

City of
Gainesville

Engineering Design & Construction Manual

2022 Edition



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1. Introduction

1.1 Purpose and Applicability

The City of Gainesville Engineering Design & Construction Manual (hereafter referred to as the EDCM or this manual) is approved and adopted by Ordinance Number ##### on ##### ##, 2022, pursuant to the authority granted by the City of Gainesville Comprehensive Plan. The EDCM further complements the requirements of the Land Development Code, Chapters 23, 26 and 30, City of Gainesville Code of Ordinances.

The EDCM is intended to implement City policy as outlined in the City's Comprehensive Plan for the provision of transportation facilities that promotes a safe and well-connected, multi-modal transportation system.

The EDCM establishes engineering design standards and specifications for the development of site plans, subdivisions, redevelopment projects, permits and capital projects within the City of Gainesville as part of the City's responsibility to provide for the health, safety and welfare of the public.

When real property within the City of Gainesville is developed and/or redeveloped or any work is proposed within the City's right-of-way (ROW) or easement, the infrastructure facilities contained within said property, serving said property or activities within the City's ROW or easement shall comply with the requirements set forth in this manual and the City of Gainesville Code of Ordinances.

1.2 Enforcement

The Public Works Department, through their designated representatives, shall have the right to inspect the land and constructed facilities addressed by this manual and to issue "Notices to Comply" for violations of the Code of Ordinances or of approved plans reviewed under this manual, an extension of the Code of Ordinance.

1.3 Conflicts with Governing Documents

Where more stringent standards are imposed by federal, state and other local agencies, the more stringent standards having jurisdiction shall apply. Where the standards and specifications included in the City of Gainesville Code of Ordinances and this manual conflict, the City of Gainesville Code of Ordinances shall prevail. Where the Code of Ordinances conflict with the Comprehensive Plan, the Comprehensive Plan shall prevail.

All construction must comply with the EDCM / Code of Ordinances, Chapter 30, Land Development Code unless a design variance or exception is approved in accordance with Chapter 1.6 by Public Works.

1.4 Definitions and Terms

The definitions of the terms used in this manual have the meanings respectively ascribed to them by common usage or specifically defined in those publications identified by reference, except in those instances where the text clearly indicates a different meaning. The definitions or terms contained herein are not intended to alter definitions expressly specified in any other City of Gainesville ordinance, policy, regulation or code, but are provided for the purpose of making clear and distinct the intention of the language used in a specific section of this document.

1.5 Amendments

The City of Gainesville shall amend the contents of this manual as may be required by ordinance adopted by the City Commission.

1.6 Design Exceptions or Variances

Design Exceptions or Variances from the standards contained in this manual may be approved when such exceptions or variances are not contrary to the public interest where, owing to special conditions, a literal enforcement of the provisions of this manual would result in unnecessary hardship in order to allow for implementation of an innovative design practice.

Design Exceptions are required when the Controlling Design Elements as specified in Chapter 14 of the Manual of Uniform Standards for Design, Construction and Maintenance for Streets and Highways (aka “Florida Greenbook”) cannot be met.

Design Exceptions shall be submitted in writing by the Professional Engineer responsible for the design and justified as described in Chapter 14 of the Florida Greenbook. The FDOT’s Utility Accommodation Manual provides guidance on exceptions with respect to utilities. The City Engineer has the authority to approve Design Exceptions that meet the requirements of this section.

When proposed design elements other than the Controlling Elements do not meet the requirements contained in this manual, sufficient detail and justification of such deviations must be documented by the Responsible Professional Engineer as a Design Variation and shall be submitted to the City. Design Variation shall include the following:

1. Design Criteria versus the proposed criteria
2. Reason the design criteria are not appropriate
3. Justification for the proposed criteria.
4. Review and evaluation of the most recent 5-years of crash history where appropriate
5. Background information which documents or justifies the request
6. Demonstration that the proposed design variations would be in harmony with the general intent and purpose of the Land Development Code, Comprehensive Plan, EDCM and the Manual for Uniform Minimum Standards for Design, Construction and Maintenance (Florida Greenbook), would not be injurious to surrounding properties, and would not otherwise be detrimental to the interest, safety, health, and welfare of the public.

7. Demonstration that the proposed alternative treatment will meet the intent of the City's specifications and not pose an undue or significant burden upon the City or any other party.

The City Engineer has authority to approve Design Variances that meet the requirements of this section.

1.7 Interpretation

The Public Works Director, if the incumbent is a registered Professional Engineer, shall provide the final interpretation of the contents of this manual; otherwise, the City Engineer shall provide the final interpretation of the contents of this manual.

As interpretations or corrections of this manual are made by the Public Works Director or City Engineer, the development community will be informed through the use of a Design Memo. The Design Memos will be posted on the Public Works Development Review webpage. The tracking of all design memos will be shown in a Revision Log, which will also be provided on the aforementioned webpage.

1.8 Omissions

Logical, accountable, and generally accepted design standards and engineering judgment shall apply where not specifically addressed in this manual.

2. Technical References

Standards and guidelines that are referenced in most recent version of the following technical publications shall be considered part of this manual including subsequent updates or revisions to these publications. In the event of a conflicting standard imposed by the City, federal, state or other local agencies, the more stringent jurisdictional standard shall apply.

American Association of State Highway and Transportation Officials (AASHTO) – A Policy on Geometric Design of Highways and Streets

Americans with Disabilities Act (ADA) – Uniform Federal Accessibility Standards (UFAS); ADA Standards for Accessible Design (ADAAG); Public Rights of Way Accessibility Guidelines (PROWAG)

ASCE - ASCE 24 Flood Resistant Design and Construction

Florida Department of Environmental Protection (FDEP) – Chapter 62-302, F.A.C., Surface Water Quality Standards

FDEP – Chapter 62-621, F.A.C., Generic Permits

FDEP – Chapter 62-624, F.A.C., Municipal Separate Storm Sewer Systems

FDEP – Chapter 62-330, F.A.C., Environmental Resource Permitting

FDEP – The Florida Stormwater Erosion and Sedimentation Control Inspector’s Manual

FDEP and Water Management Districts Environmental Resource Permit (ERP) Applicant’s Handbook Volume I (General and Environmental)

Florida Department of Transportation (FDOT) – “Accessing Transit: Designing Handbook for Florida Bus Passenger Facilities”.

FDOT Design Manual

FDOT Standard Specifications for Road and Bridge Construction

FDOT Standard Plans for Road Construction

FDOT Procedures Manual for Flexible Pavement Design

FDOT Drainage Manual

FDOT Drainage Design Guide

FDOT Utility Accommodations Manual

FDOT Florida Erosion and Sediment Control Designer and Reviewer Manual

Federal Highway Administration (FHWA) – Manual on Uniform Traffic Control Devices (MUTCD)

Florida Greenbook – also known as the FDOT Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways

Gainesville Regional Utilities (GRU) Approved Electric System Materials Manual

GRI Lighting Catalog

Institute of Transportation Engineers (ITE) – Curbside Management: Practitioners Guide

ITE – Context Sensitive Solutions in Designing Major Walkable Urban Thoroughfares: A Context Sensitive Approach Major Urban Thoroughfares for Walkable Communities

National Association of City Transportation Officials (NACTO) – Urban Bikeway Design Guide

NACTO – Urban Street Design Guide

National Cooperative Highway Research Program (NCHRP) Report 672

SJRWMD – Permit Information Manual (includes Applicant’s Handbook Volume II)

SRWMD – ERP Applicant’s Handbook Volume II

United States Department of Agriculture/National Resource Conservation Service (USDA/NRCS) – Technical Release 55 (TR-55) Urban Hydrology for Small Watersheds

3. Stormwater Management

3.1 Objective

The objective of this section of the EDCM is to provide the design and performance standards necessary for the conservation and improvement of the quality of the surface waters, as well as, the control of stormwater runoff volume and rate and floodplain elevations in the City of Gainesville.

3.2 Evaluation Criteria

Applicants must provide reasonable assurance that the construction, alteration, operation, or maintenance of a project, or removal or abandonment of an existing stormwater management system, will not cause adverse water quality impacts, water quantity impacts, or flooding impacts to on-site or off-site property.

Key documents to be utilized as reference for this section are the FDOT Drainage Manual, the FDOT Drainage Design Guide, the SJRWMD Permit Information Manual (includes Applicant's Handbook Volume II), and the SRWMD ERP Applicant's Handbook Volume II.

3.3 Permitting Thresholds

3.3.1 Cumulative Development

All development of a particular lot or site governed by final approved development plans shall be cumulative from October 1, 2013. For example, a site adding 850 sf of new impervious would not trip the New Development Threshold of 1,000 sf. If the site then added additional 150 sf or greater the following year, stormwater requirements would be triggered for the cumulative area.

3.3.2 Definition of Redevelopment of Vehicular Use Area or Building

For the purposes of applying permitting thresholds and exemption criteria, redevelopment is any demolition or reconstruction of the vehicular use area (excluding maintenance of pavement such as resurfacing and restriping) or building. Any proposal for a site on which the proposed redevelopment of building(s) or vehicular use area involves the demolition and reconstruction of more than 80 percent of the area devoted to existing building and vehicular use area shall be considered new development, and shall be required to meet the standards for new development. All redevelopment of a particular lot or site governed by a final development order shall be cumulative from October 1, 2013. Note that the 80% threshold applies to the impervious on the site versus project area.

Example 1:

5 acre site with 4 acres of total impervious, 3.5 acres of which are attributed to building and vehicular use area. If the redevelopment project involves more than 2.8 acres of the 3.5 acres attributed to building and vehicular use area, it will require water quality and quantity.

Example 2:

5 acre site with 4 acres of total impervious, 3.5 acres of which are attributed to building and vehicular use area. If the redevelopment project involves 2.8 acres or less of the 3.5 acres attributed to building and vehicular use area, it will require water quality. Note that the applicant must demonstrate the project is not impacting adjacent properties.

Only one set of permitting thresholds (new development versus redevelopment) will apply to a proposed project and will be determined by the City Engineer or designee.

3.3.3 Exemptions

1. New development < 1,000 sf of impervious area; or
2. Redevelopment < 4,000 sf of impervious area on an existing improved site.
3. Maintenance of Pavement
 - a. Activities such as milling, resurfacing, surface overlay, and minor (as determined by Public Works) limerock base replacement are potentially exempt from stormwater requirements.
 - b. Exemption status will be determined on a site-by-site basis.
 - c. A sketch or narrative must be provided to describe the proposed activity. Plan(s) may be necessary for review to confirm changes to existing grades and drainage patterns are not proposed, as well as, to demonstrate no impact to adjacent or downstream properties.
4. Accessible parking space improvements associated with Building Permits for ADA compliance.
 - a. Exemption status will be determined on a site-by-site basis.
 - b. A sketch or narrative must be provided to describe the proposed activity. Plan(s) may be necessary for review to confirm changes to existing grades and drainage patterns are not proposed, as well as, to demonstrate no impact to adjacent or downstream properties.

3.3.4 Water Quality Required

1. New development between 1,000 sf and 1,999 sf of net new impervious area.
2. Redevelopment of 4,000 sf and greater, but less than or equal to 80% as described in Section 3.3.2.
3. Demonstrate the project is not impacting adjacent properties by ensuring discharge is not directed onto a neighboring property but to a city street, landscaped area or stormwater retention area.

3.3.5 Water Quality and Quantity Required

1. New development of 2,000 sf and greater of net new impervious area; or
2. Redevelopment of 4,000 sf and greater, and greater than 80% as described in Section 3.3.2.

3.4 Minimum Requirements**3.4.1 Drainage Narrative**

See Section 7.1.2 for detailed information on what is required to be included in the drainage report.

3.4.2 General Design Standards

1. All drainage facilities shall provide a positive outfall to existing watercourses, water bodies, wetlands or storm sewer systems unless it can be proven that it is a closed system or acting as a closed basin.
2. Stormwater management facilities shall be designed to minimize the need for maintenance in accordance with this manual.
3. All stormwater management facilities shall be landscaped in such a manner as to promote safety and to integrate with the overall design of the site as required by the LDC.
4. Insofar as possible, the contour of stormwater management facilities should promote aesthetically pleasing site design and increased wildlife habitat.
5. The design and operation of stormwater management facilities shall discourage the breeding of mosquitoes.
6. The design of stormwater management facilities shall promote joint uses for habitat, open space, passive recreation, and the establishment and integration of trails.
7. Features that are identified as "Design by Others" shall demonstrate support of the overall stormwater management system and conformance with its design. A review of the features identified as designed by others during the development review process must submit for Public Works Stormwater and Constructability review prior to construction.
8. Underground utilities within the footprint of a stormwater basin are to be reviewed and approved on a case-by-case basis by the City Engineer. Underground utilities are prohibited within underground stormwater facilities. Underground utilities are discouraged from being located within a stormwater basin. Where there are existing utilities within the footprint of a stormwater basin, relocation is encouraged.

3.4.3 Technical Standards

1. The area of the top elevation of all proposed stormwater management facilities shall be considered to have a $CN = 100$ or $C = 0.95$ for applicable stormwater calculations. The top elevation is set at the control elevation of a wet pond and the design high for a dry pond.
2. Stormwater Basins
 - a. Fill Material.
 - i. Fill material used for undercut or backfill within the stormwater basin must not exceed 10% passing of 200 sieve.
 - b. Dry Retention Ponds.
 - i. Initial basin excavation should be within one foot of the final elevation of the basin floor.
 - ii. Final excavation should be deferred until all contributing areas of the drainage basins have been stabilized.
 - iii. Light equipment should be used to remove accumulated sediments and achieve final grade without compacting the basin bottom. The bottom of the pond shall be tested in the field using a double-ring infiltrometer test to demonstrate that it is not less than the design infiltration.
 - c. Underground/ Exfiltration Systems
 - i. Design permeability data collected in appropriate flow zones.

- ii. The underground facilities must be designed so that the invert elevation of the system is at least two feet above the seasonal high ground water table elevation unless the engineer of record or geotechnical engineer affirmatively demonstrates based on geotechnical information that an alternative design is appropriate for the specific site conditions.
 - iii. Provide location of building support beams and footers in relation to the underground facility.
 - iv. Provide percolation link perimeters on a scaled map. Applicable when using ICPR stormwater modeling software. Basins with shared boundaries and modeled in Ponds are to be consistent with technical memorandums supplied by Devo Engineering.
 - v. Provide mounding analysis.
 - vi. Freeboard demonstrated as identified in Section 3.4.3 paragraph 4.
 - vii. Provide location of roof drain connections. Underground facilities that are individually identified with a drainage basin delineated will have to provide documentation that justifies the design assumptions made.
 - viii. Provide location of cleanout ports.
 - ix. An isolation row or chamber that effectively filters sediment and other contaminants, which can be systematically removed using cleanout ports, shall be incorporated into designs that are not open vault style systems.
 - x. For underground facilities utilizing a geotextile, specify and provide specifications that demonstrate the proposed geotextile will not be a limiting factor in infiltration.
 - xi. The insitu material under proposed underground facilities shall be tested in the field after preparation but prior to placement of bedding material using a double-ring infiltrometer test to demonstrate that it is not less than the design infiltration.
 - xii. If utilizing a compacted backfill material, it too must be tested in the field after placement to demonstrate that it is not a limiting factor in infiltration.
 - xiii. Provide a visual “failure” indicator that would provide the O&M entity some indication that the system is not functioning as intended and requires maintenance or repair.
 - xiv. The design shall incorporate a way to perform a full visual inspection of the underground facility.
 - xv. Operation and maintenance guidance document provided.
3. Slope Stability Analysis
- a. A slope stability analysis shall be performed for berms, dams, or embankments that provide any storage above surrounding grade. Underground facilities that have the potential to daylight onto an embankment or side slope are included. Documentation of the slope stability factor shall be provided with the stability analysis. Seepage and piping through the berm or dam and erosion should be of major concern when specifying fill/soil type, placement methods, and compaction.
 - i. The City Engineer or designee shall require field density tests and these tests shall be made in accordance with FDOT standards and reported in writing to the City Engineer or designee.

- ii. Avoid planting woody species with developed root structures on embankment berms, as this can cause piping and geotechnical failures.
- 4. Freeboard
 - a. A minimum freeboard of 6 inches shall be provided for all retention/detention areas.
 - b. Underground stormwater facilities can utilize areas within the project watershed to accommodate the 6 inches of required freeboard if this freeboard area is at least 5 feet from the property boundary.
 - i. If freeboard is being provided within the project watershed, identify where the storage will occur on a scaled plan, the volume of that storage, and the maximum depth of staged water that will occur in those areas.
 - ii. The freeboard area depicted must include enough grade information to demonstrate that the area of storage is occurring at a distance of at least 5 feet from the property line. In addition, the plans must provide enough grading detail to show where discharge would occur in the event freeboard is exceeded.
- 5. Finished Floor Elevation

Finished floor elevations of structures adjacent to or that could potentially be impacted by the stormwater management facility as determined by the City Engineer shall be elevated at least one foot above the design high water elevation or base flood elevation (whichever is higher) so that the structure is adequately protected from a basin overtopping event. All stormwater management systems shall be evaluated for the 100-year critical storm event to establish the minimum finished floor elevation.
- 6. Sumps
 - a. Sumps within stormwater management facilities are discouraged. Sumps within stormwater management facilities will only be allowed due to cover issues and minimum pipe slope/velocities. The bottom elevation of the sump shall be a minimum of 12 inches above the seasonal high-water table. When sumps are utilized for dry detention facilities, the bottom elevation of the sump shall be placed up to one foot below the control elevation.
 - i. Sumps within stormwater management facilities intended to be dedicated to the City for any type of maintenance will not be accepted.
- 7. Retaining Walls
 - a. The following requirements apply to retaining walls or near-vertical soil retaining structures used to form stormwater management facilities or portions of stormwater management facilities:
 - i. Fencing or protective barriers may be required as determined by the City Engineer or designee.
 - ii. The wall shall be designed with materials that prevent sediment seepage into the stormwater management facility and that do not require regular maintenance to function properly.
 - iii. Railroad ties, wooded planks, and other similar materials should not be used within stormwater management facilities.
 - iv. Sufficient access for maintenance equipment is required in accordance with the requirements of this chapter.
 - b. For “Designs by Others”, retaining walls constructed with a drain shall ensure that the drain is at minimum two (2) feet away from stormwater basins to ensure water quality criteria is met.

8. Stabilization
All sloped areas within stormwater basins and swales/ditches, 3:1 or greater, shall be sodded.
9. Pre-Treatment Best Management Practice (BMP)
Oil/water separator or comparable BMP technology is required for pre-treating runoff from vehicular traffic areas associated with the following practices:
 - a. Car washes;
 - b. Auto or marine paint and body shops;
 - c. Auto, recreational vehicle, commercial truck, tractor-trailer, farm tractor, heavy machinery, or small engine parts, service and repair operations;
 - d. Automotive fleet operations;
 - e. Junkyards and salvage yards; and
 - f. Gas stations, including convenience stores with gas pumps.
10. Chlorinated Pool Discharges
Chlorinated pool water is not allowed to be discharged into stormwater management systems connected to the City's storm sewer system.

3.5 Water Quality Standards

Developments within the City of Gainesville shall follow the water quality treatment volume criteria in Table 3-1.

3.5.1 Water Quality Treatment Volume

Table 3-1. Water Quality Treatment Volume Criteria		
Facility	Off-line	On-line
Dry Retention, Underground, Exfiltration Systems)	Greater of 0.5" of runoff from Drainage Area or 1.25" of runoff from impervious area	Off-line + 0.5" of runoff from Drainage Area
Dry Detention	Greater of 1" of runoff from Drainage Area or 2.5" of runoff from impervious area	N/A
Wet Detention	Greater of 1" of runoff from Drainage Area or 2.5" of runoff from impervious area.	

3.5.2 Water Quality Recovery

1. The water quality treatment volume shall be recovered within 72 hours for dry systems and one-half of the volume shall be drawn down within 24 to 30 hours for wet systems.
2. All percolation rates shall have a Factor of Safety of 2 applied for all stormwater calculations and modeling.
3. A mounding analysis of the 100-year critical events must be provided for all systems using infiltration to demonstrate recovery.

3.6 Stormwater Quantity Criteria**3.6.1 Design Storm Events**

Developments within the City of Gainesville shall use the design rainfall in Table 3-2 in the design of stormwater management systems. The FDOT Zone 5 rainfall curves shall be used to determine the rainfall distribution.

Table 3-2. Design Storm Events										
Return Period (Years)	Design Rainfall (inches)									
	10 min	15 min	30 min	60 min*	2 hr*	4 hr*	6 hr	8 hr*	12 hr	24 hr*
3	1.05	1.33	1.93	2.6	3.2	3.8	4	4.48	4.68	6
10	1.19	1.54	2.31	3.2	4	4.8	5.1	5.84	6.24	7.92
25	1.34	1.74	2.66	3.6	4.4	5.28	5.76	6.56	6.96	8.64
50	1.43	1.88	2.9	3.95	4.8	5.92	6.48	6.96	7.92	9.6
100*	1.53	2.03	3.11	4.4	5.4	6.72	7.2	8	8.76	11.04

*Storms required for critical event analysis for proposed stormwater basins.

3.6.2 Levels of Service for Stormwater Quantity

Developments within the City of Gainesville shall use Design Discharge Conditions Table 3-3 in the 100-year critical events to demonstrate post < pre criteria for rates in open watersheds and rates and volumes in closed watersheds.

Table 3-3. Design Discharge Conditions			
Basins	Frequency Duration	Discharge Rate	Discharge Volume
Open Basin	100-year critical events	Post less than or equal to Pre	N/A
Closed Basin	100-year critical events	Post less than or equal to Pre	Post less than or equal to Pre

3.6.3 Volume Requirements – Closed Basin Criteria

Within a closed basin, systems must be designed to retain any increase in volume of runoff over the predevelopment volume for a 72-hour period under all 100-year storm events.

3.6.4 Tailwater

Tailwater condition for the design of the storm drain systems and for stormwater basin outfalls shall be evaluated as part of the design process.

1. Utilize the FDOT Drainage Manual for guidance on accounting for tailwater impacts.

3.6.5 Lane Spread

Lane spread shall be calculated using FDOT criteria considering the 4 inch per hour or 10-year frequency storm as noted in Chapter 3.9.1 of the FDOT Drainage Manual. Spread criteria shall be consistent with the FDOT Drainage Manual except for:

1. Minor/Major Local Roads (Table 4-1).
 - a. The allowable lane spread can potentially be to the crown of the road on a case by case basis if approved by the City Engineer.

3.6.6 System Recovery

1. Where systems are designed for reducing post-development peak rate discharge and volume, the outlet and regulation schedule should be designed to provide necessary design detention and retention storage within the times specified by the applicable water management district for its design storm events and 30 days following the City's 100-year critical events.
2. All percolation rates shall have a Factor of Safety of 2 applied for all stormwater calculations and modeling.
3. A mounding analysis must be provided for all systems using infiltration to demonstrate recovery and horizontal extent of mounding. Mounding analysis must account for other adjacent or nearby systems or properties. See previous reference to mounding analysis in Chapter 3.4.3 2. c. iv.

3.7 Floodplains and Floodways**3.7.1 100-year Floodplain**

In general, a loss of onsite floodplain storage will result in an increase in the offsite floodplain. As such, developments that encroach into a 100-year floodplain as designated by FEMA and the City of Gainesville, or any other determination by a jurisdictional authority shall demonstrate that the loss of onsite storage will not cause adverse offsite impacts to the floodplain. Additionally, the base flood elevation and the finished floor elevations for existing and proposed structures must be identified for projects located within the floodplain. Any development within a 100-year floodplain shall not increase the base flood elevation.

3.7.2 10-year Flood Channel

No permanent structures or fills shall be allowed in the 10-year flood channel except structures and fills designed for flood prevention and control, streets, bridges and sanitary sewer lift stations and utility lines. Structures that are permitted in the 10-year flood channel shall demonstrate that no adverse impacts result from placing the structure within the 10-year flood channel (i.e., there

is no increase in the elevation and limits of the 10-year flood channel or floodplain and no changes to the upstream or downstream 10-year flood channel or floodplain).

3.7.3 Critical Facilities

New Class III and IV critical facilities, as defined by the Florida Building Code, shall be located outside of areas with a floodplain subject to a 0.2% or greater chance of flooding (or 500 year flood).

3.7.4 Compensating Storage

Land use activities that do not meet the thresholds for a stormwater analysis shall minimally be required to demonstrate one-for-one compensating storage, to be reviewed and approved by the City Engineer.

3.7.5 Letter of Map Change

When proposed improvements associated with site development encroach into a flood hazard zone, it shall be necessary for the applicant to file a letter of map amendment or revision with FEMA. Provide proof of application prior to final site acceptance by Public Works.

3.8 Stormwater Conveyance

All conveyance systems shall conform to the FDOT Drainage Manual and the Level of Service (LOS) Criteria in Table 3-4.

Table 3-4. LOS Criteria	
Type of Storm	Frequency
Storm Sewer Systems (Internal to Development)	3-year
Minor/Major Local Street Minor Local Collector	10-year
Side Drain / Driveway Culvert	10-year
Major Local Collector	50-year
Minor / Principal Arterials	100-year
Cross Drains (including culverts, bridge-culverts, and bridges)	FDOT Drainage Manual
Open Channel	FDOT Drainage Manual

1. Wet piping systems are not allowed in public rights-of-way and discouraged in private systems. The City Engineer must approve wet piping systems.
2. The rainfall intensity will be determined from the IDF curve for Zone 5 at the calculated time of concentration.
3. Hydraulic Grade Line (HGL) Standard: The HGL must be 12" below inlet top of grate or 12" below theoretical gutter elevation as applicable. For Type E or F structures, this is 13.5".
4. Tailwater condition for the design of the storm drain systems shall be evaluated as part of the design process. Utilize the FDOT Drainage Manual for guidance on accounting for tailwater impacts.

3.8.1 Subdivisions – Rear lot Drainage

Any subdivision proposed for City maintenance, whether road/storm sewer or road/storm sewer/stormwater pond maintenance, cannot incorporate rear lot drainage. If rear lot drainage is incorporated, the system will be a privately maintained system, including for functionality.

3.8.2 Closed Conveyance Systems

1. Inlets
 - a. All inlets with grates shall be per FDOT standards.
 - b. Provide documentation that the inlets selected can receive the calculated flow estimated.
 - c. Curb inlets are not allowed at pedestrian crossings or within the radius of intersections.
 - d. A new structure shall be provided at any change in alignment and elevation of pipe.
 - e. Elliptical pipes are permitted.
 - f. Ram-neck connections are not permitted.
 - g. No sumps are allowed on wet piping systems in public rights-of-way.
 - h. The maximum spacing of manholes and inlets on pipe runs are shown in Table 3-5 based on operations and maintenance requirements. Spacing of inlets shall be based on spread calculations.
 - i. Pre-cast structures are preferred. All structures that are delivered in sections shall have gaskets and interlocking sections to minimize seepage.

Table 3-5. Maximum Manhole and Inlet Spacing	
Pipe Size	Maximum Spacing
15 to 18 inches	300 feet
Greater than 18 inches to 60 inches	400 feet
Greater than 60 inches	500 feet

2. Pipes
 - a. The minimum pipe size shall be 15 inches or equivalent in all roadways public or private.
 - b. All pipes within City right-of-way shall be reinforced concrete or polypropylene meeting FDOT specifications (latest edition), have a 100-year design service life, and be from an FDOT-approved production facility.
 - c. Stormwater pipes shall have a minimum separation of 3 inches from outside of the pipe to any other utility pipe or structure.

3.8.3 Open Conveyance Systems

1. Roadside swales may be provided in lieu of curb and gutter as long as all the specific requirements this manual can be met.
2. Minimum allowable ditch and swale grades shall be in accordance with the FDOT Drainage Manual.
3. Maximum side slopes on all ditches are 4:1(H:V). Front and back slopes shall also be in compliance with the Florida Greenbook. Steeper slopes may be reviewed and approved on a case-by-case basis by the City Engineer.

4. To prevent erosion in ditches all swales shall be sodded to one foot past the top of bank in addition to meeting the requirements in the FDOT Drainage Manual.
5. Roadway spread within gutter and travel lane shall conform to the FDOT Drainage Manual and the LOS criteria in Table 3-4.
6. Drainage easements in addition to ROW width shall be sufficient to accommodate all portions of the public stormwater management system facilities and to provide access for the facility maintenance. Such easements shall be dedicated to the City of Gainesville or to a recognized entity that shall be responsible for the maintenance of the easement. Where drainage facilities serve private streets, the easement or designated area reserved for stormwater management facilities shall be sufficient in width to accommodate all portions of the stormwater management system facility and to provide for access to maintain the facility. Such easements shall be dedicated to a responsible private maintenance entity.
7. Open drainageways (ditches) will not be permitted in or within 100 feet of any land designated as a residential district as defined in the Land Development Code, Sections 30-2.1 and 30-4.1, and any land in actual use or zoned for use as a school, unless it can be established to the satisfaction of the City Engineer that the open drainage way will appear and function as a natural watercourse and will not require significant maintenance. Any permitted open drainageways shall be designed to present no unreasonable hazard to life, the health of the public and nearby property residents, and to be protected against scour and erosion.

3.9 Geotechnical Criteria

All basins shall require geotechnical borings. Documentation of the geotechnical parameters shall be submitted to the City by a licensed geotechnical engineer. Methods of testing should be done in accordance with the appropriate water management district standards (SJRWMD Permit Information Manual or the SRWMD Applicant's Handbook Volume II). The number of borings required shall be in accordance with Section 26.4 of the SJRWMD Applicant's Handbook: Regulation of Stormwater Management Systems Chapter 40C-42 F.A.C.

If a basin's percolation occurs over different soil layers, each layer must be tested for permeability.

A soil cross section must be provided that shows the stormwater basin top, bottom modeled seasonal high groundwater table and modeled base of aquifer.

See Section 8.7 for additional geotechnical criteria during construction.

3.10 Water Management District Criteria

All stormwater basins shall be designed in accordance with the criteria of the appropriate water management district. See SJRWMD Permit Information Manual or SRWMD Applicant's Handbook Volume II. Applications must include demonstration the criteria are met.

3.11 Stormwater Pollution Prevention Plan

An erosion and control plan shall be developed and submitted in accordance with the Florida Department of Environmental Protection's requirements of Rule 62-621.300(4) National Pollution Discharge Elimination System (NPDES) Generic Permit for Stormwater Discharge from Large and Small Construction Activities.

3.12 Erosion and Sedimentation Control

3.12.1 Key Criteria

Construction plans shall provide notes for the Contractor to outline key criteria including but not limited to:

1. Best Management Practices (BMPs) to be utilized,
2. Timing of BMP Installation,
3. Installation Details for BMPs,
4. Permanent and Temporary Stabilization Measures,
5. Inspection of BMPs,
6. Maintenance of BMPs,
7. Final Site Stabilization and BMP removal.

3.12.2 Additional Requirements

1. Erosion and perimeter controls shall be used to prevent runoff, and/or disposition of sediment from the site and shall be regularly inspected and maintained during construction.
2. Sites are required to control waste such as building materials, concrete truck washouts, chemicals, litter, and sanitary waste.
3. Failure to install or maintain erosion, perimeter, and waste controls shall result in enforcement, up to and including an order to stop all work until site is in compliance.

3.13 Karst Areas and High Aquifer Vulnerability Areas

All stormwater management facilities and systems shall be designed and constructed to ensure that adequate treatment of stormwater runoff is provided prior to this runoff being discharged to the aquifer. The stormwater management facility and system shall be designed to prevent the formation of sinkholes. A map of the most recent Sensitive Karst Area can be obtained from the water management district. SJRWMD provides a map in its Permitting Information Manual (Figure 13.0-3). Section 5.9 of the SRWMD Environmental Resource Permit Applicants Handbook Volume II provides guidance on its Sensitive Karst Area Design Criteria.

Stormwater management facilities and systems located in sensitive karst areas as delineated by the appropriate water management district shall adhere to the minimum following design standards:

1. A minimum of 3 feet of unconsolidated soil material is required between the surface of the limestone bedrock and the bottom and sides of the stormwater management facility. The City Engineer shall approve the type of excavation and backfill material that will be used to meet these criteria.

2. Stormwater management facilities shall be designed to be as shallow as possible with horizontal bottoms. Deeper areas shall not be allowed in the bottom of the facility unless approved by the City Engineer.
3. To prevent the formation of sinkholes, the maximum facility depth shall be ten (10) feet.
4. The stormwater management facility side slopes, bottoms and areas adjacent to the facility that were disturbed or altered during construction shall be fully vegetated and stabilized.
5. All fill material used onsite shall be free of phosphatic Hawthorn Group sediments or other phosphorous rich materials that may leach phosphorus causing surface water quality degradation and lake eutrophication.
6. Any excavation that would lead to exposure of Hawthorn Group sediments or other phosphorus rich materials that could leach and adversely impact groundwater or surface water shall be mitigated by covering, backfilling or using other techniques to prevent phosphorus leaching.
7. Utility lines shall not be installed beneath stormwater basins in karst sensitive areas unless approved by the City Engineer or designee and GRU. Any lines for temporary irrigation of vegetation in and around stormwater management systems shall be installed to minimize excavation in karst sensitive areas.

3.14 Stormwater Management Utility

All development plans shall include on the cover sheet the following information under the heading "Stormwater Management Utility Data":

1. Total Project Impervious Area
 - a. All project impervious located within the project parcel(s) and in the right-of-way (sidewalks, driveways, etc.).
2. Total Site Impervious Area for SMU Determination
 - a. Includes all the impervious proposed on the project parcel(s) plus the driveway impervious in the right-of-way.
3. Total Semi-Impervious Area (i.e., grass parking)
4. Table containing the following information for each stormwater management facility:
 - a. SMF ID
 - b. Lowest Discharge Elevation (ft)
 - c. Retention Volume Below Lowest Discharge Elevation (cf)
 - d. Retention Area at Lowest Discharge Elevation (ft)

3.15 Operation and Maintenance

3.15.1 Accessibility

1. Reasonable maintenance access to all stormwater management facilities shall be provided.
2. The maintenance path shall have a minimum cleared width of 5 feet, a maximum slope of 8H: 1V, and be stabilized with grass.
3. A driveway apron to access into stormwater management facilities for maintenance/larger equipment is required for ponds intended to be maintained by the City for functionality.

4. The sidewalk in maintenance access ways to stormwater basins or facilities shall be a minimum of 6 inches thick.
5. Stormwater management facilities within subdivisions or that are maintained by the City shall provide a minimum cleared maintenance path width of 15 feet.
 - a. This includes facilities in subdivisions that are intended to be maintained by the City for functionality.

3.15.2 Operation & Maintenance Overview / Manual

1. Maintenance Entity

The entity responsible for all maintenance on the stormwater structures and facilities shall clearly be identified with the following information through a letter to the Public Works Department Director, the subdivision plat or the approved site plan.

 - a. Name of the entity.
 - b. Point of contact for the entity. A position title can be used.
 - c. Address of the entity.
 - d. Phone number of the entity.
2. Operation & Maintenance Overview / Manual

An Operation & Maintenance (O&M) Overview / Manual is to be provided that outline the following:

 - a. Facility Description
 - i. Brief description of the stormwater management system.
 - b. Description of maintenance required for major components of the stormwater management system. Describe routine maintenance for:
 - i. Stormwater Basins
 - ii. Erosion Control
 - iii. Swale/Ditch
 - iv. Culverts, Pipes and Structures
 - c. Outline frequency of inspections for major components of the stormwater management system.
 - d. Provide guidance for sinkhole repairs.
 - e. Illicit Discharges
 - i. Outline best management practices (BMPs) for activities on the operational site that could potentially impact the stormwater system or affect downstream water quality. This would include items such as on-site pools, pet waste management, sidewalk or pavement washing activities, a dumpster in disrepair, etc. A reference to the Clean Water Partnership of Gainesville brochures on BMPs can be utilized.
3. Long Term Operation & Maintenance
 - a. The O&M entity shall provide routine maintenance of all components of the stormwater management system to remove trapped sediments and debris. Removed materials shall be disposed of in a landfill or other uplands in a manner that does not require a permit under Chapter 62-330, F.A.C., or cause violations of state water quality standards.
 - b. The O&M entity shall inspect the stormwater or surface water management system after the completion of construction per the Water Management District Requirements and copy the inspection reports to Public Works Stormwater.

- c. Once a system has been constructed and is in its O&M phase, City staff shall be granted access to inspect stormwater management systems to ensure compliance with permitted conditions.

4. Roadway Design

4.1 Objective

These roadway design standards demonstrate the City's commitment to the provision and maintenance of a safe, accessible, and integrated transportation system. Road design shall prioritize the implementation of Vision Zero principles to maximize safety and prevent incidence of severe crashes, while balancing the needs of all users including drivers of vehicles, bicyclists, pedestrians, and transit riders. Designs shall be based on functional classification, context classification and design speed. Other mitigating factors such as demand, existing conditions, land use, environment and costs, must also be considered.

4.2 Governing Standards

Roadways shall be designed and constructed in accordance with the applicable sections of the Florida Greenbook, the FDOT Design Manual, FDOT Standard Plans, the MUTCD, the Americans with Disabilities Act and the Public Right-of-Way Accessibility Guidelines "PROWAG" except as modified herein. In the event it is necessary to deviate from the standards referenced in this chapter, a design variance or exception is required.

4.3 Roadway Classification

All streets shall be designed in accordance with the Street Types listed in the Subdivision section of the City's Land Development Code. For the purposes of this manual, utilize Table 4-1 to correlate Street Types to Functional Classifications listed in the Florida Greenbook. Classifications and Street Types referenced in this manual are defined in accordance with the Florida Greenbook.

Table 4-1. Roadway Classifications		
Land Development Code Street Type	ADT	Regulating Florida Greenbook Classification
Minor local street	Less than 800	Local
Major local street	800 to 1,200	Local
Minor local collector	1,201 to 3,200	Local
Major local collector	3,201 to 7,000	Collector
Minor arterial	7,001 to 12,000	Collector
Principal arterial	Over 12,000	Arterial

4.4 Lane Widths

Travel lanes shall be designed to safely and cost-effectively accommodate vehicular, transit, and cycle travel. In residential areas, travel lanes shall be 10' wide. Travel lanes may be reduced to 9' wide when justified and approved by the City Engineer. Where there are high volumes of transit or other large vehicles, travel lanes shall be a minimum of 11' wide. Travel lanes shall not exceed 12' wide.

4.5 Drainage

Stormwater design related to roadways shall adhere to the design criteria established in Chapter 3 Stormwater Management.

4.6 Intersection Design

4.6.1 Type Selection

Roundabouts are the preferred method of intersection control and shall be utilized as opposed to signal control. When new traffic signal is warranted or reconstruction of a traffic signal is necessary, a roundabout shall be constructed unless study is provided in accordance with Chapter 6.

4.6.2 Roundabouts

Roundabouts may be installed in all areas; mini-roundabouts (as defined by NCHRP Report 672) may be installed within roadways projected to carry less than 1,200 ADT. Roundabouts and mini-roundabout design shall be designed in accordance with NCHRP Report 672 and meet the following criteria; in the event of a conflict, the criteria herein shall prevail:

1. Roundabouts:
 - a. Roundabouts on arterials and collectors shall be designed to accommodate WB-50 class vehicle in the travel lane.
 - b. Local roadways shall be designed to accommodate a WB-40. Truck aprons shall be provided to accommodate the next highest-class vehicle.
 - c. Mini-roundabout shall be designed to accommodate an S-BUS-36 within the travel lane. A fully traversable central island may be used to accommodate larger vehicles.
 - d. Raised splitter islands shall be provided on all approaches to a roundabout.
 - e. A six-by-six foot pedestrian refuge shall be provided in the splitter island.
 - f. Pedestrian crossing shall be located at least 20 feet back from the yield line to provide storage room for vehicles.
 - g. On roads with an on-street bike line, a ramp shall be provided ahead of the roundabout to allow bicyclists access to the sidewalk.
 - h. Lighting in accordance with NCHRP Report 672 or the Greenbook, whichever is greater, shall be provided to light all approaches and the center island.
2. Mini-roundabouts
 - a. Mini-roundabout shall be designed to accommodate an S-BUS-36 within the travel lane. A fully traversable central island may be used to accommodate larger vehicles
 - b. Raised splitter islands should be provided on all approaches.
 - c. A six-by-six foot pedestrian refuge should be provided in splitter islands.
 - d. Lighting in accordance with NCHRP Report 672 or the Greenbook, whichever is greater, shall be provided to light all approaches and the center island.

4.6.3 Traffic Signals

Design of new traffic signals or a modifications or reconstruction of an existing traffic signal shall meet the following criteria:

1. All signal plans are to be signed and sealed by a professional engineer licensed in Florida.
2. Signed and sealed traffic signal timings shall be provided to accommodate timing changes. For new signals and reconstruction of signals, provide basic controller timings, clearance interval calculations, coordination plans and base day plans. If significant changes are implemented, new coordination plans for the entire corridor will be required.
3. All signal and pedestrian heads shall be LED.
4. Countdown pedestrian signal heads shall be utilized.
5. All new construction shall be mast arms, painted black, with horizontally mounted traffic signal heads.
6. Traffic signal heads shall be mounted on articulating astro-brackets with terminal compartments.
7. All signal equipment shall be compatible with the existing City of Gainesville Traffic Management System.
8. When providing protected/permissive left turn phasing a four-section horizontal flashing yellow arrow shall be utilized.
9. Furnish and install video detection for vehicle and bicycle detection on all approaches.
10. Traffic signals within or adjacent to existing traffic signal systems shall be interconnected with a minimum 2" underground conduit and 72-count fiber optic cable. The interconnect communications equipment shall be provided.
11. If the intersection being modified or reconstructed, any existing functionalities related to intersection detection, video monitoring, and communications shall be preserved during the duration of the construction project. The use of infrared temporary vehicle detection is prohibited. If any traffic control detection or communication devices are to be replaced, offline or downtime shall be less than 48 hours.

4.7 Pavement Designs

4.7.1 Flexible Pavement

Flexible pavements shall be designed in accordance with applicable standards referenced in this EDCM and the FDOT Procedures Manual for Flexible Pavement Design. Minimum City standards for the design of flexible pavements are as follows:

1. Roadway pavement materials shall be FDOT approved and from FDOT approved sources.
2. Pavement designs shall be FDOT approved asphalt mixes.
3. Asphalt Concrete shall be Superpave only.
4. Limerock bases require roadway underdrains in all areas of subgrade where ground water may rise to within 12 inches of the bottom of the base material or in undercut areas where ground water may infiltrate or accumulate in the stabilized subgrade.
5. Subgrade materials shall be Type B Stabilization (LBR 40).
6. The minimum pavement thicknesses shown in Table 4-2 shall be provided. The City Engineer has the authority to approve alternate designs provided the professional

engineer demonstrates that the proposed design meets objectives and minimum requirements for the application.

Table 4-2. Minimum Pavement Thickness				
Facility	Type B Stabilization	Base	Structural Course	Friction Course
Trails & Multi-use Paths	12 inches	6 inches	1.5 inches	Optional
Local Roadways	12 inches	6 inches	2 inches (two lifts)	Optional
Local Roadways (Design Speed >30 MPH OR ADT >3,000)	12 inches	8 inches	1.5 inches	1.5 inches
Arterials & Collectors	12 inches	8 inches	2 inches	1.5 inches

4.7.2 Concrete Pavement

Concrete pavement may be used in lieu of flexible pavement if its structural capacity meets or exceeds the values for the minimum flexible pavement sections.

1. Concrete pavements shall be designed in accordance with the FDOT Procedures Manual for Rigid Pavement Design.
2. FDOT Design Manual with Draincrete edgedrains and shall be a minimum of 6 inch thick.
3. Design shall provide all steel reinforcement, doweling and joint requirements.

4.7.3 Brick Pavement

Brick Pavement may be used in lieu of flexible pavement.

1. Brick pavement cross section shall include a 6" concrete pavement with Draincrete edgedrains under-layer in accordance with the FDOT Rigid Pavement Design Manual.
2. Brick pavers shall be 4"x8", 2-3/4" thick, mortarless with joint width between 1/16" to 1/8" and with 3/4" concrete bedding fines. See Appendix B for details.

4.7.4 Geotechnical for Public Roadways

Roadways intended to be dedicated to the Public must provide the following geotechnical and boring information:

1. Geotechnical recommendations for roadways signed and sealed by a Professional Geotechnical Engineer.
2. Borings will be collected within the proposed roadway every 500 feet or a minimum of one per roadway segment.
3. The depth of the borings must be to a depth of the proposed roadway template plus 3 feet.

4.8 Driveways

Driveways must be designed as follows:

1. Refer to the City's Land Development Code for specific requirements regarding dimensions, types, locations, number and permitting of driveways.
2. Unless permitted by Code or by the City Engineer, ramp style (FDOT concrete flared) driveways shall be utilized at all locations.
3. Unless permitted by the City Engineer, all driveways shall be 6 inch thick concrete with 6x6 WWM or 1.5 lbs. polypropylene fiber mesh per CY.

4.9 Bicycle Facilities

Bicycle facilities shall be provided on all new roadway projects. The NACTO Urban Bikeway Design Guide also provides design solutions to help accommodate bicyclists and achieve complete streets in roadway design.

1. Shared lane markings may be required at the City Engineer's discretion on roadways with posted speed of 25 mph or less, with ADT of 3,000 or less. Shared lane markings shall be centered in travel lanes.
2. Dedicated in-street bicycle lanes shall be provided for all roadways with posted speeds greater than 25 mph and projected to carry an ADT greater than 3,000.
3. The preferred bicycle lane width is 6' and the minimum bicycle lane width shall be 5' measured to the face of curb. A minimum of 4' width is required for roadways without curb.
4. Bicycle lanes adjacent to on-street parallel parking shall have a width of 7' (6' minimum) and a 3' buffer to allow for door swing from parked cars.
5. Bicycle lanes along corridors with vehicular speeds posted above 35 mph shall be buffered or separated (protected) with a vertical element.
6. Separated bicycle facilities that employ vertical elements (to separate bicycles from motorized traffic) should be considered provided that minimum design criteria can be met:
 - a. Where speeds are 40 mph or greater such facilities shall be 7' wide (6' minimum) for one-way facilities and 12' wide (10' minimum) for two-way facilities with a preferred separation of 8' (2' minimum) when adjacent to travel lanes and 3' (2' minimum) when adjacent to on-street parking.
 - b. Separation should be maintained where feasible between bicycle and motorized vehicle traffic through intersections.
 - c. Conflict points are minimal and mitigated; cyclists should be given priority at the driveway and side street crossings.

4.10 Sidewalks and Shared-use Paths

Pedestrian facilities shall be provided on all new roadway projects. The NACTO Urban Design Guide also provides design solutions to help achieve complete streets in roadway design.

1. All sidewalks and shared used paths shall be designed with a 1.5% cross slope.
2. Sidewalks shall be a minimum of 5' wide.

3. Shared use paths shall be a minimum of 10' wide, but may be reduced down to 8' where there are constraints.
4. Sidewalks and shared-use paths may be designed with asphalt, concrete or brick pavers.
5. Asphalt pavement cross-sections shall meet the requirements of Table 4-2.
6. Asphalt pavement section with expected vehicle loads shall be designed as a local roadway. Asphalt may be placed in a single lift.
7. Concrete areas with expected vehicle loads shall be 6 inch-thick concrete with 6x6 WWM or 1.5 lbs. polypropylene fiber mesh per CY; otherwise, 4 inch thick concrete is permissible.
8. Brick pavers shall be 4"x 8", 2-1/4" thick, mortarless with joints width between 1/16" to 1/8" and with 3/4" concrete bedding fines; areas with expected vehicle load shall include a 6 inch thick concrete underlayer; otherwise, a 4 inch thick concrete underlayer is permissible.
9. See Appendix B for details for brick paver details.

4.11 Pedestrian Crossings

The City, at its discretion, may direct a marked crosswalk to be placed at any location that does not violate a Federal or State law or rule. Marked pedestrian crosswalks shall be provided if justified by an engineering study. All uncontrolled or mid-block crosswalks shall be supplemented by appropriate warning signs, beacons or signal devices as determined by the City. On streets with pavement markings: All controlled crosswalks shall be marked; where block length or marked crosswalks exceed 600 ft, uncontrolled crosswalks or mid-block crosswalks should be marked every 300 to 400 ft if justified by an engineering study.

4.12 Curb Ramps and Sidewalk Connections

Curb ramps and sidewalk connections shall meet the following criteria:

1. All curb ramps and sidewalk connections shall be 6 inch thick concrete with 6x6 WWM or 1.5 lbs. polypropylene fiber mesh per CY.
2. Detectable warning areas shall be clay fired or concrete brick with truncated domes, red in color only.
3. The City brick detectable warning area details are shown in Appendix B.

4.13 Signage

All signs designs shall be approved by the City prior to fabrication. All street signs placed in the Public right-of-way shall meet the following requirements:

1. Sheeting: Use Type XI sheeting for all signage.
2. Street name signs:
 - a. Blanks: 0.080-gauge 30 inch by 9 inch aluminum (4 per intersection).
 - b. Public street color scheme: white on green.
 - c. Private street color scheme: green on white.
 - d. Border: One-half inch around the perimeter of the sign.
 - e. Standard Lettering: 6 inch – series "B".

- f. Superscript letters: 2 ¾ inch letters – series “C”
- 3. Historic Street Name Signs:
 - a. Blanks: 0.080-gauge 30 inch by 9 inch aluminum (4 per intersection).
 - b. Color scheme: white on black.
 - c. Border: one-quarter inch, one-quarter inch off the perimeter of the sign, leaving a one-quarter inch black border on the perimeter of the sign.
 - d. Standard Lettering: 4 ½ inch – series “B”.
 - e. Superscript letters: 2 inch letters – series “C”.
- 4. Mast arm overhead street signs:
 - a. Blanks: 0.080-gauge aluminum, 18 inches by 54 inches minimum, 18 inches by 72 inches maximum. The size of the sign shall be increased in 6 inch increments only.
 - b. Placement: Attached to the right of the outside most traffic signal head to the maximum extent possible.
- 5. Posts:
 - a. Street name signs shall be mounted on a uni-strut square post, 2 lb/ft (or equivalent as approved by the Public Works Department).
 - b. Combination stop signs and street name signs shall be mounted on a uni-strut square post, 2 lb/ft (or equivalent as approved by the Public Works Department).
 - c. All other traffic signs shall use a U-channel post, 2 lb/ft (or equivalent as approved by the Public Works Department).
 - d. If the signpost is to be painted, it shall be powder coated and painted black.
- 6. Abbreviations:

Full street type names are preferred. If necessary, abbreviations shall be as follows: Avenue – AVE; Boulevard – BLVD; Place – PL; Street – ST; Road – RD; Terrace – TERR; Lane – LN; and Drive – DR.
- 7. Specialty or decorative signs & posts may be approved at the discretion of the City Engineer; any specialty or decorative signs & posts shall require a maintenance agreement and all cost associated with furnishing, installing, replacing & maintenance shall be the responsibility of the permittee.

4.14 Pavement Markings

Pavement markings shall meet the following criteria:

- 1. Pavement markings shall not be placed on local roadways unless required by the MUTCD. Other exceptions include vertical deflection of traffic calming markings, at intersections with collector/arterial roadways, and as directed by the City Engineer.
- 2. Collector and arterial roadways shall include all standard markings and RPMS.
- 3. All final pavement markings shall be thermoplastic.

4.15 Traffic Calming

Traffic calming measures shall be utilized at the direction of the City Engineer where roadway alignments may encourage high vehicle speeds or cut through traffic on local roadways. Traffic calming devices shall be implemented in accordance with standards referenced in this manual at 600 ft intervals or as feasible based on the adjacent context.

4.15.1 Horizontal Traffic Calming Measures

Horizontal traffic calming measures, such as bulb-outs, chicanes or roundabouts are the preferred treatment to minimize impacts to emergency response vehicles.

4.15.2 Vertical Traffic Calming Measures

If vertical traffic-calming measures are utilized, they shall be designed as raised intersections, speed tables, speed cushions, or raised crossings.

Examples of traffic calming devices are illustrated in Appendix B.

4.16 On-Street Parking**4.16.1 On-Street Parking**

1. When on-street parking is proposed, curb extensions are required to reduce crossing distance for pedestrians.

4.16.2 Angle parking

1. When angle parking is proposed, back in angle parking is preferred if technically feasible.

4.17 Lighting

Lighting shall meet the following criteria:

1. Lighting shall be LED and designed in accordance with the Florida Greenbook.
2. GRU and the Public Works Department shall approve all lighting designs, including photometrics.
3. All publicly-maintained lighting facilities, including but not limited to poles, arms, boxes and fixtures shall be approved by GRU.
4. All publicly-maintained lighting materials shall be selected from the current GRU Lighting Catalog and GRU Approved Electric System Materials Manual.
 - a. If a developer chooses to install roadway lighting that is not approved by GRU and the Public Works Department, an agreement acceptable to the City shall be submitted stating that the developer/home owners association is responsible for 100% of the capital, maintenance, electricity, replacement costs of the roadway lighting facilities, registration with Florida Sunshine 811, and provision of utility locates in perpetuity.
5. New lighting shall be aesthetically compatible with any existing adjacent lighting.
6. Existing highway lighting is to remain in service during all phases of construction or until new lighting is installed and placed in service.

4.18 Utilities

Utilities shall meet the following criteria:

1. Utilities shall be designed to minimize impacts and conflicts with roadway elements in the right-of-way. Utilities shall be placed in accordance with the current FDOT Utility Accommodations Manual and the City's Code of Ordinances.

2. Roadway, trail and sidewalk surfaces newer than 5-years old shall not be open cut.
 - a. Exceptions may be approved by the City Engineer.
3. Any allowable open cut shall be repaired in accordance with FDOT Standard Plans, flowable fill option only.
 - b. Open cut restoration shall encompass a full lane minimum width and a minimum of 50 feet in length.
 - c. Multiple open cuts on the same block may require resurfacing of the entire block, at the City Engineer's sole discretion.
4. Utility work within the City right-of-way will require a permit from the Public Works Department (Utility and/or Obstruction permits) in accordance with the City's Code of Ordinances.
5. All utility services, including but not limited to those of franchised utilities, electric power and light, telephone, cable services, water, sewer and gas, shall be installed beneath the surface of the ground, unless the City Manager or designee determines that the soil, topography or other compelling condition makes it unreasonable or impractical.
6. The subsurface mounting of incidental appurtenances, including but not limited to transformers, switchgear boxes or pedestal-mounted boxes for the provision of utilities, electric meters, back flow preventers and fire hydrants, is not required.

4.19 Landscaping

When planning for the street tree requirements under Code of Ordinances, Chapter 30, Land Development Code, Public Works will consider the use of innovative design elements and other BMPs to promote trees and other landscaping within the ROW. Design elements should protect all infrastructure within the ROW and promote the reduction of stormwater runoff from the existing storm sewer system. As an example, use of a tree well that utilizes a barrier along the side adjacent to a linear utility would be considered a valid design element. Designs that propose innovative alternatives will be reviewed for the following:

1. Structural Integrity;
2. Functionality;
3. Constructability;
4. Maintainability;
5. Safety; and
6. Aesthetics.

4.20 Transit

Transit facilities shall meet the following criteria:

1. Transit facilities shall be designed in accordance with standards referenced in this manual and the Americans with Disabilities Act. The FDOT Transit Design Handbook provides technical guidelines in the design of transit facilities. The design of transit facilities shall be coordinated with and approved by the Gainesville Regional Transit System (RTS).
2. ADA compliant bus stops shall be considered in the design of all new roadway projects. At a minimum, boarding and alighting areas shall be designed to include a

firm surface measuring 8' perpendicular to the roadway and 5' measured parallel to roadway.

3. Bus bays and shelters should also be considered and provided if feasible.

4.21 Mailboxes

Community and group mailboxes shall be placed in locations that will not encourage the congregation of pedestrians or parked vehicles on high volume or high-speed roadways. Placement of such mailboxes shall be contemplated during the design plat process and shall be prohibited on or adjacent to arterial and collector roadways unless approved by the City Engineer.

4.22 Temporary Traffic Control

Obstructions such as road closures, lane closures and sidewalk closures shall be minimized. If required, the impacts on the public and time duration shall be minimized. The City Engineer, at its discretion, may limit the days of week, times of day, or duration of closures. Obstruction permitting shall be in accordance with Chapter 8-Construction of this manual.

5. Site Design

The criteria listed under this heading apply to site development, which typically includes projects that are primarily outside of the Public ROW and that do not have elements of a typical residential subdivision. The requirements listed in this section may be applied to all other types of development at the discretion of the City Engineer.

5.1 Driveways

Driveways shall be designed in accordance with Chapter 4.8 of this manual.

5.2 Utility Service

Utilities shall be designed in accordance with Chapter 4.18 of this manual.

5.3 Refuse Collection and Dumpster Pads

Refuse Collection and dumpster pads shall be designed as follows:

1. A minimum of 6 inch thick 3,000-psi concrete shall be used for dumpster pads.
2. Refuse collection areas shall be situated so that collection vehicles are not required to back out into the Public right-of-way.
3. Temporary dumpsters and roll-offs are prohibited in the Public right-of-way and temporary permits will not be issued.
4. Sites should be designed so that all refuse needs can be accommodated on-site.

5.4 Parking (off street)

5.4.1 Dimensions

Minimum dimensional standards are provided in Appendix B of this manual.

5.4.2 Grading

Parking lots shall be graded to provide safe pedestrian and vehicle conditions while maintaining positive drainage into inlets and minimizing surface ponding. As a guideline, 8% maximum and 0.5% minimum slope should be used in all areas where ADA requirements do not overrule local requirements.

5.4.3 Site Striping

Site striping on hard surfaces shall be a minimum of 4 inch wide on private sites. All striping shall comply with the MUTCD.

5.4.4 Inlets

Inlets shall be located away from areas frequently traversed by pedestrians. Grates shall be safely traversable by all anticipated traffic including pedestrian, bicycle, wheelchair and vehicle.

5.4.5 Vehicle Parking

A physical barrier shall be provided to ensure vehicle overhang does not obstruct a pedestrian route. A minimum of 5 feet of open travel pedestrian area shall be maintained.

5.4.6 Bicycle Parking

Bicycle parking shall be located in areas convenient to building entrances and in areas that require minimal effort to access. The type and number of bicycle parking spaces shall be in accordance with the Code of Ordinances, Chapter 30, Land Development Code.

5.4.7 Motorcycle Parking

Motorcycle parking shall be 4.25 feet wide and 8 feet deep and be located in areas convenient to the building entrances. The parking surface shall be concrete.

5.4.8 Scooter Parking

Scooter parking shall be 3 feet wide and 6 feet deep and be located in areas convenient to the building entrances. Each scooter-parking stall shall be accessible from a minimum 3 feet wide aisle. The parking surface shall be concrete.

5.5 Public Right-of-Way and Maintenance

Private amenities or infrastructure, such as bike racks, on-site landscaping requirements, etc., proposed for construction in the public right-of-way shall be approved by the City Engineer and shall require a perpetual Maintenance Agreement.

5.6 Public Sidewalks

Public sidewalks shall be constructed in accordance with Chapter 4 of this manual. A sidewalk easement is required for that portion of a public sidewalk proposed on private property.

6. Traffic Study Guidelines

The City of Gainesville has adopted transportation policies that promote infill, urban redevelopment and transportation choices. It is the intent of these guidelines to provide information that ensures the maintenance of adequate traffic safety and operating conditions of the transportation system within City limits. Traffic studies shall be signed and sealed by a professional engineer licensed in Florida.

6.1 Study Thresholds

6.1.1 Traffic Statement

1. Projects that generate less than 100 gross net new peak hour trips. For purposes this threshold, gross net new peak hour trips is defined as the gross trips from the development with a reduction of trips from any existing uses on the site. No reductions for pass-by or multimodal trips are applied for 100 gross net new trip threshold.
2. A Traffic Statement shall document driveway volumes, site trips per mode (based on the latest edition of ITE Trip Generation and local multiuse rates as available), and roadway characteristics that may affect site access and/or safety.
3. A Traffic Statement may be included on the site plan and no other documentation is needed.
4. Location specific conditions may dictate the need for site access and intersection analysis or traffic study. The City retains the sole discretion to determine the scope of additional analyses or studies; such analyses or studies shall be communicated to the applicant no later than the conclusion of the First Step meeting.

6.1.2 Traffic Study

Projects that generate that generate 100 or more gross net new peak hour trips.

6.2 Methodology Letter

Prior to the preparation of a traffic study, the project's Traffic Engineer in coordination with the City of Gainesville must develop and agree on the study methodology. For projects impacting County or State roads or within one-quarter mile of the unincorporated area, coordination with the appropriate jurisdiction is required. Final approval of the methodology by the City and other agencies is required prior to commencing the study and should be documented in the final study.

6.3 Required Information

The standard required information to be included in the traffic study is listed below. City reserves the right to request additional information or further evaluation based on site location and conditions.

6.3.1 Project Description

1. Type of development (e.g., standard subdivision, commercial/retail, office, mixed use, etc.), size (acres, etc.) and number of units as appropriate for the project (dwelling

units, square feet, etc.). For student-oriented multi-family developments, the analysis should be performed based on the number of bedrooms.

2. Expected build-out year.
3. Access
 - a. Identify vehicular, transit, bicycle, and pedestrian access to the development from the public roadway system.
 - b. Identify proposed connections (including cross-access or joint driveways) to existing and future adjacent developments.
 - c. Provide location map and figure illustrating the adjacent roadway network and all site access points.
4. Trip generation
 - a. Calculate average daily, AM and PM peak hour trip generation according to the latest version of the ITE Trip Generation Manual;
 - b. If appropriate, document any unique trip generation characteristics of the project;
 - c. Document calculation of internal capture, pass-by trips, and multimodal trip reductions including assumptions and methodology used.
5. Trip Assignment
 - a. Calculate directional distribution of project traffic and state methodology used (GUATS, observation of traffic at nearby developments, based on directional distribution of existing traffic, etc.) and provide projected ADTs for all new roadway segments. Data obtained from other developments should be based on an average using a minimum of 1 day of manual counts (Tuesday, Wednesday and Thursday only).

6.3.2 Study Area

1. The City will specify the boundary of the Study Area and any intersections that shall be analyzed as part of the study. At a minimum this shall extend one-quarter mile from the project site and include main intersections and project driveways. Extent may vary depending on site conditions and intensity.
2. Acceptable dates for traffic counts will be approved as part of the study methodology letter. Counts may not be taken on Mondays, Fridays, holidays, significant events (e.g., Gatornationals or holiday shopping season) or during school breaks (UF, Santa Fe College, and/or the public schools).
3. Turning movement counts should be collected for a minimum of one day at locations and time-periods specified in the methodology.
4. The Study may require a Highway Capacity Manual operational analysis using the most recent version of Synchro or the Highway Capacity Software as applicable.

6.3.3 Analysis of Conditions

1. Transportation System Serving the Project Site
 - a. Identify all arterial and collector streets within one-half mile of project, as defined by the City's Comprehensive Plan and list the governmental jurisdiction(s) responsible for maintenance.
 - b. Identify Regional Transit System routes serving project and locate bus stops (indicate whether a bus shelter(s) exist at the stop) within one-quarter mile of the project.

- c. Identify streets with sidewalks (one-side/both sides) within one-quarter mile of the project.
- d. Identify any bicycle facilities (bike lanes, rail trails, wide curb lanes, etc.) within one-quarter mile of the project.
- e. Identify any gaps in sidewalk and/or bicycle facilities within one-quarter mile of the project.
- 2. Programmed Transportation Modifications
 - a. List proposed transportation system modifications in the study area as stated in the adopted 5-year Transportation Improvement Plan (TIP) and the City's or Alachua County's Capital Improvement Element (as appropriate).
 - b. List any proposed and/or scheduled transportation system modifications that will impact the project that are not in the TIP.
- 3. Background Growth Rates
 - a. Use the City of Gainesville, Alachua County and Florida Department of Transportation (FDOT) counts to determine growth trends. For instances where there is no data available to establish the growth rate, a standard 2% growth rate shall be used. For roadways having a negative growth rate, a 1% growth rate shall be used.
- 4. Analysis Scenarios
 - a. The study shall document the following conditions: existing, future with background growth projects, future with project traffic, future with project traffic and proposed improvements.
 - b. Provide figures that illustrate existing and future turning movement counts including traffic associated with nearby developments that have received development plan approval, as identified in the study methodology.
 - c. Calculate level-of-service at affected intersections for all scenarios.
 - d. If required, perform warrant analysis for traffic control devices at affected unsignalized intersections. All intersection warrant analysis for signal control and signal reconstruction shall include a roundabout evaluation and operation analysis. If there are no site constraints (environmental or land rights needs outside the control of the applicant) and a roundabout operates at an acceptable level of service in the design year, a roundabout shall be selected as the appropriate intersection control type.
- 5. Summary of Transportation System Impacts
 - a. Provide summary of the project impacts on the public roadway system.
 - b. Provide summary of the project's impacts on the transit, pedestrian and bicycle system.
 - c. Identify any needed roadway modifications which may be required (i.e., turn lanes, medians, traffic separators, or traffic control devices).
 - d. Any additional information requested in the methodology letter.
- 6. Supporting Documentation
 - a. All supporting documentation shall be provided in the Appendix, including but not limited to:
 - i. Copy of the signed methodology letter.
 - ii. Copies of required traffic counts.
 - iii. Copies of all analysis performed utilizing various engineering software programs (such as Highway Capacity Software, Synchro, etc.).
 - iv. Warrant studies.

- v. Growth trends.
- vi. Site plan
- vii. Signal timings
- viii. Volume calculations
- ix. Distribution calculations / model plots
- x. TMPA district information

7 Submittal Requirements

The following is a list of components that may be included for various submittals. Requirements are deemed by type of project and stage of submittal. It is the engineer of record's responsibility to provide all documentation for a stand-alone permit application.

7.1 Site Plans

7.1.1 Conceptual Review

1. Approximate topographic map (USGS or Regional Planning Council maps may be used) showing:
 - a. Existing creeks.
 - b. Ditches.
 - c. Above ground utilities.
2. A statement identifying the location and elevation of any flood zones.
3. A statement as to whether the project will be affected by the creek setback regulations.
4. A general description of how the drainage will be handled, including an initial identification of soils (information from NRCS acceptable), and the general area of the site to be used for stormwater management facilities.
5. Conceptual review submittals shall meet applicable requirements in the City of Gainesville Code of Ordinances Sec. 30-3.50 – Conceptual Review.

7.1.2 Development Plan Review

1. The coordinate system shall be Florida State Plane Coordinates, NAD 83 Zone North US Survey feet. Vertical coordinates shall be referenced to the NAVD 88 datum with elevations given in US Survey feet unless otherwise approved by the City Surveyor.
2. Grading and paving plan, including horizontal control, elevations, complete notes and specifications covering construction (this can be combined with the drainage plan).
3. Provide turning templates for driveways and intersections as requested by the City Engineer.
4. Incorporate projected ADTs of new roadway segments into plan set submittal.
5. Erosion and sediment control plan must be submitted, if appropriate, or a statement must be on the plans that one is not required.
6. A statement outlining the status of State environmental permits.
7. Final review shall meet applicable requirements in the City of Gainesville Code of Ordinances Sec. 30-3.46 - Submittal Requirements and Sec. 30-3.47 - Contents of Final Development Orders.
8. Drainage narrative shall minimally include:
 - a. A complete description of the stormwater management plan, including, but not limited to:
 - i. Information for all affected drainage areas;
 - ii. Existing, proposed, and previously permitted and future impervious areas;
 - iii. Water quality treatment criteria;
 - iv. Structural analysis for dams and berms;

- v. Explanation of all assumptions;
 - vi. Supporting electronic stormwater modeling files;
 - vii. All pre-development and post-development basins that contribute runoff to the area proposed for development, including all off-site contributions, and areas that may be impacted by the development fully delineated and quantified.
 - viii. Hydrologic and hydraulic stormwater model analysis including all input parameters, supporting calculations, assumptions, documentation for design and results.
 - ix. Calculations pipe and lane spread calculations.
 - x. Demonstration that freeboard is met, see Section 3.4 for criteria.
 - xi. Recovery analysis based on drawdown of the total required volume.
 - xii. A slope stability analysis if required. See Section 3.4 for criteria.
 - xiii. Calculations must be consistent with the plan sheets and other supporting details.
 - xiv. Calculations shall use standard methodology recognized in the State of Florida, including hand and/or computerized calculations.
 - xv. Calculations must be provided for drainage features identified as “Design by Others” (for example but not limited to, roof drains, drainage for retaining walls, underground stormwater facilities).
 - xvi. Signed and sealed by a professional engineer.
9. Geotechnical investigation report shall minimally include:
- a. A summary of all subsurface exploration data and subsurface soil profiles.
 - b. Exploration logs, laboratory or in situ test results, groundwater information, the interpretation and analysis of the subsurface data.
 - c. Recommendations for design, discussion of conditions for solution of anticipated problems, and recommended geotechnical special provisions.
 - d. Signed and sealed by a professional engineer.

7.1.3 Drainage plan sheets shall minimally show:

- 1. The location and design parameters for all retention/detention areas including:
 - a. Dimensions or coordinates for constructability.
 - b. Cross sections, to scale, along the width and length of each pond, showing the design high water elevation, estimated seasonal high-water elevation, pond top elevation, pond bottom elevation, side slope steepness, maintenance berm width, sod stabilization of the pond side slopes, and appropriate vegetative cover on the pond bottom.
 - i. A typical cross section can be used instead when sufficient information is shown on the plan view, which minimally includes pond width and length call outs as measured at the pond's top and bottom elevations.
- 2. Soil boring location with labels and ground elevation at time of collection.
- 3. All stormwater features or connective elements located and identified that may have an impact on the existing or proposed system, including but not limited to cross-drains, natural weirs, water line of lakes, wetlands, rivers, springs, streams, canals and other manmade or natural features.

4. All existing and proposed stormwater structures located and identified including labels and design parameters such as, references to a detail or source, widths, depths, heights and pertinent elevations.
5. A structure table that presents existing and proposed inlets, inlet type per FDOT index, and inverts of pipes.
6. All existing and proposed stormwater pipes located and identified including labels and design parameters such as, sizes, materials, lengths, slopes, references to a detail or source, and invert elevations.
7. All existing and proposed swales located and identified including labels and design parameters such as, side slope steepness, widths, dimensions, ditch block locations and details, stabilization, and material used to stabilize.
8. Identification of finished-floor elevations of structures. See Section 3.4.3 for criteria to be met.
9. Site access accounting for stormwater conveyance within the right-of-way.
10. Site grading, using spot grades at all corners and other critical or transitional locations, with directional flow arrows, details, cross sections, or general grading depictions.
11. Erosion control measures, including:
 - a. The construction entrance location and controls;
 - b. Limits of silt fence, turbidity barrier, and other perimeter or intermediate controls; and
 - c. References to a detail or source.
12. Details, cross-sections, or references clearly describing the construction intent. It is acceptable to reference standard details, such as FDOT's, when used instead of reproducing them.
13. Signed and sealed by a professional engineer.

7.1.4 Road Construction / Improvements Associated with Site Plans

If roadways are part of a site plan and are to be dedicated to the City, the submittal shall provide standard sheets containing information identified under Section 7.2.

7.1.5 Required Notes on Plans

The following notes shall be added to the plans if work is required to be done within the City, County or State ROW:

1. City Right-of-Way
 - a. "The method and manner of performing the work and the qualities of material for construction within the ROW shall conform to the requirements specified by the Public Works Department."
 - b. "No work shall be done nor materials used in the ROW, without inspection by the Public Works Department (352-334-5070), and the Contractor/Developer shall furnish the Department with every reasonable facility for ascertaining whether the work performed and materials used are in accordance with the requirements and intent of the plans and specifications."
 - c. "The Public Works Department reserves the right to modify the proposed work within the ROW to ensure compatibility with existing improvements. Such modification costs shall be borne by the Developer."
 - d. "All required backfill within the ROW shall be documented within a FDOT type density log book, compiled and maintained by the contractor, and shall be

available for review by the Public Works inspector at all times and immediately upon request. The log book will be reviewed for compliance to specifications by City Staff prior to any earthwork starting. The log book shall contain proctors, LBRs, soil classifications, etc. as required by specification. The log book shall be signed and sealed by the professional engineer responsible for materials testing and provided to the Public Works Department for review and TCO acceptance as part of the closeout documents.”

- e. “Post installation video inspections in accordance with FDOT Specifications shall be required for all pipe in the City right-of-way and the cost shall be borne by the contractor.”
 - f. “Exact limits of roadway and sidewalk to be removed will be determined by City Public Works Inspection staff. Any non-compliant or damaged areas due to construction within the right-of-way shall be removed and replaced prior to final acceptance.”
2. County Right-of-Way
 - a. “The method and manner of performing the work and the qualities of material for construction within the County ROW shall conform to the requirements specified by the Alachua County Public Works Department.”
 - b. “No work shall be done nor materials used in the ROW, without inspection by the Alachua County Public Works Department (352-462-2147), the Contractor/Developer shall furnish the Alachua County Public Works Department with every reasonable facility for ascertaining whether the work performed, and materials used are in accordance with the requirements and intent of the plans and specifications.”
 3. State Right-of-Way
 - a. “The method and manner of performing the work and the qualities of material for construction within the ROW shall conform to the requirements specified by the Public Works Department and the Florida Department of Transportation (FDOT).”
 - b. ““No work shall be done nor materials used in the State ROW, without inspection by FDOT and the Public Works Department (352-334-5070) per its maintenance agreement with FDOT. The Contractor/Developer shall furnish each Department with every reasonable facility for ascertaining whether the work performed, and materials used are in accordance with the requirements and intent of the plans and specifications.”
 4. Stormwater Basins
 - a. “If a geotextile is proposed, the Engineer of Record will provide specifications to Public Works prior to installation to demonstrate the geotextile is not be a limiting factor in infiltration.”
 - b. “The insitu material for all dry retention ponds will be tested by a geotechnical engineer using appropriate methodologies such as onsite testing with a double-ring infiltrometer or trench test, or collection of an undisturbed sample for testing such as a Shelby tube to demonstrate that it is not less than the design infiltration. Test results shall be submitted to the City for approval. The cost shall be borne by the contractor.”
 - c. “The insitu material under all proposed underground stormwater systems will be tested by a geotechnical engineer in the field after preparation but prior to placement of bedding stone using a double-ring infiltrometer test to demonstrate

that it is not a limiting factor in the design infiltration. If utilizing a compacted backfill material, it too must be tested in the field after placement to demonstrate that it is not a limiting factor in infiltration. Test results shall be submitted to the City for approval. The cost shall be borne by the contractor.”

- d. “Stormwater basins utilizing underground storage facilities must remain off-line until it is demonstrated that all sediment within the stormwater conveyance has been removed and will not be flushed into the basin.”
- e. “Final excavation of dry retention ponds to within one foot must be deferred until all contributing areas of the drainage basin are stabilized. Light equipment should be used to remove accumulated sediments and achieve final grade without compacting the basin floor.”
- 5. General
 - a. “On slopes of 3:1 or greater, or wherever erosion may be a problem, sod shall be laid with staggered joints and secured by pegging or other approved methods.”

7.1.6 Electronic File Submittals

Electronic copies of all reports, calculations, and plans shall be provided to the Public Works Department in .pdf format for all requested reviews.

7.2 Subdivision Development

In addition to the requirements identified for Site Plans under Section 7.1, the following is a list of standardized sheets required for Plans Submittal. Sheets may be omitted if those elements are not present in the project.

7.2.1 Plat Map / Right-of-Way Map

Construction Plans shall be consistent with the approved design plan plat. The final plat shall conform to the design plat as approved by the City Commission.

7.2.2 Construction Plans

Sheets referenced below shall meet all applicable requirements stated in the current version of the FDOT Design Manual.

- 1. Key sheet.

Any elements of the key sheet mentioned in the manual specific to the FDOT, shall be replaced with the corresponding element specific to the City of Gainesville.
- 2. Subdivision plat.

Final Plat must identify the allowed impervious per lot. The allowed impervious can be specified as a percentage or by square footage.
- 3. General notes.
 - a. Identify the benchmark datum.
 - b. Specify the source in which construction shall be in accordance
 - c. List stakeholder contacts the contractor shall coordinate with including utilities and other government agencies.
 - d. Include any other notes specific to the project to ensure successful completion by the contractor.
- 4. Certified topographic and boundary survey.
 - a. Surveys shall meet the minimum technical standards of the current version of the Florida Administrative Code.

- b. The coordinate system for all drawings shall be Florida State Plane Coordinates, NAD 83 Zone North US Survey feet. Vertical Coordinates shall be referenced to the NAVD 88 datum with elevations given in US Survey feet.
- 5. Summary of drainage structures.
- 6. Master drainage map / Sub-division or roadway map.
- 7. Roadway typical sections.
- 8. Roadway soil survey and auger borings.
Boring information shall be shown on the roadway cross sections.
- 9. Special details.
- 10. Plan and profile sheets.
Where appropriate, the horizontal scale shall be 1 inch = 20 feet and the vertical scale shall be 1 inch = 2 feet.
- 11. Utility plans.
Provide sufficient information to clarify potential conflict locations, including pipe slopes, elevations, required separation, etc., based upon the FDOT Utility Accommodation Manual or applicable state & federal statutes.
- 12. Roadway cross sections.
 - a. Where appropriate, the horizontal scale shall be 1 inch = 10 feet and the vertical scale shall be 1 inch = 5 feet.
 - b. Boring information shall be shown on the roadway cross sections.
- 13. Signing and marking plans.
 - a. The horizontal scale shall be the same as the scale chosen for the plan and profile sheets.
- 14. Drainage details.
 - a. Shall include details of major roadway connections, urban and rural turnouts, stormwater management facilities, and concrete structures such as box culverts and retaining walls.
 - b. Shall include details of special drainage structures, which include the rebar, formwork design, and specials construction specifications such as joints and connections.
 - c. Include any other details not covered in other sheets that contribute to successful drainage in the project.
- 15. Stormwater pond plans.
Include all stormwater basins and details including control structures, slopes, outfalls, underdrain systems, and stabilization information.
- 16. Stormwater pond cross sections.
 - a. Include cross sections at spacing sufficient to determine pond performance.
 - b. Where appropriate, the horizontal scale shall be 1 inch = 10 feet and the vertical scale shall be 1 inch = 5 feet.
- 17. Temporary Traffic Control (TTC) plans.
 - a. EOR to provide note to the Contractor that informs them that TTC plans are required for the ROW Permit. See Chapter 8.2 ROW Permits for additional information on City ROW Permit requirements.
- 18. Landscaping and streetscaping plans.
- 19. Stormwater pollution prevention plan.
- 20. Lighting plans.
 - a. The horizontal scale shall be the same as the scale chosen for the plan and profile sheets.

- b. Include a table that shows the photometric calculations, including average maintained luminance and uniformity ratio compared to the chosen design standard values.
- 21. Irrigation plans.
 - a. Irrigation plan sheets shall show the location and type of irrigation equipment to be installed to support the landscaping and streetscaping plans.
 - b. The horizontal scale shall be the same as the scale chosen for the plan and profile sheets.
 - c. Include a summary of quantities table specific to irrigation items.
 - d. Private subdivisions do not require a summary of quantities.

7.2.3 Submittal Format

Electronic copies of all reports, calculations, and plans shall be provided to the Public Works Department in pdf format for all requested reviews.

7.3 Interim Stormwater As-built Survey

The Contractor shall provide the City with an interim as-built survey of the retention/detention basin(s) and associated control structures that must be prepared by a registered land surveyor. The survey shall provide vertical and horizontal extents of the stormwater basins and elevation of control structures and confirm the stormwater system is in conformance with approved plans prior to permanently covering or burying the basins. The survey shall be in accordance with standards identified in Section 7.4.

7.4 As-built Survey

All work within or on City owned and maintained facilities, ROW or easements, as well as all stormwater infrastructure, whether on private or public property, shall require as-built plans. As-built Surveys must meet the following criteria:

1. As-built plans must show the constructed conditions of the City owned or maintained area and be performed by a Florida Licensed Professional Surveyor and Mapper.
2. The as-built survey data must be overlaid on the construction plan set that was approved for the project.
3. Construction Plan information must be shown in grayscale with the plan information untouched or unaltered.
4. The as-built survey must be to scale match the plan scale information.
5. The as-built survey data will be shown in bold print that is easily discernible from the grayscale plan information. When appropriate, use of strikethroughs, asterisks and clouds should be used to ensure it is clear what changes have occurred.
6. The coordinate system shall be Florida State Plane Coordinates, NAD 83 Zone North US Survey feet. Vertical Coordinates shall be referenced to the NAVD 88 datum with elevations given in US Survey feet.
7. The as-built shall be certified as meeting the Minimum Technical Standards set forth by the Florida Board of Land Surveyors pursuant to Chapter 472, Florida Statutes and Chapter 5J-17, Florida Administrative Code.
8. As-built plans shall be submitted to the Public Works Department for review and acceptance prior to TCO of any buildings or phase of the site as signed and sealed plans and an electronic drawing file.

9. One final as-built survey compiling all phased surveys shall be submitted to the Public Works Department for review and acceptance prior to CO or final acceptance.
10. As-built plans for driveway permits may be required on a case-by-case basis.
11. The engineer of record shall file the as-built survey with the Public Works Department upon completion of constructed improvements.
12. The final as-built cover sheet at minimum shall be produced from the approved construction drawing. The as-built shall include, but not be limited to:
 - a. Transportation infrastructure
 - b. Traffic control infrastructure
 - c. Signage
 - d. Stormwater infrastructure
 - e. Pedestrian infrastructure
 - f. Street furnishings
13. All changes to final utility locations including horizontal and vertical locations shall be clearly shown and referenced to permanent surface improvements and include all manholes, hydrants, valves, valve boxes, and structures.
14. As-built surveys shall also document actual installed pipe materials.
15. As-built surveys shall clearly show and document all field changes of dimension and detail.
16. As-built surveys shall include all details not on the original drawings, but constructed.
17. As-built Digital Submittal Requirements:
 - a. Must be prepared by a FL licensed professional surveyor.
 - b. Must have coordinate systems assigned.
 - i. Horizontal: State Plane NAD 83
 - ii. Vertical: NAVD 88
 - iii. Submittal must be in digital file format. A paper copy can accompany the digital file(s) but is optional.
 - iv. Both paper and digital copies must be signed and sealed.
 - c. Digital file submittal shall be in the following formats:
 - i. Adobe PDF file.
 - a) Minimum 300 DPI.
 - b) PDF must be saved in the native page size.
 - c) Submit one pdf file that includes all pages of the as-built.
 - d) Files must be clear and legible.
 - ii. AutoCAD or ArcGIS files.
 - a) AutoCAD DWG file (2013 and above).
 - 1) Includes XREF files.
 - (a) Utilize relative path for XREF files.
 - 2) Must be drawn in Model Space.
 - b) ArcGIS Geodatabase file.
 - 1) Provide data using the Cityworks schema.
 - c) Utilize the Public Works Digital Geographic Information System and CADD Standards and Requirements for as-built.

8 Construction

8.1 Objective

The purpose of this Chapter is to describe the requirements for construction improvements within City ROW, easements or any other City-maintained properties or properties intended to be turned over to the City for maintenance in the future.

All work within the aforementioned areas shall be constructed in accordance with the FDOT Standard Specifications (Division II and Division III) and the FDOT Standard Plans except as modified herein; if the provisions contained herein conflict with any FDOT requirements, the provisions herein shall prevail. Whenever, in the Florida Department of Transportation's Standard Specifications for Road and Bridge Construction, the following terms or their pronouns occur, they shall be defined as follows:

Department of Transportation: City of Gainesville, Florida, or its duly authorized representative.

State Highway Engineer, State Transportation Engineer, District Engineer, Engineer of Materials and Tests, Engineer, Inspector: The City of Gainesville City Engineer.

8.2 ROW Permits

All construction work in the City ROW, easements or City maintained properties would require permit(s) prior to beginning work. A permit is required whether the construction work is temporary or permanent.

8.2.1 City ROW Use Permits

City ROW Use Permits in the form of an Obstruction of Right-of-Way Permit or a Utilities in Right-of-Way Permit are issued by the Public Works Department.

1. Obstruction of Rights-of-Way: City of Gainesville Code of Ordinances, Chapter 23, Article V. - Public Rights-of-Way Obstructions requires any person or entity wanting to obstruct a City Right-of-Way (including temporarily obstructing the general movement of vehicular or pedestrian traffic, as well as any digging or excavation) must first obtain a permit from the Public Works Department.
2. Utilities in Rights-of-Way: Code of Ordinances - Chapter 23, Article VI. - Public Rights-of-Way Use by Utilities requires that any person, entity, or communications services provider wanting to install or maintain a communications facility in a city right-of-way be required to register prior to applying for a permit. Upon an effective registration, a Utilities in Rights-of-Way Permit must be obtained prior to performing any work in a city right-of-way.

8.2.2 City Building Permits

City Building Permits are required for the installation or replacement of driveway aprons, curbs, sidewalks, and stormwater systems are issued by the Building Department.

8.2.3 Other Permits

Permits from federal, state and local regulatory agencies may also be required. These may include City of Gainesville, FDEP, Water Management District, FDOT, Alachua County, Florida Division of Forestry, etc. Permits must be approved prior to beginning work in the City ROW, easements and City maintained properties.

8.3 Construction Activities

8.3.1 Preconstruction Meeting

All work in City ROW shall require a preconstruction meeting or conference between the Owner, Contractor, Design Engineer and City Engineer or designee prior to beginning work. A less formal onsite meeting may be allowed for minor projects.

8.3.2 Inspections

1. Gainesville Public Works Department Inspectors and staff must be granted access to all City of Gainesville permitted sites.
2. Regular hours for inspections are Monday through Friday from 7:00 AM through 3:30 PM.
3. Inspections outside of normal work hours will be by appointment only. Inspections are to be scheduled one business day (24 hours) in advance of the required inspection. Inspection staff contact information is provided on the permit.

8.3.3 Site Housekeeping

1. Stockpiles of materials shall not be placed within the ROW or easements without a ROW obstruction permit.
2. Stockpiles of excavated topsoil or fill material shall be located such that site drainage or waterways are not obstructed.

8.3.4 Traffic Control

1. A detailed traffic control plan is required for all work impacting roadways, trails or sidewalks. The plan shall be submitted with the ROW Permit and approved by the Public Works Department prior to the start of work.
2. The Contractor is to provide a Certified Worksite Traffic Supervisor in accordance with FDOT Standard Specifications (Section 102 and 105). The Contractor shall provide the Engineer with a copy of the certification(s) prior to the beginning of the work. No work shall begin until the traffic control is set up and satisfactorily inspected by the Worksite Traffic Supervisor.
3. The Contractor shall provide a written request to the City for all traffic control initial set ups or subsequent plan changes. Allow a minimum of 14 days for approval of major set ups or plan changes and 7 days for minor set ups or plan changes. No closures will be set up without approval from City of Gainesville project staff.
4. Those certified in MOT shall design Traffic Control Plans (TCP). TCP shall include configuration traffic control devices, detour routes, notifications, schedules, responsible field contact, etc. FDOT Standard Plans 102 and MUTCD may be utilized as applicable.

8.4 Stormwater

8.4.1 Erosion Control

1. A stormwater pollution prevention plan shall be submitted in accordance with the Florida Department of Environmental Protection's requirements of Rule 62-621.300(4) F.A.C. National Pollution Discharge Elimination System (NPDES) Generic Permit for Stormwater Discharge from Large and Small Construction Activities. See Sections 3.11 and 3.12 for additional requirements.
2. The NPDES generic permit for construction activity must be posted on site at all times.

8.4.2 Dewatering Activities

A detailed dewatering plan is required for all dewatering activities on the project. The plan is to be submitted with the ROW Permit and approved by the Public Works Department prior to the start of work.

1. The dewatering plan shall include the following:
 - a. A Site Map identifying the site location and the proposed discharge location.
 - b. Type of dewatering proposed (i.e., well point, sump pump, etc.)
 - c. Rate and duration of the activity.
 - d. Hours of operation and decibel levels must comply with City Noise Ordinance.
 - e. Identification of any contamination or pollution on site.
 - f. Types of control technologies proposed (i.e., sediment traps or basins, filters, chemical treatments, etc.)
 - g. Types of monitoring to be implemented.

8.4.3 Drainage Structures and Pipe

1. Storm sewer piping and structures shall be manufactured and installed in accordance with the FDOT Standard Specifications for Roadway and Bridge Construction, the FDOT Design Standards (Roadway Index), and the FDOT Drainage Manual.
2. A copy of the engineer approved shop drawings shall be submitted to Public Works for all pipes and structures to be maintained by the City. Submit shop drawings upon EOR approval to Public Works to confirm conformance with approved plans.
3. The manufacturer shall stamp all structures and pipes. City staff shall inspect the condition of all structures and pipes at time of delivery.
4. Storm sewer piping materials other than concrete and polypropylene will be considered in special circumstances only and their use in City ROW will be on a case-by-case basis.
5. As such, if PP pipe is proposed to be utilized, independent calculations shall not be required if the proposed application meets the general notes and cover requirements in the FDOT Drainage Manual. If the application does not meet the general notes and cover requirements, then independent calculations shall be provided.
6. Post installation video inspections shall be required for all pipe in the City right-of-way and the cost shall be borne by the contractor. A general note to this effect must be included in all plan sets.
7. City staff shall inspect all structures and pipes prior to backfilling to ensure proper line, grade and joint tolerances.

8. The Contractor shall provide a proctor density for all backfill materials. If on site material is to be used in the backfill operation, City inspection staff shall decide where proctor density samples are to be taken.
9. Backfill compaction shall be density tested per FDOT specifications by the Contractor, and all proctor and density reports shall be submitted to the City.
10. City staff shall inspect structures before and after the pouring of inverts.

8.4.4 Stormwater Basins

1. Inspection
 - a. City staff shall inspect all basins before sodding and/or seeding or before covered such as in the case of underground systems.

8.4.5 Underdrain

Roadway underdrain design once approved or required by City Engineer, shall be installed per FDOT Standard Plans 440-001 Type II.

8.5 Stormwater As-built Survey

The survey shall be in accordance with standards identified in Section 7.4.

8.6 Utility Work

Utility work shall comply with FDOT's Utility Accommodation Manual (UAM) and this manual. Below are some City utility requirements including some clarifications and exceptions to the UAM and other referenced FDOT standards.

1. Cutting of the asphalt surface of an existing City maintained roadway is discouraged and will only be allowed after the pavement is 5-years old without extenuating circumstances.
2. Pavement cuts that are allowed shall have the asphalt surface replaced within 24 hours, with open cut restoration performed in accordance with most current edition of FDOT Standard Plans utilizing the flowable fill option.
3. The dimensions of replacement asphalt pavement sections will be at the discretion of the Public Works Department. Small and oddly shaped patches are strongly discouraged.
4. Underground installations placed parallel to and within the roadway may constitute complete reconstruction of the roadway and more extensive design and coordination requirements. The City Engineer will make this determination.
5. All underground utilities installed within City ROW will be installed to a depth meeting the minimum requirements of this manual; however, never less than the minimum depth of 36 inches below finished grade when installed beneath the pavement and 30 inches below finish grade when installed outside the limits of the pavement.
6. Underground crossings of existing roads by jacking, boring, or directional bore are encouraged and open cut trenching will only be allowed on a case-by-case basis and as approved by the City Engineer. No missile bores, stitch boring, or similar shall be permitted.

7. All crossings installed either by direct bury or by boring shall have the ends of the casing no closer than 8 feet from the edge of the pavement on rural roads with paved shoulders, 13 feet on rural roads without a paved shoulder, and no closer than 5 feet from the back of the curb on a curb and gutter roadway. Casing lengths may be required to be longer in order to facilitate known future widening or reconstruction. All jacked, bored, or directional bored crossings are subject to require pressure testing to a minimum of 20 psi for 24-hours, prior to the installation of the utility line, if there are any concerns about the integrity of the casing after installation.
8. Per Section 3.16.6 Casing Requirements of the UAM, the UAO shall provide casing for underground utilities (whether longitudinal or crossing) within toes of the front slopes when any the following conditions exist:
 - a. The underground utility does not meet the requirements in UAM Section 3.16.3 or UAM Section 3.16.4.
 - b. The underground utility contains flammable gases or fluids and does not meet the requirements of 49 CFR, Part 192, or 49 CFR, Part 195.
 - c. When venting is necessary, the UAO shall vent the casing at or outside the R/W line.
9. City of Gainesville Public Works Department shall be notified 24-hours prior to the start of a roadway crossing by directional bore or by jack and bore. The assigned inspector and the utility contractor making the crossing shall meet on site prior to the excavation of any bore pits. The area shall be evaluated to prevent damage to any underground drainage structures, underdrain, sidewalk, or any other structural portion of the roadway.

8.7 Earthwork

1. Earthwork shall conform to FDOT specification section 120 Earthwork and Related Operations for LAP (Off-System) (REV 1-8-18) (FA 1-9-18) as modified herein.
2. All delivery tickets shall contain the approved pit/source information and be available for review on site and submitted to the City.
3. Subgrade, curb pad and base inspections shall be performed to ensure proper grade, finish and densities. If two lifts are required, each lift shall be inspected separately.
4. A-4 material is prohibited in soil envelope.
5. Compaction under wet conditions: Backfill without compaction shall only be allowed after normal dewatering methods have been attempted and failed, and with written authorization from the City Engineer.
6. The Contractor shall perform all sampling and testing required by the specification (City and Contractor requirements). All costs shall be borne by Contractor or Developer.
7. All required fill and embankment within the ROW shall be documented within a FDOT type density Log book, compiled and maintained by the contractor, and available for review by the Public Works inspector at all times and immediately upon request. The log book shall be prepared and reviewed for compliance to specifications by City Staff prior to any earthwork starting. It shall contain proctors, LBRs, soil classifications, etc. as required by specification. The log book shall be signed and sealed by the Engineer in responsible charge of Contractor Testing and provided to the Public Works Department for review and TCO / Acceptance as part of the closeout documents.

8. The Contractor shall perform all sampling and testing required by the specification (City and Contractor requirements). All costs shall be borne by Contractor or Developer.
9. If City funding from any source is used, embankment will be paid at the plan quantity. Where payment for embankment is not to be included in the payment for the excavation, and is to be paid for on a cubic yard basis for the item of embankment, the plan quantities to be paid for will be calculated by the method of average end areas unless the Engineer determines that another method of calculation will provide a more accurate result. The measurement will include only material actually placed above the original ground line, within the lines and grades indicated in the Plans or directed by the Engineer. The length used in the computations will be the station-to-station length actually constructed. The original ground line used in the computations will be as determined prior to placing of embankment and no allowance will be made for subsidence of material below the surface of the original ground.

8.8 Asphaltic Concrete

1. Asphalt work shall conform to FDOT specification section 334 Hot Mix Asphalt for LAP (Off-System) (Rev 1-26-15) (FA 1-29-15) as modified herein.
2. All asphalt shall be produced using a currently approved FDOT mix design.
3. The Contractor shall perform all sampling and testing required by the specification (City and Contractor requirements). All costs shall be borne by Contractor or Developer.
4. Prior to application of surface course, all drainage construction shall be complete to include:
 - a. Inlet inverts, inlet tops, storm drainpipes and outfalls, basins (to include grass-stabilized slopes) and swales.
 - b. Swale sections parallel to roadways may be left rough graded until installation of utilities in accordance with these specifications.
 - c. Fill required behind curbs must be in place and shoulder stabilization must be completed to the depth and LBR specified by design.

8.9 Concrete

1. Concrete shall be per FDOT specification section 344 Concrete for LAP (Off-System) (REV 12-20-11) (FA 2-27-12) as modified herein.
2. The City Engineer will randomly select a sample from each 200 cubic yards or one day's production for testing by the Developers / Contractors Quality Control Engineer to determine plastic properties and to make three 4 x 8 inch cylinders at 28 days to ensure that the design compressive strength has been met for the class of concrete as specified.
3. Maximum allowable transit time for concrete in Category 1 & 3 is 90 minutes.
4. The Contractor shall perform all sampling and testing required by the specification (City and Contractor requirements).
5. All costs shall be borne by Contractor or Developer.

8.10 Signals

1. All work shall be inspected and formally accepted by City staff.
2. An FDOT approved/certified traffic signal contractor shall perform traffic signal construction.
3. All materials provided shall be on the FDOT Approved Products List (APL).
4. All new construction shall be mast arms with horizontally mounted traffic signal heads.
5. Traffic signal heads shall be mounted on articulating astro-brackets with terminal compartments.
6. If the intersection being modified or rebuilt, existing functionalities related to intersection detection, video monitoring, and communications shall be preserved during the duration of the construction project. The use of infrared vehicle detection is prohibited. If any traffic control detection or communication devices are to be replaced, offline or downtime shall be less than 48 hours.
7. Any Traffic Control equipment, devices, and materials removed from service shall be maintained in good working condition. The return or disposal of any traffic control equipment, devices, and materials shall be at the discretion of the City.
8. All overhead sign messages must be approved by the City of Gainesville prior to fabricating overhead street name signs. Shop drawings shall be required.

8.11 Signs & Markings

1. All materials provided shall be on the FDOT's Approved Products List (APL).
2. Traffic signs shall be mounted on a uni-strut square post for combination Stop Sign and Street Name Signs (or equivalent as approved by the Public Works Department); all other signs shall use U-channel post.
3. All signs shall be bolted to the uni-strut post with stainless steel bolts and vandal proof stainless steel nuts.
4. Any specialized street name signs shall have a maintenance agreement or a license agreement. All cost associated with furnishing, installing and replacing shall be the responsibility of the permittee.
5. Signs installed in concrete:
 - a. A 6 inch long, 8 inch round, schedule 40 PVC pipe is to be buried so it is thru the entire concrete pour and each end is open and accessible.
 - b. The top opening of the sign tube is to be flush with the surface of the sidewalk and empty of debris for the entire length.
 - c. Where applicable, a cap shall be applied over the top prior to a post being installed so debris cannot enter the opening.
 - d. The pipe shall be buried not driven into the ground.
 - e. The pipe shall be installed before the concrete pour and the concrete poured around the pipe, leaving the top of the pipe exposed for sign installation.
 - f. The party installing the pipe is responsible for getting utility locates prior to installation of the pipe and maintaining clearances to any buried utilities.
6. Signs installed in bricks:
 - a. A 6 inch long, 8 inch round, schedule 40 PVC pipe is to be buried.

- b. The top opening of the sign tube is to be flush with the surface of the brick sidewalk and empty of debris for the entire length.
- c. Duct tape shall be applied over the top prior to a post being installed so debris cannot enter the opening.
- d. If a concrete base is poured for the bricks the PVC tube is to go the length of the bricks and the concrete so there is an opening of the tube at the top and one at the bottom below the concrete.
- e. The pipe shall be installed before the concrete pour and the concrete poured around the pipe, leaving the top of the pipe exposed for sign installation.
- f. Thermoplastic pavement markings and reflective pavement markers shall not be installed until the pavement has cured for a minimum of 14 days. Traffic paint in compliance with FDOT standards shall be installed in the interim.

8.12 Landscaping

- 1. Landscaping shall be per FDOT specification Section 580 Landscape Installation for LAP (Off-System) (REV 4-5-11) (FA 4-15-11) as modified herein.
- 2. Plant material maintenance period shall extend 180 days after certification of acceptability by the City. Maintenance shall include watering fertilizing and general care to establishment of landscaping materials.
- 3. Plant material guarantee (warranty) period shall extend 1-year after certification of acceptability by the City.
- 4. All work, including clearing and grubbing activities, shall be completed in accordance with ANSI A300 and Z133 standards.

8.13 Lighting

- 1. All lighting facilities in the Public right-of-way, including but not limited to poles, arms, boxes, conduit and fixtures shall be selected using the latest GRU Lighting Catalog and GRU Approved Electric System Materials Manual.
- 2. Lighting facilities shall be inspected by GRU and Public Works.
- 3. Existing Illumination levels shall be maintained during the duration of construction.

Definitions and Terms

Brush Barrier: A temporary sediment barrier composed of limbs, weeds, vines, root mat, soil, rock and other cleared materials pushed together to form a berm, located across a slope to intercept and detain sediment and decrease flow velocities.

Check Dams: Small, temporary dams constructed across shallow swales to reduce the velocity of concentrated flows, reducing erosion of the swale or ditch.

A “Closed Basin” means a watershed in which the runoff does not have a surface outfall up to and including the 100-year flood level.

Dust Control: Reducing surface and air movement of dust during land disturbance, demolition or construction activities in areas subject to dust problems in order to prevent soil loss and reduce the potentially harmful airborne substances.

Impervious Area: For purposes of applying permitting thresholds and exemption criteria, impervious area means surfaces that do not allow, or minimally allow, the penetration of water, including semi-impervious areas. Semi-impervious means land surfaces that partially restrict the penetration of water, such as porous concrete and asphalt pavements, gravel, limerock, and certain compacted soils.

Inlet Protection: The installation of various kinds of sediment trapping measures in or around drop inlet or curb inlet structures prior to permanent stabilization of the disturbed area.

Level Spreader: An outlet consisting of an excavated depression constructed at zero grade across a slope to convert concentrated, sediment-free runoff to sheet flow and release it onto areas of undisturbed soil stabilized by existing vegetation.

Mulching: Application of plant residues or other suitable materials to disturbed surfaces to prevent erosion and reduce overland flow velocities. Applicable to all seeding operations, other plant materials, which do not provide adequate soil protection by themselves, and bare areas, which cannot be seeded due to the season but which still, need soil protection.

Outlet Protection: The installation of paved and/or riprap sections and/or stilling basins below drain outlets to reduce erosion from scouring at outlets and to reduce flow velocities.

Permanent Seeding: Establishment of perennial vegetative cover by planting seed on rough-graded areas that will not be brought to final grade for a year or more or where permanent, long-lived vegetative cover is needed on fine-graded areas.

Redevelopment: Any demolition and/or reconstruction of the vehicular use area (excluding resurfacing and restriping) or building.

Riprap: A permanent, erosion-resistant ground cover of large, loose, angular stone installed wherever soil conditions, water turbulence and velocity, expected vegetative cover, etc., are such that soil may erode under design flow conditions.

Silt Fence: A temporary sediment barrier constructed of posts, filter fabric and, in some cases, a wire support fence, placed across or at the toe of a slope to intercept and detain sediment and decrease flow velocities from drainage areas of limited size; applicable where sheet and rill erosion or small concentrated flows may be a real problem. Installation shall be in accordance with the FDEP "Florida Stormwater Erosion and Sedimentation Control Inspector's Manual" and FDOT/FDEP "State of Florida Erosion and Sediment Control Designer and Reviewer Manual."

Sodding: Stabilizing fine-graded areas by establishing permanent grass stands with sod. Provides immediate protection against erosion, and is especially effective in grassed swales and waterways or in areas where an immediate aesthetic effect is desirable. In some cases where slopes dictate, pinning of sod will be required.

Sprigging: The establishment of vegetative cover by planting springs, stolons or plugs used to stabilize fine-graded areas where establishment with sod is not preferred.

Subsurface Drain: A perforated conduit installed beneath the ground to intercept and convey groundwater preventing sloping soils from becoming excessively wet and subject to sloughing.

Temporary Diversion Dike: A ridge of compacted soil located across a sloping disturbed area to divert off-site runoff away from unprotected slopes and to a stabilized outlet, or to divert sediment-laden runoff to a sediment trapping structure. Maximum effective life is 18 months.

Temporary Gravel Construction Entrance: A stabilized pad located at points where vehicles enter and leave a construction site to reduce the amount of sediment transported onto public roads by motor vehicles or runoff.

Temporary Sediment Trap: A small ponding area, formed by constructing an earthen embankment to detain sediment-laden runoff from small-disturbed areas for enough time to allow most of the sediment to settle out. Maximum effective life is 18 months.

Temporary Seeding: Establishment of temporary vegetative cover on disturbed areas by seeding with appropriate rapidly growing plants on sites that will not be brought to final grade for periods of 30 days to 1-year.

Temporary Slope Drain: A flexible tubing or conduit, used before permanent drainage structures are installed, intended to conduct concentrated runoff safely from the top to the bottom of a disturbed slope without causing erosion on or below the slope.

Top Soiling: Preserving and using topsoil to provide a suitable growth medium for vegetation used to stabilize disturbed areas. This would be applicable where preservation or importation of topsoil is most cost-effective method of providing a suitable growth medium. Not recommended for slopes steeper than 2:1.

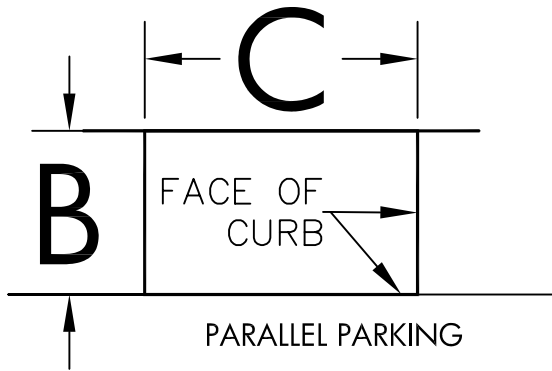
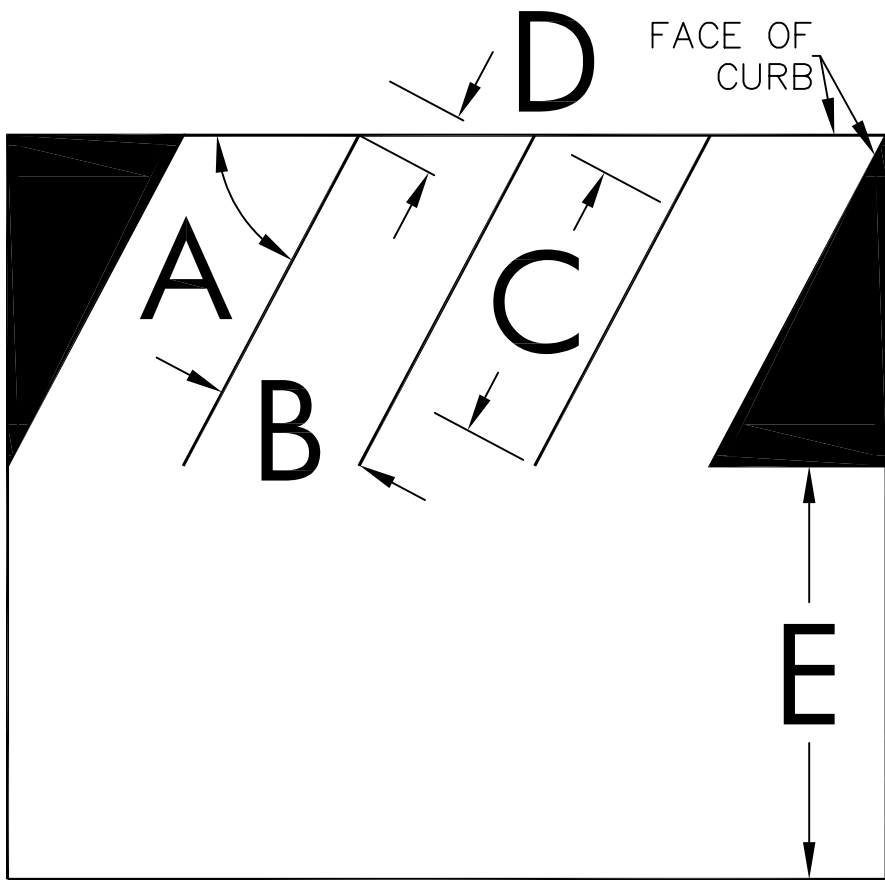
Tree Preservation and Protection: Protecting existing trees from mechanical and other injury during land disturbing and construction activity to insure the survival of desirable trees where they will be effective for erosion and sediment control and provide other environmental and aesthetic benefit.

Trees, Shrubs, Vines, and Ground Covers: Stabilizing disturbed areas by planting trees, shrubs, vines and ground covers where turf is not preferred. These plant materials also provide food and shelter for wildlife as well as many other environmental benefits. Especially effective where plants are desirable and turf maintenance is difficult.

Vegetative Streambank Stabilization: The establishment of appropriate vegetation to protect the banks from erosion.

APPENDIX B

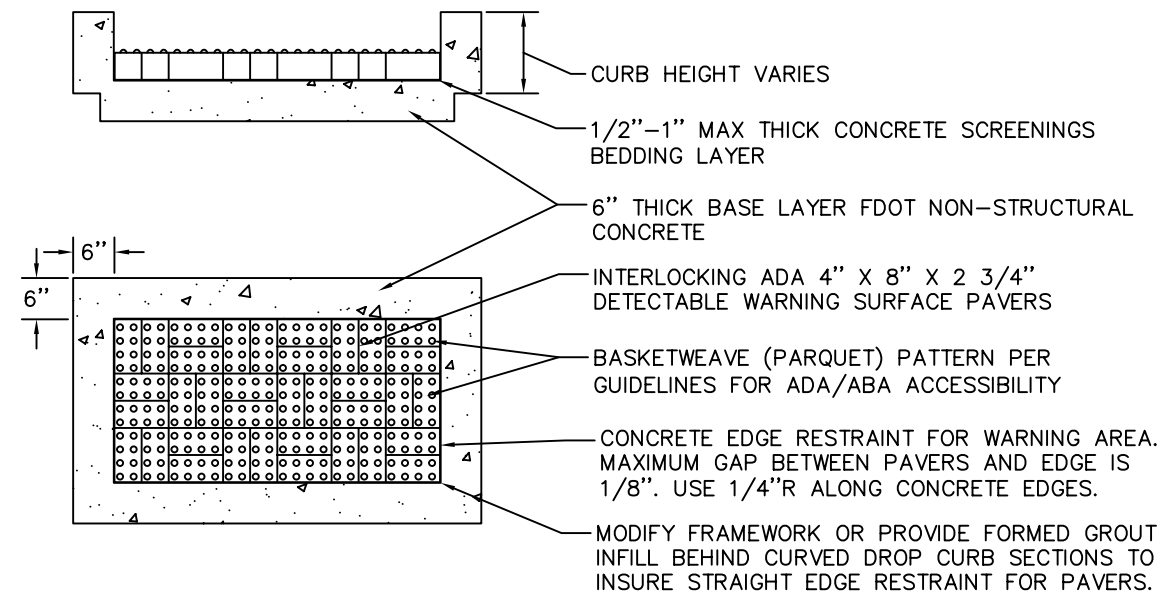
Standard Details



MINIMUM DIMENSIONAL STANDARDS FOR PARKING SPACES

A	B	C	D	E	
ANGLE	MIN. WIDTH	PAVED DEPTH	OVERHANG DEPTH	AISLE WIDTH	TRAFFIC CIRCULATION
90°	8'-6"	16'-0"	3'-0"	24'-0"	TWO-WAY
60°				13'-6"	ONE-WAY
45°				11'-10"	ONE-WAY
30°				11'-0"	ONE-WAY
0°	8'-0"	20'-0"	0'-0"	N/A	N/A

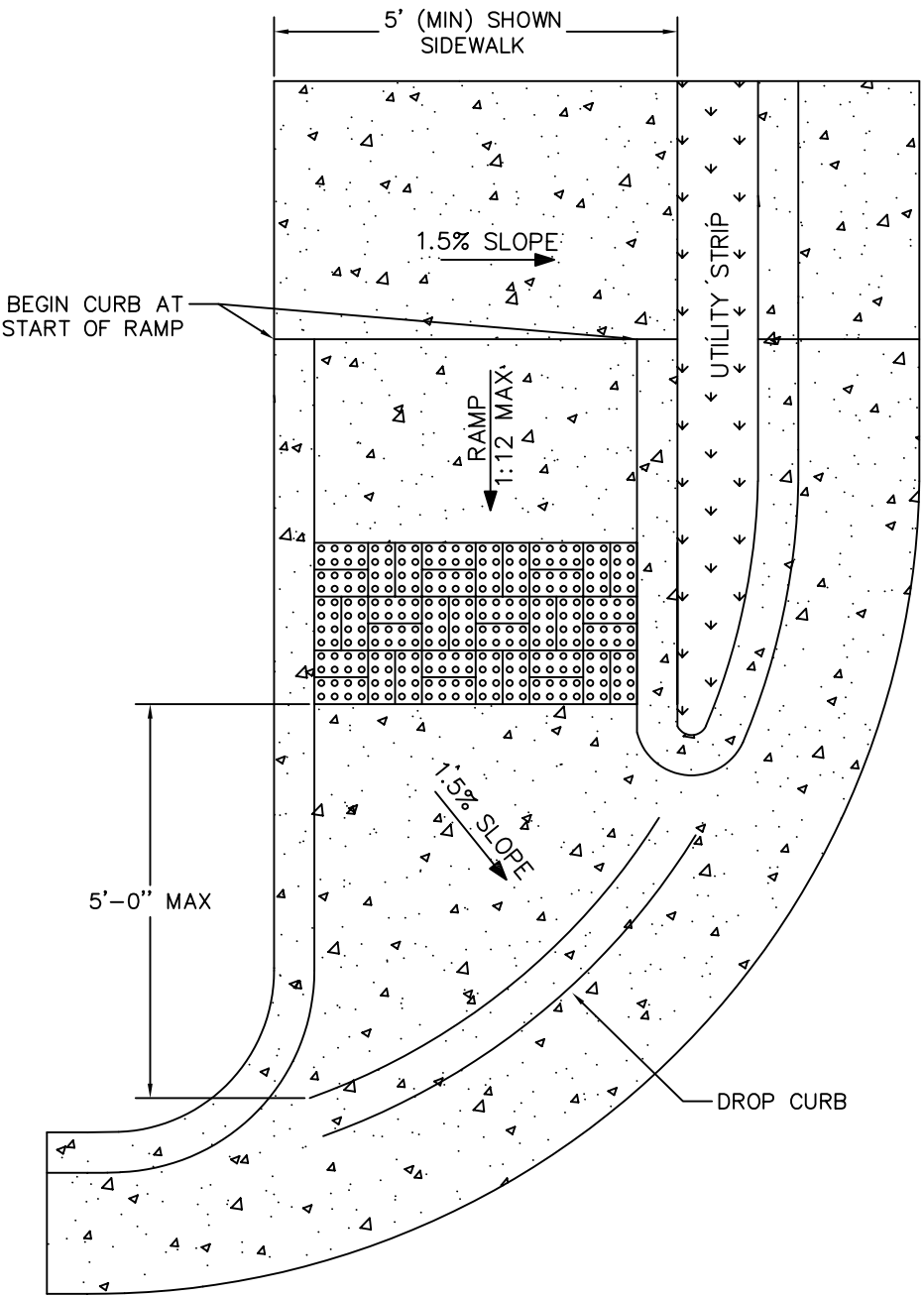
- GENERAL NOTES:
- 1. AISLE WIDTHS MAY BE REDUCED OR ENLARGED WITH AUTHORIZATION FROM THE CITY ENGINEER.
 - 2. BACK-IN ANGLED PARKING SHALL UTILIZE 45° ANGLE DIMENSIONS



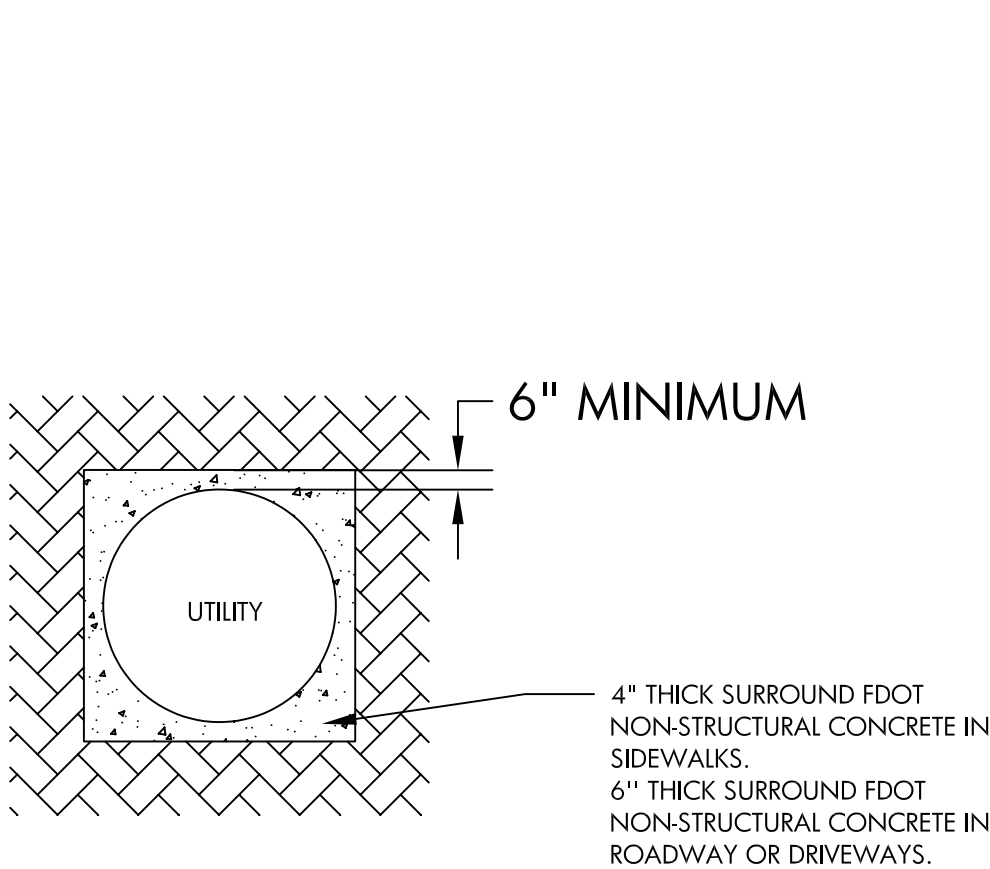
DETECTABLE WARNING DETAIL

DETECTABLE WARNING NOTES:

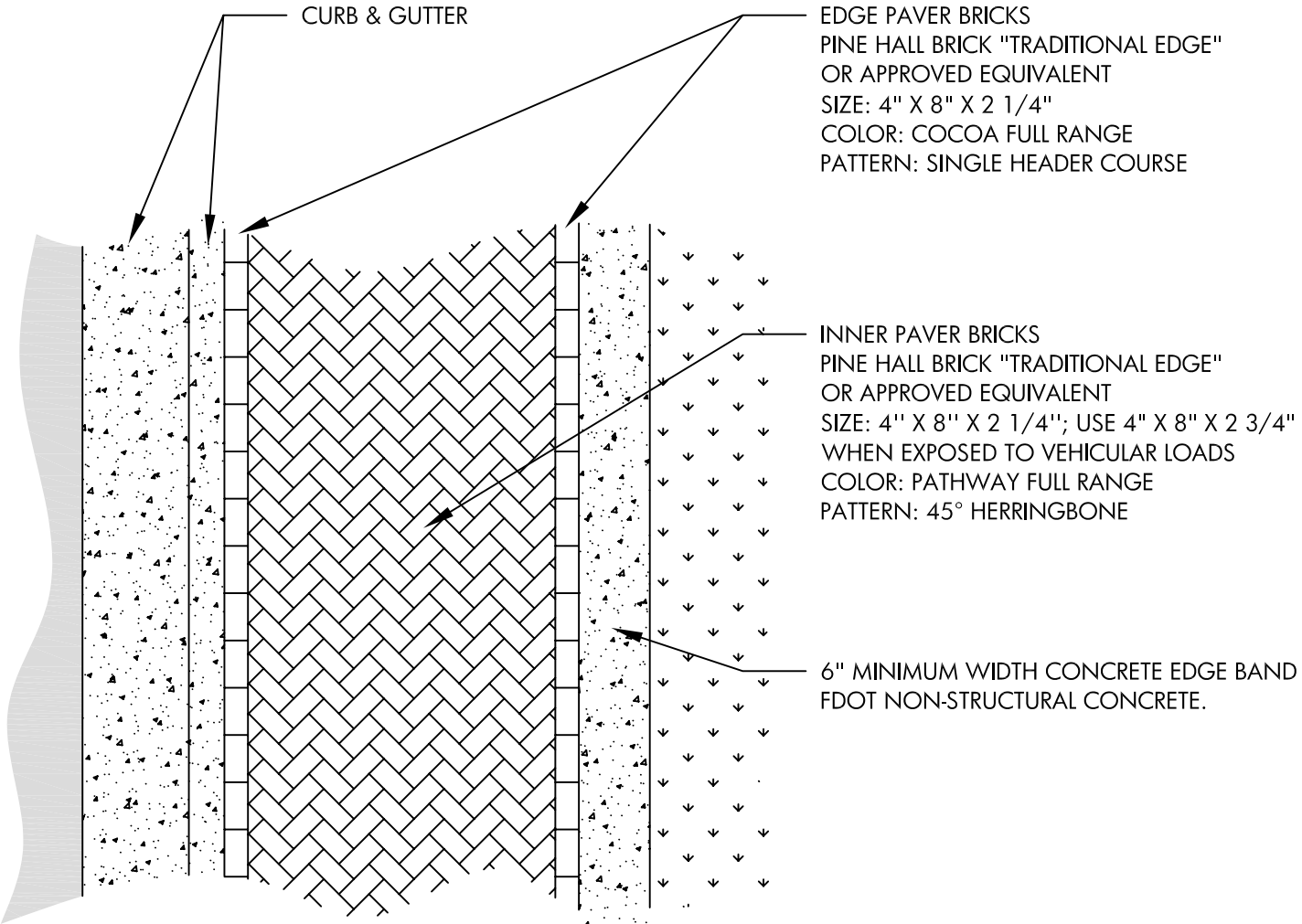
1. DETECTABLE WARNING SURFACE FOR THE RAMPS SHALL CONSIST OF INTERLOCKING 4"x8"x2 3/4" ADA DETECTABLE WARNING SURFACE PAVERS HAVING A MINIMUM DEPTH OF 2" WITH RAISED TRUNCATED DOMES WITH A DIAMETER OF NOMINAL 0.9 INCHES, A HEIGHT OF NOMINAL 0.2 INCHES, AND CENTER-TO-CENTER SPACING OF NOMINAL 2.35 INCHES. CONCRETE PAVERS ARE TO MEET ASTM C902, CLASS SX, TYPE I AND THE COLOR OF THE BRICK SHALL BE BRICK RED. ALL OTHER COLOR SCHEMES SHALL BE APPROVED BY THE CITY ENGINEER.
2. ALL UNITS SHALL BE SOUND AND FREE OF DEFECTS THAT WOULD INTERFERE WITH THE APPEARANCE OR PROPER PLACEMENT OF THE UNIT OR IMPAIR THE STRENGTH OR LONGEVITY OF THE FINAL STRUCTURE. ANY UNITS THAT ARE STRUCTURALLY DAMAGED DURING THE WORK SHALL BE IMMEDIATELY REMOVED AND REPLACED. THE PAVERS ARE TO BE LAID IN A TWO BY TWO BASKETWEAVE PATTERN, FLUSH WITH THE FINISH GRADE OF THE DOME SURFACE AND HAVE GAPS BETWEEN 1/16" AND 1/8". CUT PAVERS (MASONRY SAW ONLY) SHALL BE NO SMALLER THAN ONE-THIRD OF A WHOLE PAVER.



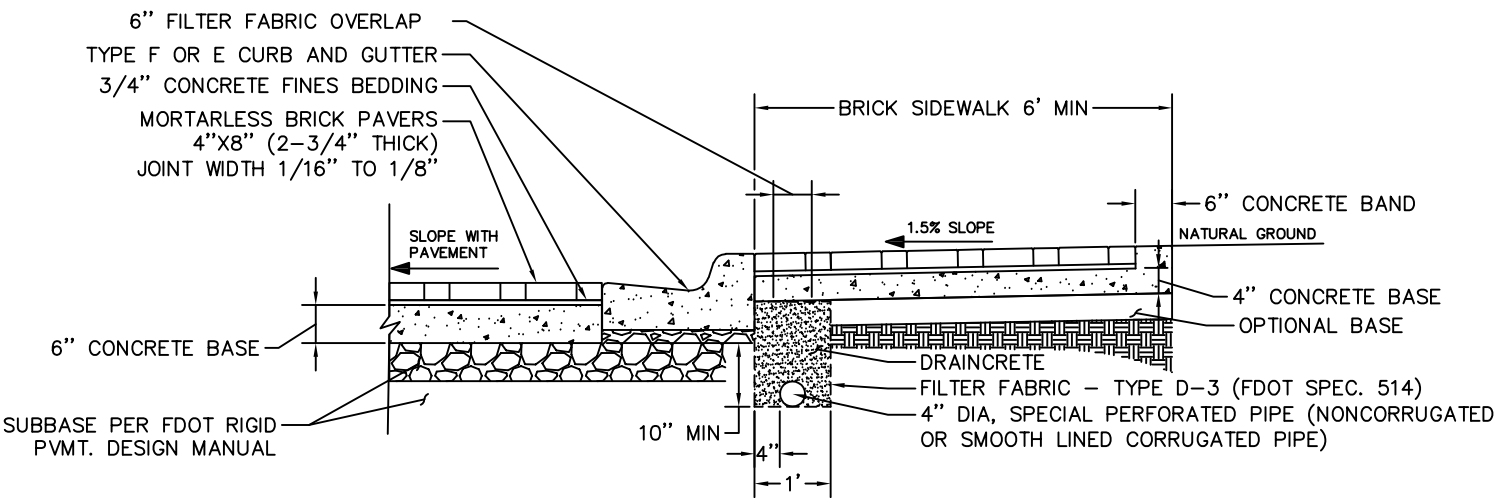
CURB RAMP DETAIL



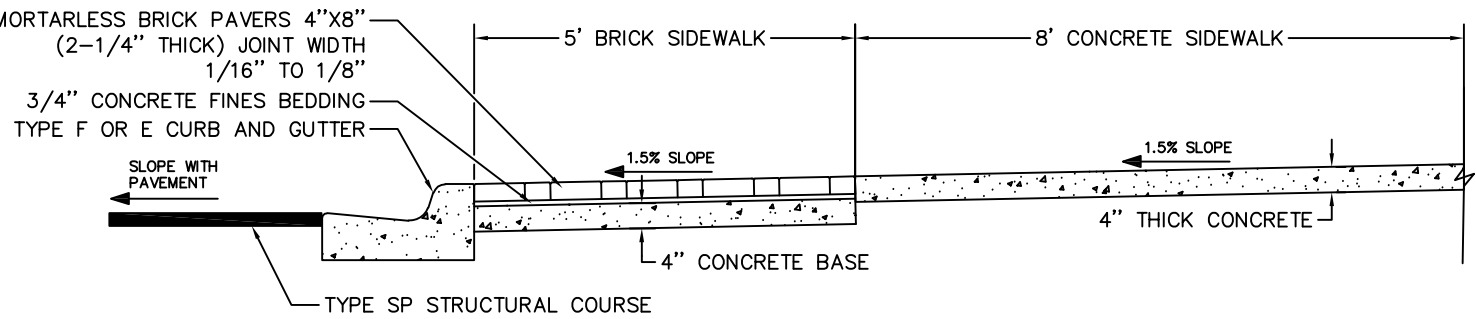
UTILITY STRUCTURE CONCRETE SURROUND DETAILS



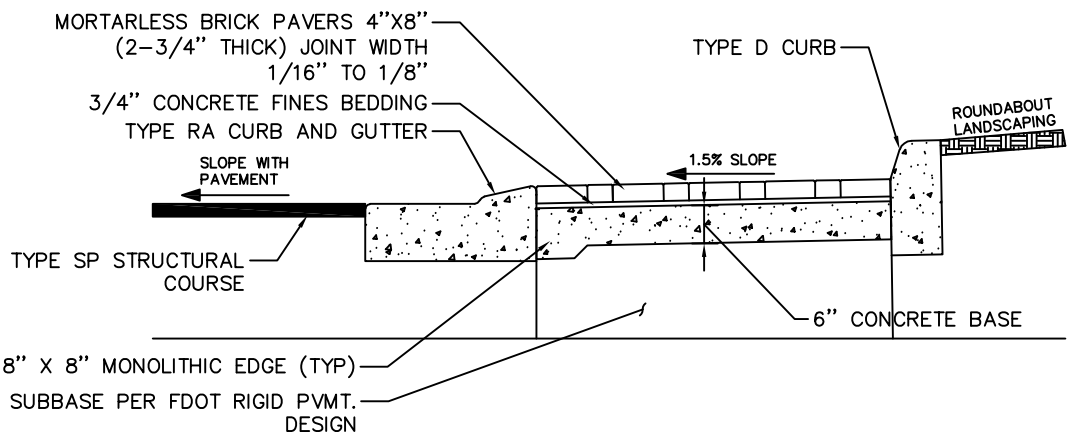
BRICK SIDEWALK DETAILS



BRICK ROADWAY SECTION

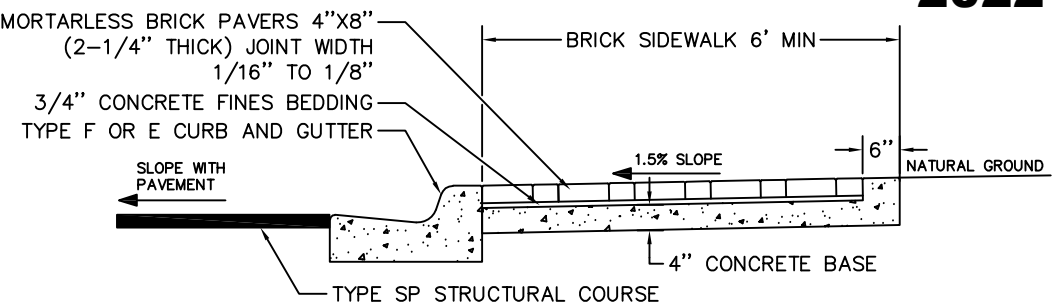


BRICK & CONCRETE SIDEWALK SECTION

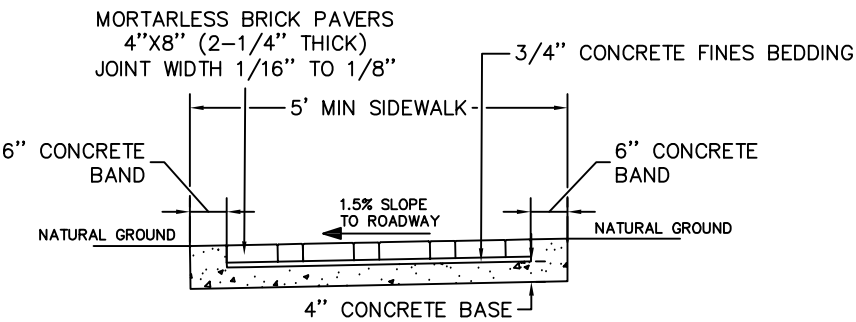


TRUCK APRON SECTION

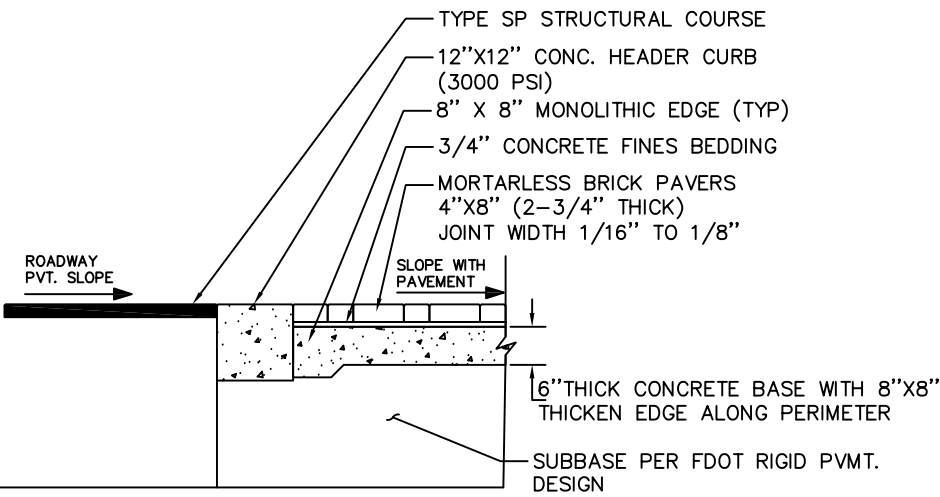
PROVIDE 1/8" JOINTS (TOOL ONLY) AT LANE LINES AND 1/2" EXPANSION JOINTS AT GUTTERS



BRICK SIDEWALK SECTION



BRICK & SIDEWALK SECTION NOT ADJACENT TO CURBING

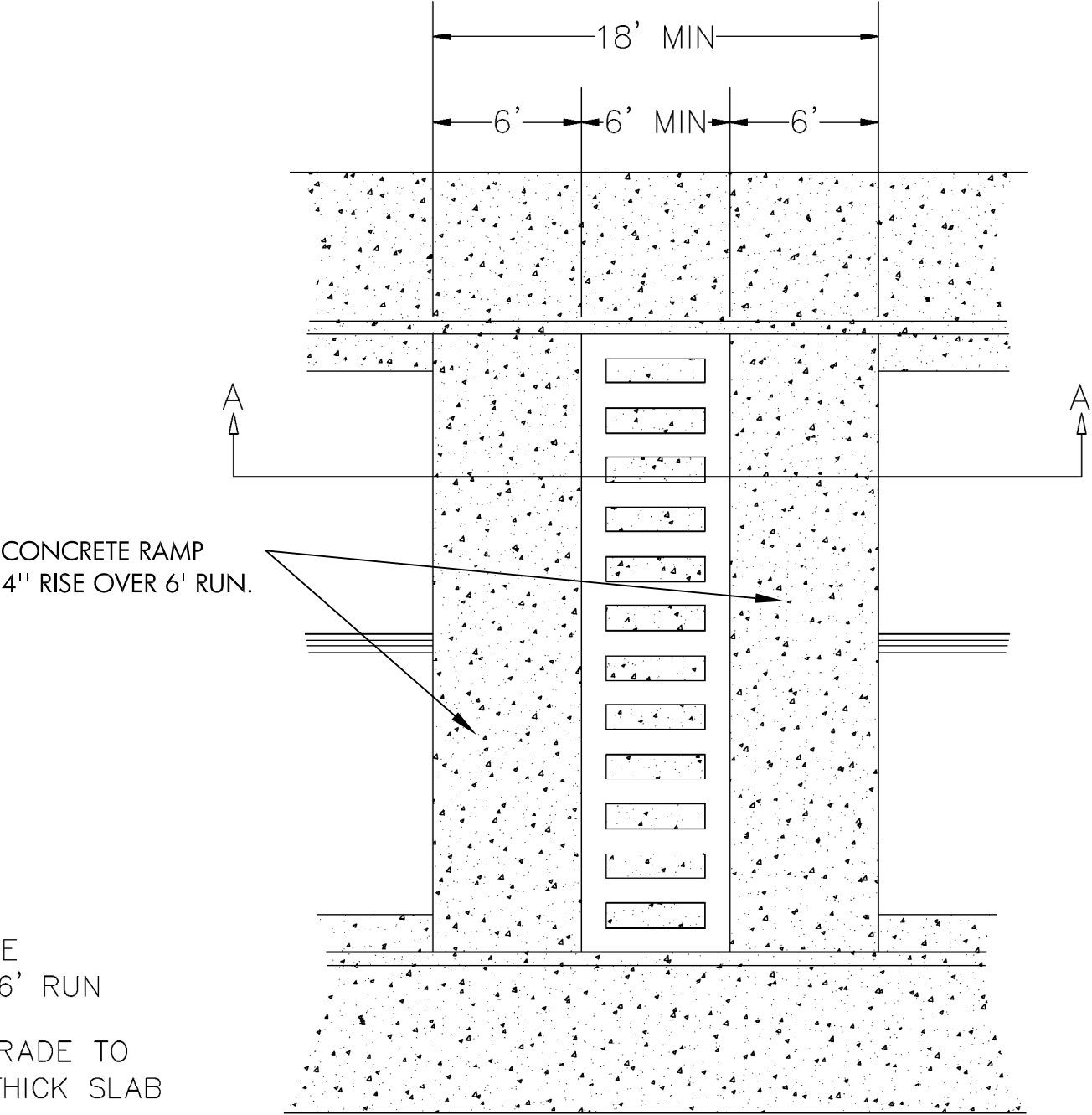
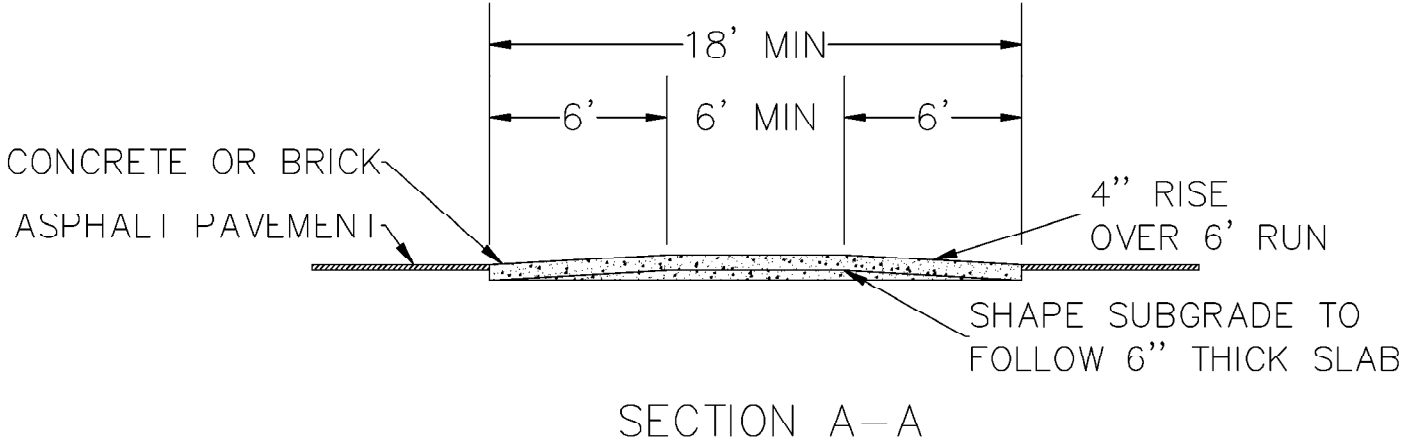


CROSSWALK SECTION

EDGEDRAIN REQUIRED

GENERAL NOTES:

- 1. IF SIDEWALK AT BACK OF CURB, CROSSWALK MUST MEET AT TOPS OF CURBS OR PROVIDE CURB CUTS TO TIE INTO SIDEWALKS.
- 2. ALL GRADES SHALL BE ADA COMPLIANT.
- 3. FLAT TABLE SURFACE MAY BE CONCRETE, BRICK, OR ASPHALT DESIGNED IN ACCORDANCE WITH CHAPTER 4. BRICK FLAT TABLE SURFACE SHALL BE PINE HALL BRICK "TRADITIONAL EDGE" OR APPROVED EQUIVALENT. SIZE: 4" X 8' 'X 2 3/4 ". COLOR: PATHWAY FULL RANGE. PATTERN: 45° HERRINGBONE
- 4. UNLESS PERMITTED BY THE CITY ENGINEER, ALL CONCRETE SHALL BE 6" THICK CONCRETE WITH 6X6 WWM OR 1.5 LB POLYPROPYLENE FIBER MESH PER CY.
- 5. SIGNING AND MARKING SHALL ADHERE TO FDOT STANDARDS.
- 6. SIDEWALKS SHALL BE ADJACENT TO BOTH ENDS OF THE CROSSWALK.
- 7. ASPHALT RAMPS ARE PROHIBITED. RAMPS SHALL BE CONCRETE OR BRICK DESIGNED IN ACCORDANCE WITH CHAPTER 4.
- 8. ALL VERTICAL DEFLECTIONS SHALL NOT EXCEED A FOUR INCH RISE OVER A SIX FOOT RUN.



GENERAL NOTES:

- 1. SPEED TABLE SHOWN. EXTRAPOLATE FOR RAISED INTERSECTIONS.
- 2. IF USED FOR INTERSECTIONS, PEDESTRIAN CROSSINGS SHALL BE IN THE RAISED PORTION OF THE INTERSECTION.
- 3. IF SIDEWALK AT BACK OF CURB, CROSSWALK MUST MEET AT TOPS OF CURBS OR PROVIDE CURB CUTS TO TIE INTO SIDEWALKS.
- 4. ALL GRADES SHALL BE ADA COMPLIANT.
- 5. FLAT TABLE SURFACE MAY BE CONCRETE, BRICK, OR ASPHALT DESIGNED IN ACCORDANCE WITH CHAPTER 4. BRICK FLAT TABLE SURFACE SHALL BE PINE HALL BRICK "TRADITIONAL EDGE" OR APPROVED EQUIVALENT. SIZE: 4" X 8" X 2 3/4 ". COLOR: PATHWAY FULL RANGE. PATTERN: 45° HERRINGBONE
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