shall meet FDOT gauge requirements.
    c. Corrugated Aluminum Pipe - Prior to the installation of corrugated aluminum pipe, the manufacturer, registered professional, or developer shall furnish the City Engineer test reports on the soil pH with a certification that the material furnished will provide sufficient resistance to corrosion to maintain a normal useful life. The expected life shall be stated. FDOT Gauge requirements shall apply.
    d. Steel or Aluminum Structural Plate and Arch - Same as b and c previous.
    e. Aluminized Steel Type 2 Pipe – Shall be manufactured and tested in accordance with AASHTO M-36.
    f. Fiber Reinforced Concrete Pipe - Class III use only meeting FDOT Standard Specifications for Road and Bridge Construction section 430, the same standard specification as Steel Reinforced Concrete Pipe and follow sections 125 and 430 of the Standard Specification for Roads and Bridges.
    g. Underdrains - Materials used for underdrains shall meet the requirements of AASHTO M197 for aluminum pipe, ASTM C444 for concrete pipe, ASTM D3033 for PVC pipe or ASTM F949 for profiled wall PVC pipe, smooth interior, corrugated exterior, high density polyethylene pipe, meeting ASTM F2619 and F2619M − 13 pipe. All perforations shall meet the requirements of ASTM C508.
    h. Spiral Ribbed – Shall be manufactured and tested in accordance with AASHTO M-36.
    i. Profile Wall pipe (HDPE) - for use as storm sewer outside paved travel surfaces (15” to 60” diameter). The manufacture of the pipe shall be certified to the requirements found in the current edition of AASHTO M294 for Type “S”. The pipe shall be installed and inspected in accordance with ASTM 2321.

Upon completion of installation, the pipe shall be evaluated to determine whether the internal diameter of the barrel has been reduced more than 5 percent. Pipe deflection shall not exceed 5 percent. Pipe shall be de-watered and checked for deflection using a mandrel or any other device approved by the City Engineer (or his designee). If a

mandrel is used for the deflection test, it shall be a nine (or greater odd number) arm mandrel. Testing equipment and test supervision will be provided by the contractor.

Pipe sizes larger than 24" shall be dewatered and tested for deflection using a mandrel or other device approved by the City Engineer (or his designee). Mandrel testing is not mandatory in sizes less than or equal to 24 inches in diameter (including under pavement). If during visual inspection, should the City Engineer (or his designee) determine that pipe sizes 24" or less warrant mandrel testing, a mandrel test will be required.

If HDPE pipe is used in driveway culvert applications concrete or metal mitered end section must be used.

Corrugated Polypropylene Dual Wall (smooth interior) – PP (ADS HP Storm) – The manufacture of the pipe shall be certified to the requirements found in the current edition of AASHTO M330, ASTM F2881, and ASTM F2736 for the respective diameters. The pipe shall be installed in accordance with ASTM D2321.

For use as storm sewer outside and under paved travel surfaces (15" to 60" diameter).

Upon completion of installation, the pipe shall be evaluated to determine whether the internal diameter of the barrel has been reduced more than 5 percent. Pipe deflection shall not exceed 5 percent. Pipe shall be de-watered and checked for deflection using a mandrel or any other device approved by the City Engineer (or his designee). If a mandrel is used for the deflection test, it shall be a nine (or greater odd number) arm mandrel. Testing equipment and test supervision will be provided by the contractor.

Pipe sizes larger than 24" shall be dewatered and tested for deflection using a mandrel or other device approved by the City Engineer (or his designee). Mandrel testing is not mandatory in sizes less than or equal to 24 inches in diameter (including under pavement). If during visual inspection, should the City Engineer (or his designee) determine that pipe sizes 24" or less warrant mandrel testing, a mandrel test will be required.

If HP pipe is used in driveway culvert applications concrete or metal mitered end section must be used.

5.10.3 PIPE JOINTS

Joints and joint material for reinforced concrete pipe shall be "O-ring" for round pipe or "ram-nek" in conjunction with a 24 inch band of filter fabric (one foot on each side of joint) for elliptical pipe.

Connecting bands for steel CMP shall be "O-ring" or a gasketed band with corrugations designed to fit the pipe used.

Connecting bands for aluminum CMP may be the same as those specified for steel CMP. A suitable neoprene gasket shall be used with all other types of connecting bands.

Reinforced fiberglass pipe shall be jointed by a solvent weld. Underdrains shall be jointed by an AASHTO-approved connector.

Joints for Polypropylene Pipe shall be joined with a gasketed integral bell and spigot joint meeting the requirements of AASHTO M330, ASTM F2881, and ASTM F2736 for the respective diameters. 15- through 60-inch (300 to 1500 mm) shall be water-tight in accordance with ASTM D3212 (10.8 psi lab test), ASTM F1417 (3.5 psi field test), and ASTM F2487 (infiltration / exfiltration test). Spigots shall have two (2) gaskets meeting the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly. 15-through 60- inch (300 to 1500 mm) diameters shall have a reinforced bell with a polymer composite band installed by the manufacturer.

HDPE pipe soil tight joints shall have a bell and spigot design with an elastomeric gasket meeting the requirements of ASTM F477. HDPE watertight joints shall meet a laboratory test pressure of 10.8 psi per ASTM D3212 and shall have a bell and spigot or bell–bell design with an elastomeric gasket meeting the requirements of ASTM F477.

5.10.4 HEADWALLS

5.10.4.1 POURED IN PLACE HEADWALLS

Poured-in-place headwalls shall be constructed of 3000 PSI concrete in accordance with City Standards.

5.10.4.2 PRECAST HEADWALLS

The City has accepted Standard Precast headwalls in sizes for 15 inch through 42 inch pipe. Such walls are in accordance with poured-in-place walls regarding size. Steel has been added to accept the handling of loads imposed.

5.10.4.3 FLARED END SECTIONS

Flared end section may be used in place of headwalls as desired. They shall conform to City Standards.

5.10.4.4 SAND CEMENT (RIP RAP) HEADWALLS

Sand cement rip rap headwalls will be allowed on temporary pipes only. By temporary, it is meant those items which are expected to last no more than 10 years.

5.11 STORM DRAIN FACILITIES "AS-BUILT" DRAWINGS REQUIREMENTS

"As-built" drawings must be submitted and approved for all drainage work done (See **Attachments 2-2A, B, and C and 2-6**.)

5.12 EROSION AND SEDIMENT CONTROL

5.12.1 EROSION AND SEDIMENT CONTROL – GENERAL (C/CM-2.3.2)

Erosion during and immediately after construction is a major contributor to the siltation of drainage ways, wetlands, tributaries, and is a major factor in the degradation of water quality.

To minimize the impacts of erosion and sediment transport, an effective erosion control plan for all land-disturbing activities under the Department of Subdivisions must be submitted for approval by the Department of Public Works. All erosion control plans to be submitted must be signed and approved prior to submittal by a person trained and certified in the Florida Department of Environmental Protection's Erosion and Sediment Control Designer and Reviewer manual as well as the Florida Department of Environmental Protection's Erosion and Sediment Control Inspector Training Manual.

The approved erosion plan will be sent by the Department of Public Works to the Environmental Quality Division for monitoring of the construction site to ensurecompliance with the plan.

Soil erosion and sediment control measures shall conform to the Florida Department of Environmental Protection's Erosion and Sediment Control Designer and Reviewer manual as well as the Florida Department of Environmental Protection's Erosion and Sediment Control Inspector Training Manual, which are hereby adopted and incorporated by reference, as well as the standards herein described, whichever is more stringent. The application of measures shall apply to all land-disturbing activities under the Department of Public Works jurisdiction, except single family residential building permits. These activities shall include, but not be limited to, roadway and drainage construction, utility installation, site dewatering and other temporary or permanent improvements.

To be successful, an erosion control plan must be a dynamic plan which can be implemented in stages and can be modified to suit different construction practices and site conditions. If, during construction, the contractor chooses

to modify the approved erosion control plan, he must submit his plan to the Department of Public Works for approval prior to construction of the plan, except where emergency measures are required to control erosion.

5.12.2 EROSION AND SEDIMENT CONTROL – PRINCIPLES

1. The plan of development should fit the particular topography, soils, drainage patterns, and natural vegetation of the site.

2. Minimize the extent of the area exposed at one time and the duration ofexposure.

3. Apply effective erosion control measures to prevent off-site damage.

4. Apply perimeter control practices to protect the disturbed area from off-site runoff and to prevent sedimentation damage to areas below the development site.

5. Runoff velocities should be kept low and should be detained on the site.

6. Stabilize disturbed areas immediately after final grade has been obtained.

7. Implement a thorough maintenance and compliance program.

5.12.3 EROSION AND SEDIMENT CONTROL – PRACTICES

To comply with the principles set forth above, the erosion control plan should utilize those practices set forth in the Florida Department of Environmental Protection's Erosion and Sediment Control Designer and Reviewer manual as well as the Florida Department of Environmental Protection's Erosion and Sediment Control Inspector Training Manual or the most effective combination of the following, whichever is more stringent:

1. Synthetic bale barrier: Synthetic bale barriers can be used below disturbed areas subject to sheet and rill erosion with the following limitations:

    a. Where the maximum slope behind the barrier is 33 percent.

    b. In minor swales or ditch lines where the maximum contributing drainage area is no greater than 2 acres.

    c. Where effectiveness is required for less than 3 months.

    d. Every effort should be made to limit the use of bale barriers constructed in live streams or in swales where there is the possibility of a washout. If necessary, measures shall be taken to properly anchor bales to insure againstwashout.

2. Filter fabric barrier: Filter fabric barriers can be used below disturbed areas subject to sheet and rill erosion with the following limitations:

    a. Where the maximum slope behind the barrier is 33 percent.

    b. In minor swales or ditch lines where the maximum contributing drainage area is no greater than 2 acres.

3. Brush barrier with filter fabric: Brush barrier maybe used below disturbed areas subject to sheet and rill erosion where enough residue material is available on site.

4. Temporary diversion dike: Temporary diversion dikes may be used to divert runoff through a sediment-trapping facility.

5. Temporary sediment trap: A sediment trap is usually installed in a drainageway at a storm drain inlet or at other points of discharge from a disturbed area with the following limitations:

6. The sediment trap may be constructed either independently or in conjunction with a temporary diversion dike.

7. Outlet protection: Applicable to the outlets of all pipes and paved channel sections where the velocity of flow at design capacity of the outlet will exceed the permissible velocity of the receiving channel or area.

8. Level spreader: A level spreader may be used where sediment-free storm runoff is intercepted and diverted away from the graded areas onto undisturbed stabilized areas. This practice applies only in those situations where the spreader can be constructed on undisturbed soil and the area below the level lip is stabilized. The water should not be allowed to reconcentrate after release.

9. Surface Roughening: Surface roughening may be used to reduce erosion and provide sediment trapping for the following conditions:

10. For slopes steeper than 3:1, surface roughening will consist of either stair-step grading, grooving, furrowing or tracking if they are to be stabilized with vegetation.

11. Areas with grades less steep than 3:1 should have the soil surface lightly roughened and loose to a depth of 2 to 4 inches.

12. Areas which have been graded and will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.

13. Stockpiling Material: No excavated material shall be stockpiled in such a manner as to direct runoff directly off the project site into any adjacent water body or stormwater collection facility.

14. Exposed Area Limitation: The surface area of open, raw, erodible soil exposed by clearing and grubbing operations or excavation and filling operations shall not exceed 10 acres. This requirement may be waived for large projects with an erosion control plan which demonstrates that opening of additional areas will not significantly affect off-site deposit of sediments.

15. Inlet Protection: Inlets and catch basins which discharge directly off-site shall beprotected from sediment-laden storm runoff until the completion of all construction operations that may contribute sediment to the inlet.

16. Temporary Seeding: Areas opened by construction operations and that are not anticipated to be re-excavated or dressed and receive final grassing treatment within 30 days shallbe seeded with a quick-growing grass species which will provide an early cover during the season in which it is planted and will not later compete with the permanent grassing.

17. Temporary Seeding and Mulching: Slopes steeper than 6:1 that fall within the category established in Paragraph 12 above shall additionally receive mulching of approximately 2 inches loose measure of mulch material cut into the soil of the seeded area adequate to prevent movement of seed and mulch.

18. Temporary Grassing: The seeded or seeded and mulched area(s) shall be rolled and watered or hydromulched or other suitable methods if required to assure optimum growing conditions for the establishment of a good grass cover.

19. Temporary Regrassing: If, after 14 days from seeding, the temporary grassed areas have not attained a minimum of 75 percent good grass cover, the area will be reworked and additional seed applied sufficient to establish the desired vegetative cover.

20. Maintenance: All features of the project designed and constructed to prevent erosion and sediment shall be maintained during the life of the construction so as to function as they were originally designed and constructed.

21. Permanent Erosion Control: The erosion control facilities of the project should be designed to minimize the impact on the off-site facilities. All stormwater discharge from the project limits shall be designed in accordance with Section 3 of the Land Development Procedures.

22. Permanent Seeding: All areas which have been disturbed by construction will, as a minimum, be seeded. The seeding mix must provide both long-term vegetation and rapid growth seasonal vegetation. Slopes steeper than 4:1 shall be seeded and mulched or sodded.

5.12.4 CONTRACTOR CERTIFICATION

1. Where required by Chapter 489 of the Florida Statutes, contractors shall be licensed as underground utility contractors.

2. All contractors conducting land-disturbing activities shall be certified Florida Department of Environmental Protection's Erosion and Sediment Control Designer and Reviewer manual as well as the Florida Department of Environmental Protection's Erosion and Sediment Control Inspector Training Manual.

5.12.5 DRAINAGE SWALE CONSTRUCTION

Drainage swales across more than 1 lot and shown on the approved site development plans shall be constructed as a part of the subdivision improvements. The swales shall be inspected and approved prior to acceptance of the public improvements.

SECTION 6.0 – SOLID WASTE

6.1 SOLID WASTE – GENERAL

6.1.1 APPLICATION

This section applies to all commercial buildings and developments except single-family residences.

6.1.2 DEVELOPER'S RESPONSIBILITY

It shall be the developer's responsibility to provide adequate loading facilities for the proper handling of any and all solid waste generated by the development. Calculations shall be provided to show that the size and number of containers will accommodate all solid waste generated on the project at all times, to include that waste generated as a result of any single incidence, such as weekend parties, holidays, etc. There shall be no spillage of the solid waste from the containers.

6.2 SOLID WASTE CONTAINERS

6.2.1 TYPE OF CONTAINERS

Containers for solid waste collection shall be of the standard type used by the City of Jacksonville Sanitation Division or the type used by local contract collection agencies. These generally are the large volume containers, for either front or rear loading; or roll-on, roll-off, on-site compaction unit containers. The containers shall be leak-proof and totally enclosed. Doors of adequate size and design shall be provided so that users can open and close them with ease.

6.2.2 NUMBER OF CONTAINERS

There shall be a sufficient number of containers of adequate volume placed at convenient locations to handle the solid waste generated by the facilities to be served.

6.2.3 LOCATION OF CONTAINERS

Large volume containers shall be placed in such locations so as to avoid blockage of the containers by parked vehicles. The sites of containers should be such that the vehicles servicing them can reach the containers with a minimum of maneuvering. Careful consideration should be given to both horizontal and vertical obstructions. Special concern of horizontal and vertical obstructions should be considered when working inside a building. Adequate information shall be provided on the drawings to indicate the turning and loading parameters for both horizontal and vertical clearances.

In apartment-type complexes, containers should not be located further than 200 feet apart.

Solid waste containers placed to service buildings or developments constructed after August 13, 1974, shall not be on any part of publicly owned property.

6.2.4 PAVING UNDER CONTAINERS

All solid waste containers shall be placed on a concrete pad. The pad shall be designed in accordance with acceptable engineering practices, including steel reinforcing, etc. The pad shall extend at least two feet beyond the edges of the containers used and shall be enclosed by a 6-inch high header curb. The pad shall be shaped to drain to a common point within the curb.

Either concrete or asphalt may be utilized in the area to be used by the container service vehicles. It is suggested that the immediate area around the container on which the service vehicle will operate be concrete.

6.2.5 DRAINAGE REQUIREMENTS

In order to adhere to the city's NPDES permit and prevent potential illicit connections to the municipal storm drainage system, the pad on which a large volume garbage container (e.g., a dumpster) sits must either drain into a pre-treatment swale that is a minimum of six (6) inches deep and equal in area to that of the pad or drain directly into a sanitary sewer system.

6.2.6 ENCLOSURE

Enclosure of large volume containers shall be required if location and/or containers are allowed to overflow, thereby creating a public nuisance.

Appendix 1 Attachments and Forms

Number	Description
2-1	Driveway Classification
2-2	In-lieu Sidewalk Program Application
2-3A	As-Built Stamp Registered Professional
2-3B	As-Built Stamp Surveyor
2-3C	As-Built Stamp Contractor
2-4	Storm Sewer Tabulation Form
2-5	Detention Basin Design Form
2-6	As-Built Requirements - Paving and Drainage