



Engineering Review Application

Development Services
 8060 Station Hill Drive, Spring Hill, TN 37174
 Phone: (931) 451-0904

Date: _____ Project Name: _____

Planning Approval Date: _____ City Project No.: _____

Property Address/Location: _____

Engineer of Record (EOR) email: _____

Engineer of Record (EOR): _____
 Name (Printed & Signature)

Developer/Owner: _____
 Name (Printed & Signature)

Must Check One of the Following:

- City of Spring Hill In-House Review
- 3rd Party Review (see [On-Call-Engineering-Review-Agreement](#) for application and fee)

Required Materials Submitted	(Please Initial)
Review Fee Check (see attached for fees)	
Letter of Request/Narrative	
Construction Plans	
Drainage Report	
Civil Engineering Review Checklist (see attached)	
Geotechnical Report	
Planning Approval Letter with Approved Landscape Plans (PC Stamped)	
Sanitary Sewer Flow Monitoring Specs. / Allocation Letter (if applicable)	
Any applicable files to aid in review	



Requirements:

1. First submittal must be submitted to the above address with a USB port and check for the review to begin also submit via email to lhungerpiller@springhilltn.org

NOTE: I have read the attached checklist and have complied with all requirements listed and understand that this application **may be deemed incomplete if the submittal lacks any of the information required for the application type, and if incomplete it will not be reviewed until updated.** I also understand that other information may be requested by staff during review, relevant to the request. As the point of contact for this application I understand that it is my responsibility to share information with others as needed.

Applicant Name: _____
Name (Printed & Signature)

Address: _____

Phone Number: _____ Email: _____

Development Fees (08/05/2024)

PLAN REVIEW	FEE	
Plans Review - Commercial	\$175.00 + \$100.00 per acre	
Plans Review - Commercial - Revision/Resubmittal	\$200.00 per review after 2nd resubmittal	
Plans Review - Residential	\$175.00 + \$20.00 per Lot	
Plans Review - Residential - Revision/Resubmittal	\$200.00 per review after 2nd resubmittal	
Plans Review - Infrastructure Only	\$175.00 per review	
Plans Review - Infrastructure Only	\$50.00 per subsequent review	
Field Changes	\$100.00 per request	
GRADING PERMIT APPLICATION		
LDP Application (Fill site included)	1/2 acre or less	\$150.00
	1/2 to 1 acre	\$250.00
	1 to 4.99 acres	\$600.00
	5 to 19.99 acres	\$850.00
	20 to 49.99 acres	\$1,250.00
	50 to 149.99 acres	\$4,000.00
	150+ acres	\$4,000.00 + \$100.00 each acre
INSPECTION		
Water/Sewer/Stormwater Infrastructure (pipes and ditches)	\$1.00 per LF	
Detention Pond	\$100.00 per pond	
Bioretention Pond/SCM Measures	\$100.00 per pond	
Roadway Infrastructure (roads and sidewalks)	\$0.50 per LF	
Commercial Sidewalks	\$1.00 per LF	
Surety Reduction	\$150.00 per inspection; 1 free per year	
Water Line Testing	\$100.00	
Re-inspection	*can be charged at inspection rate for sites needing excessive re-inspections	
RIGHT-OF-WAY EXCAVATION		
ROW Application	\$150.00	
DRIVEWAY PERMIT		
Driveway Application - Commercial	\$150.00	
Driveway Application - Residential	\$100.00	
Driveway Application - Residential Extension	\$50.00	
INSPECTION INDIVIDUAL VALUES (RE-INSPECTION)		
Storm Pipe	\$1.00 per LF	
Detention Pond	\$50.00 per pond	
Bioretention Pond	\$50.00 per pond	
Ditch	\$1.00 per LF	
Proof Roll	\$0.50 per LF	
Sidewalk	\$1.00 per LF	
FLOOD STUDY SUBMITTAL		
Floodplain Development Permit	\$150.00	
Flood Study Submittal	\$100.00	



Civil Engineering Plans Review Checklist

Revised - Tuesday, September 20, 2022

Utilize the following checklist as a guide only. The checklist is NOT a substitute for the Unified Development Code ("UDC") and only intends to summarize the UDC in a clear and cogent manner. To the extent that the checklist is in the conflict in any way with the UDC, the UDC takes precedence. It is incumbent upon the engineer of record to meet or exceed applicable UDC requirements, general engineering standards, and all applicable federal, state, and local laws and requirements.

REQUIRED FOR ALL PROJECTS:

- 1.1** Written project narrative/report of the proposed development that discusses all existing and proposed conditions and utilities including conceptual layouts for future phases if the development is planned to be phased. UDC Table 13-3, 13-4, & 17-2.
- 1.2** All plan sheets shall be sealed by the engineer of record. UDC Table 13-3, 13-4, & 17-2.
- 1.3** Provide a drainage report and narrative of the proposed development. UDC Table 13-3, 13-4, & 17-2.
- 1.4** Provide a Geotechnical Report for pavement designs as requested by the Planning Department. UDC 15.6.F.
- 1.5** Provide a general note on the plans stating all improvements will be completed in compliance with all the City of Spring Hill's specifications.
- 1.6** It is required that a preservation area adjacent to all watercourses two times the water course width, be designated as a water quality buffer zone. UDC 15.9.C.4.
- 1.7** Floodplain encumbered properties will be required to provide a Flood Study including a hydrologic and hydraulic analysis, and a downstream analysis/assessment showing no adverse impacts to adjacent, upstream, and downstream properties and structures including culverts, bridges, and buildings. A LOMR/CLOMR may be required. UDC 7.5 & UDC 15.9.E.
- 1.8** A hydrologic and hydraulic downstream analysis and/or capacity analysis will be required by all developments proposing no detention and/or conveyance to existing storm sewer



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facility showing no adverse impacts to adjacent, upstream, and downstream properties and structures including culverts, bridges, and buildings. UDC 15.9.E.

- 1.9** RV Parks must have an evacuation plan if built within the floodplain. NFIP CFR Title 44.
- 1.10** Provide Topography of existing conditions with slopes called out throughout the site to confirm the development is not within a hillside preservation area. UDC 7.6.
- 1.11** Fire apparatus access roads must be designed in accordance: with a minimum of 75,000 pounds, 25 feet width, maximum 10% grade, 25 and 50 feet inside and outside radii, and dead-end criteria. UDC 16.3.G.
- 1.12** Fire apparatus roads must be provided by the UDC and IFC: provide turnaround for fire trucks, include hydrant to hydrant spacing, show the building to fire lane spacing (150'), hydrant to FDC spacing, call out the fire lane specifically using a stipple pattern, dead-end fire lanes called out with length dimensions and turnarounds dimensioned if applicable, pavement section, fire lane striping or signage as applicable, overhead power lines called out and shown, fire lane and radii labeled with a detail of the fire lane striping and signage. UDC 16.3.G.
- 1.13** The fire codes official is authorized to require more than one fire apparatus access road based on the potential for impairment of a single road by vehicle congestion, condition of the terrain, climatic conditions, or other factors that could limit access. IFC 503.1.2.
- 1.14** Provide benchmark coordinates and datums. UDC 17.7.B.1.
- 1.15** NOTE: Development is defined as any man-made change to improved or unimproved real estate, including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavating, drilling operations, or storage of equipment or materials. UDC 7.5.C
- 1.16** Property Owners Association/HOA must provide documentation of ownership. UDC 15.5.D.
- 1.17** Provide a lighting photometric plan showing footcandle readings every 25 feet within the lot or site, and 10 feet beyond the lot lines are required for commercial, multi-family, and townhouses. UDC 9.2. A.



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REQUIRED FOR TRANSPORTATION RELATED IMPROVEMENTS:

- 2.1** Right-of-way design and construction including displaying both horizontal and vertical curve data and street centerlines at proposed street curvature points must also be per the standards of TDOT, AASHTO, MUTCD, and NACTO. UDC 16.1.B & 16.5. A.
- 2.2** All curb, gutter, and sidewalk concrete materials must be Class A as per Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction, Section 604.03. UDC 16.5. B.7.
- 2.3** Provide plan and profiles of all proposed streets, including sidewalk and multi-use trails, which must be at a scale of 1" = 50' horizontal and 1" = 5' vertical or larger with the profile view directly under the corresponding plan view. UDC Tables 13-3, 13-4, 17-2.
- 2.4** Provide plan and profiles of all sidewalks and multi-use trails if no roadway improvements are proposed, at a scale of 1" =50' horizontal and 1" = 5' vertical or larger with the profile view directly under the corresponding plan view. UDC Tables 13-3, 13-4, 17-2.
- 2.5** The maximum grade is 15% for local and 8% for collector and arterial streets. Display street grades as a percent on all profile views. UDC 16.5. A.4.
- 2.6** Collector and arterial roadways must have a 24-inch concrete curb and gutter. Local roadways may utilize either a 24-inch concrete curb and gutter or an 18-inch extruded concrete curb. UDC 16.5. B.6.
- 2.7** Label all existing and proposed curb returns. The minimum curb radius at the intersection must be as follows: local streets connected to a collector or arterial: 12.5-foot radius, connector streets connected to a connector or arterial streets: 25-foot radius. UDC 16.5. E.4
- 2.8** Intersections must be designed with a flat grade wherever feasible. In hilly or rolling areas, at the approach to an intersection, a leveling area must be provided having not greater than a 2% grade for a distance of 60 feet, measured from the nearest right-of-way line of the intersecting right-of-way. The cross-slope on all public rights-of-way, including intersections, must be 3% or less. For vertical alignment, an extension of the through street cross slope must be carried back 100 to 200 feet each way from the intersection of the two street centerlines, and an allowance of 2% maximum intersection grade is permitted. UDC 16.5. E.
- 2.9** All driveways must be surfaced with durable all-weather material, such as asphalt, concrete, or other product. Pervious paving is allowed. However, in the AG, R-A, and R-



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R District, a gravel driveway is permitted with a paved driveway apron a minimum of 15 feet in depth, as measured from the right-of-way line. Display and appropriately label all driveway approaches. UDC 10.9.

- 2.10** Sidewalks, multi-use trails, or other pedestrian access improvements must be included as part of any arterial, collector, or local street, and as shown on the Major Thoroughfare Plan, Bicycle and Greenway Plan, or as determined by the Planning Commission during subdivision approval. Sidewalks are not required in the AG, R-A, and R-R Districts. Display all existing and proposed sidewalks and bicycle paths. UDC 16.6.
- 2.11** Show and dimensions turn lanes and deceleration lanes with associated storage and transition areas. UDC 16.5. C.
- 2.12** Display and label all curb and barrier-free ramps including surface color and texture treatment. UDC 16.5.
- 2.13** Display and label all existing and proposed guardrails and barricades for staff. UDC 16.5.
- 2.14** Dimension all stacking distances for staff to determine design conforms to and meets the TIS. UDC 10.3. F.
- 2.15** Dimension and label distances between driveways and intersecting streets including stopping sight distance measurements and calculations. Label and dimension the sight triangle and visibility clearances. State the roadway design speed for review purposes. Intersection Sight Distance example being TDOT RD01-SD-1. UDC 16.5.
- 2.16** Label all pavement construction (asphalt, concrete, etc.). UDC 16.5.
- 2.17** Provide and label concrete joints for construction. Joints to be per American Concrete Institute (ACI). Recommend Sawed Joints to be placed every 20' in all directions except at expansion joint or construction joint or at an average as close to 20' as reasonably possible. Longitudinal sawed joint to be placed at the center of pavement when there is no construction joint. The saw joint is to be continuous through the curb when applicable. Expansion joints are to be placed at the PCs of an intersection and then every 200' maximum thereafter. Provide joint details. UDC 16.6.
- 2.18** Call out pavement markings (one-way arrows, etc.) with paint material and color. Provide Pavement marking details and Signage Plans. UDC 16.
- 2.19** Provide Temporary Traffic Control Plans and a truck route from the highway to the site. UDC 16.



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- 2.20** Access Driveways should be profiled (example being AASHTO Figure 4-12 Driveway Vertical Alignment and Profile Elements). UDC 16.
- 2.21** Cul-de-sac to be no greater than 750 feet in length and be a minimum of 96 feet in diameter face of curb to face of curb, with ROW no less than 110 feet. UDC 16.3. F.1.
- 2.22** Provide fill compaction requirements, testing specifications, and frequency of testing. UDC 16.
- 2.23** All parking lots of 15 spaces or more must provide a pavement design by a licensed professional engineer. UDC 10.6. F.
- 2.24** Crosswalks of paving, brick paver, bituminous brick pattern stamping, or painted striping must connect landscaped areas and parking lot islands to building entrances to improve safe passageways for pedestrians. Curb cuts must be included on landscaped areas or islands where such crosswalks are located. UDC 10.6. K.
- 2.25** Dead-end parking lots are prohibited. A turnaround space is required, and the minimum depth and width of such turnaround space must be ten feet and designated with signs stating, "No Parking" and striped to indicate no parking permitted. UDC 10.6. J.



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REQUIRED FOR UTILITY RELATED IMPROVEMENTS:

GENERAL UTILITY IMPROVEMENTS:

- 3.1** Note that all TDEC approvals will be required before the pre-construction meeting.
- 3.2** Provide benchmarks at approximately 1,500-foot intervals based on NAVD88 and NAD83. Section B.8 of City of Spring Hill Sewer Specifications.
- 3.3** Label floodplain encroachments. Manholes constructed in the floodplain will be required to be sealed and vented per the wastewater specifications. UDC 4.5. A
- 3.4** Show and label all existing and proposed utilities, drainage features, lot lines, easement lines, and Rights of Way limits on plan views. Section B6 and B9 of City of Spring Hill Sewer Specifications.
- 3.5** Show, label, and station all manholes, junction boxes, valve boxes, water fittings, inlets, fire hydrants, and other surface features in plan and profile views. Section B6 and B9 of City of Spring Hill Sewer Specifications.
- 3.6** Include overall plan views of the water system and the sanitary sewer system layout for the entire development (including future phases). UDC 15.9.
- 3.7** Show and label and station water mains and sanitary sewers in both plan and profile views scaled at a minimum of 1" =50' horizontal and 1" =5' or 1" =10' vertical. UDC Table 17.2.
- 3.8** Display existing and proposed ground elevations at the centerline of water and sewer pipe spaced no greater than every 100 feet, specifically the calling out depth of cover including pavement thickness. UDC Table 17.2.
- 3.9** Label all water and sewer pipe sizes including thicknesses, measure separation from outside of the pipes, and include material types in their respective profile views. UDC Table 17.2.
- 3.10** Show and label all parallel and crossing utilities (including drainage features) in all profile views. UDC Table 17.2.
- 3.11** Call out backfill under the pavement in the water and sewer profiles. Show trench details with compaction requirements and label all sheeting, shoring, and bracing location. Deep manholes and mains will require trench boxing, etc. Provide details and notes denoting proper use of trench boxing. Provide fill compaction requirements, testing specifications, and frequency of testing to ensure proper compaction. UDC 15.9. I.10.



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- 3.12** Call out the method of pipe installation (bore or open trench). All borings will require profile views indicating and dimensioning enter and exit boring pits with the distances between the bottom of channels and the upper limit of the pipe casing. UDC 15.9. I.10.
- 3.13** Display casing and conduit for future utility crossings. UDC 15.9. I.10.
- 3.14** In addition to hard copies and electronic PDFs, provide the electronic plans and models to the City of Spring Hill for review (AutoCAD, AutoSketch, Visio, Generic CADD, or others).
- 3.15** Call out all hydrants, valves, manholes, utility poles, etc. They are proposed to be placed in the sidewalk area. Additional easements and meandering of sidewalks will be required to prevent obstructions on the sidewalk. Compliance with the applicable ADA standards will be required. UDC 15.9. I.10.

WATER IMPROVEMENTS:

- 3.16** Provide a minimum of two water feeds to proposed developments. Dead-end waterlines will not be accepted unless no other option is available. UDC 15.10.
- 3.17** Water mains will be required to be extended for future developments in coordination and as directed by staff. UDC 15.10.
- 3.18** Provide a water meter on all fire lines for townhomes, apartments, and condominiums. UDC 15.10.
- 3.19** Provide a double detector check valve in a backflow preventer vault when connecting fire lines to the water main. UDC 15.10.
- 3.20** Dimension and label distances from a fire hydrant to a fire hydrant and fire hydrant to FDCs as the hose lays. UDC 15.10.
- 3.21** Provide a general note on the plans stating all newly laid water pipes will be hydrostatically tested and disinfected by the City of Spring Hill's Water Specifications UDC 15.10.

SEWER IMPROVEMENTS:

- 3.22** Sanitary sewer systems must be designed for ultimate build-out conditions within the proposed development sanitary sewer basin and projected development served within the basin. UDC 15.11. I
- 3.23** Sewer lines must be located under the pavement in the center of roadways and outside flooding areas when possible and shall not be located within detention basins. Designed



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for uniform slope with a clear minimum distance of 10 feet separation between water lines. UDC 15.11.J and UDC 15.11. Q.

- 3.24** All manholes located in areas of special flood hazards must be flat top manholes with watertight rings and covers. UDC 15.11. R.
- 3.25** The energy gradient line must be maintained whenever a small sewer joins a larger sewer. This can be approximated as the 0.8 depth of both sewers. UDC 15.11. Q.
- 3.26** Four-foot diameter manholes can be used for pipes up to 18 inches. Five-foot diameter manholes must be used for pipes 21 inches in diameter and larger. UDC 15.11. R.
- 3.27** Services shall tie into sewer mains, and not into inline manholes. Provide slope of the service line and depth of service at the building cleanout. Change in direction will require a cleanout. UDC 15.11. S.
- 3.28** Provide flow direction arrows on the plan views. UDC Table 17-2.
- 3.29** Provide water lines and water service lines on the sewer plan and profile sheets. Identify all crossings as conflict crossings in the plan view. UDC 15.11.
- 3.30** Display all flow line invert elevations at all manhole connections and every 100 feet. UDC Table 17-2.
- 3.31** Show and label all grease traps per the City of Spring Hill's Fats, Oils & Grease Ordinance and per UDC 15.11. S.
- 3.32** Show and label all oil-water separators per the City of Spring Hill's specifications. UDC 15.11. S.
- 3.33** Provide a general note on the plans stating all manholes will be vacuum tested to a vacuum of 10 inches per the City of Spring Hill's sewer specifications. UDC 15.11. O.
- 3.34** Provide a general note stating all pipes will be low-pressure air exfiltration tested as specified in ASTM C828-80 per the City of Spring Hill's sewer specifications. UDC 15.11. O.
- 3.35** Provide a general note on the plans stating all new gravity sewer lines and service laterals shall be required to be inspected using CCTV video. UDC 15.11. G.
- 3.36** Provide a note where the "serviceability" of a lot or residence is questionable stating that the service tee is to be placed at the lowest possible elevation on the main line and the service line is to be laid on a minimum slope. The home builder is responsible for the location of the elevation of the end of the service line and setting building finished floor elevations such that gravity service is available. A sewer connection must be provided for each parcel or proposed lot. All service connections shall be shown as SDR 26 PVC



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(machine made only), four (4) inches for residential and six (6) inches for commercial. UDC 15.11.

- 3.37** Sewer pipe will be required to be SDR 26 PVC pipe or Class 250 ductile iron pipe as specified in City of Spring Hill Sewer Specifications.
- 3.38** SDR 26 PVC pipe shall have a minimum of 30 inches of cover on private property and 48 inches in paved areas subject to vehicular traffic. In general, sewers should be set at a minimum depth of five (5) feet and Sewer crossings shall have a minimum of 18 inches below the bottom of the culvert or conduit and the sewer line as specified by the City of Spring Hill Sewer Specifications. UDC 15.11.
- 3.39** Manholes shall be provided at a distance not greater than 350 feet for sewers 15 inches in diameter or less, 400 feet for sewers 18 inches and larger. UDC 15.11. R
- 3.40** Call out if the development proposes a lift station. All sheets that relate to the design and construction of a lift station must be differentiated from other sheets with the plan set. UDC 15.11.
- 3.41** NOTE: International building code requires slopes of 1/8 inch per foot for laterals of 3" to 6", which is 1.041667%. Recommend 1.5% to avoid issues with not meeting the minimum required slope in construction.
- 3.42** All sanitary sewer facilities (including manholes) located in a flood hazard area must be flood-proofed to the regulatory flood protection elevation. UDC 15.11. D.
- 3.43** Sewer lines must be extended to the property boundaries of the development to allow future connections to adjacent property. UDC 15.11. E.
- 3.44** Townhomes services are to be designed per UDC 15.11. S.8.
- 3.45** Sewage lift stations shall be designed per UDC 15.11. T.
- 3.46** Drop manholes cannot be used unless the invert elevations between the receiving pipe and the discharging pipe is more than three feet and the discharging pipe has greater than five feet of cover by 15.11. Q.3.



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REQUIRED FOR STORM SEWER RELATED IMPROVEMENTS:

- 4.1** Show, label, and station all storm sewers (including future phases) in plan and profile views at a minimum scale of 1" =50' horizontal and 1" =5' vertical. Provide separate land and profiles of storm sewers. List hydraulics on each segment of pipe profile that includes design flow and storm frequency event, Manning's roughness coefficient, full flow capacity, slope, depth, velocity, and $v^2/2g$. Plot and label the hydraulic grade line and friction slope when at or above full pipe flow. UDC 15.9. I.
- 4.2** Label storm sewer pipe diameter, box size, slopes, and type of materials for all storm sewer systems. Include details for all headwalls and flumes. UDC 15.9. I.
- 4.3** Label all energy dissipaters. Call out rock riprap size and specifications including underlying blanket thickness. Include all hydraulic data, dimensioning, and sizing calculations with construction details for all proposed energy dissipaters. UDC 15.9.
- 4.4** Show and label all existing and proposed utilities, drainage features, lot lines, easement lines, and Rights of Way limits on plan view. Section B6 and B9 of City of Spring Hill Sewer Specifications
- 4.5** Label all pipe sizes, inlets, manholes, junction boxes, inlets, connections, top-of-curb elevations, etc. in both the plan and profile views. UDC 15.9.
- 4.6** Show and label all existing and proposed contour lines (including the pavement) in the profile view. UDC 15.9.
- 4.7** Show and label flow line invert elevations and water surface elevations at the storm drain outfall in profile views at connections and spaced not to exceed 100 feet. UDC Table 17-2.
- 4.8** Provide dimensioned details of all non-standard junction boxes, headwalls, storm sewers, flumes, and manholes. UDC Table 17-2.
- 4.9** All storm sewer facilities to meet design standards. UDC 15.9. I.
- 4.10** Show and label drainage easements onsite and downstream as necessary to convey site drainage. UDC 15.7.C
- 4.11** All stormwater piping must have a minimum velocity of three feet per second. UDC 15.10. I.8
- 4.12** Show conveyance of the 100-year storm event. UDC Table 13-1.



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- 4.13 Show and label runoff and flow direction at all inlets. UDC Table 17-2.
- 4.14 Provide inlet capacity, including formulas used and inlet design computation tables. Inlets to be designed at 50% clogged. UDC 15.9. I.7

REQUIRED FOR BRIDGES AND CULVERTS:

- 5.1 A culvert or other drainage facility must be large enough to accommodate potential runoff from its entire upstream drainage area, whether inside or outside the subdivision. Necessary facilities will be sized based on the construction specifications and **assuming conditions of maximum potential watershed development permitted by any zoning regulations.** UDC 15.9. D.
- 5.2 Show and label geotechnical soil boring information on the plan view and provide a copy of the geotechnical report. UDC 7.6.11.H.
- 5.3 Plan and profile bridge or culvert crossing starting a minimum of 50 feet upstream of the structure and extending a minimum of 50 feet downstream of the structure. Label slopes, backfill, riprap design, design methods/calculations, pipe material, guardrail details, sidewalks, etc. UDC 16.5. B.4.
- 5.4 Provide all hydraulic calculations. Clearly state the culvert flow type (inlet, outlet, submerged, and unsubmerged). UDC 16.5. B.4.
- 5.5 Show, label, and state the tailwater elevation and computation. A short narrative or statement should be provided explaining why this elevation is used as the tailwater condition. UDC 16.5. B.4.
- 5.6 Show and label skew angle, and vertical and horizontal centerline alignments. UDC 16.5. B.4.
- 5.7 Provide bridge scour analysis. UDC 16.5. B.4.
- 5.8 Provide all electronic design files and state which program was used to run the design calculations. HEC-RAS is the preferred hydraulic calculation software. UDC 16.5. B.4.



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REQUIRED FOR DRAINAGE ANALYSIS:



6.1 Drainage report consisting of the following sections (as necessary): UDC 15.9.

- a. Executive Summary
- b. Introduction
- c. Data Sources (topographic, land cover and land use, soil cover, rainfall, FEMA FIRM reference, Upstream/downstream flood studies)
- d. Hydrology
- e. Methodology
- f. Model domain, platforms, conditions
- g. Pre-project and Post-project
- h. Ultimate (full buildout)
- i. Hydrologic Methods
- j. Watershed delineation
- k. Loss rate
- l. Baseflow
- m. Watershed lag time
- n. Rainfall to runoff transformation method
- o. Meteorological models
- p. Reach routing method
- q. Results
- r. Hydraulics
- s. Methodology
- t. Model domain
- u. Model state and method
- v. Modeling platforms
- w. Topographic data
- x. Manning's roughness coefficients, Expansion and Contraction coefficients
- y. Ineffective flow and Distributive flow
- z. Geometries
- aa. Storm Sewer Design
- bb. Detention Pond Design (including Hydrographs)
- cc. Downstream boundary conditions
- dd. Results
- ee. Conclusions



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6.2 All hydrologic analyses shall use NOAA Atlas 14 Point Precipitation Frequency Estimates.

6.3 Streamstats is a great tool for historic ungauged, unregulated stream flow data. The use of StreamStats must be justified as the following limitations preclude it from most design/modeling uses:

- a. "Flood-frequency prediction methods described in this report should not be applied to heavily developed basins or storm-sewer basins having greater than 10-percent impervious cover." Water-Resources Investigations Report 03-4176.
- b. "Annual-peak streamflow records, historical flood information, and selected basin characteristics for stream gages in the study area with 10 or more years of record through the water year 1999 were combined to form a database that was used to develop the prediction methods for use at unregulated sites in Tennessee." Water-Resources Investigations Report 03-4176. Stream stats utilizes 20-year-old flow values. With the development in Spring Hill being required to detain to the 25-year storm event, the 100-year storm event has been left unattenuated, increasing the 100-year storm events' peak discharge in streams and rivers throughout Spring Hill.
- c. Regulated is defined as having attenuating properties/structures (detention ponds, dams, culvert crossings, etc.)
- d. Hydrologic results are not proposed or ultimate flows.

6.4 Provide separate drainage area maps for existing, proposed, and ultimate (as necessary) conditions. UDC 15.9.

6.5 Show and label the Time of Concentration lines (broken down to flow type if using the velocity method). Please note that Sheet Flow length must either be based on engineering judgment with supporting data or use McCuen and Spiess approximate length equation (can be found in USDA NRCS Part 630 Chapter 15 – Time of Concentration manual, page 15-7, equation 15-9). Time of Concentration calculations and equations shall meet the USDA NRCS Part 630 Chapter 15 published in 2010. UDC 15.9. B.1.

6.6 Include runoff and routing methods, parameters, and calculations for all areas including flow arrows within each subbasin. UDC 7.6.C.11.d. & UDC 15.9. B.1.

6.7 Show and label the effective and proposed floodplain. UDC Table 17-2.

6.8 Lots to be configured for positive drainage away from buildings. **No cross-lo drainage is allowed.** UDC 15.4. H.



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- 6.9** Where a lot in any flood-prone area must be improved to provide a building site free from flooding, such improvements must be made outside the floodway by elevation or fill to at least two feet above the regulatory flood protection elevation (100-year flood) for a distance extending at least 25 feet beyond the limits of intended structures and, additionally, extending a sufficient distance to include areas for subsurface sewage disposal if the lot is not to be connected to a public sanitary sewer system. Any fill must be protected against erosion by riprap, vegetative cover, or other methods deemed acceptable by the Planning Commission. In non-residential building sites outside a floodway but subject to flooding, the use of the structural floodproofing of these regulations, as an alternative to landfill, may be approved by the Planning Commission. UDC 15.4. J.
- 6.10** For drainage swales, lined channels, and natural channels, the system must be designed to carry the 100-year storm and can convey storm runoff without life hazards or property damage. UDC 15.9. I.3.C

REQUIRED FOR DETENTION OR RETENTION PONDS:

- 7.1** No stormwater management facilities may be located within streamside buffers, nor can they be detrimental to such buffers, unless a plan with appropriate mitigation is authorized by the City Engineer UDC 15.9. I.5.
- 7.2** Stormwater basins must be designed and incorporated into usable open space, accessible and open to the public. UDC 15.9. I.6.
- 7.3** Water level fluctuations between the normal and high-water level cannot exceed 18 inches for the 2-year design event and cannot exceed five feet for the 100-year design event. UDC 15.9. I.6.
- 7.4** Provide cross sections of the detention basin, controlling outfall structure, and emergency spillway. UDC 15.9.
- 7.5** Profile the detention basin, controlling outfall structure, and emergency spillway. UDC 15.9.
- 7.6** Show existing and proposed contours for the detention basin. UDC 11.1. B.4
- 7.7** Include embankment sections for water storage impoundment with compaction specifications. UDC 15.9.
- 7.8** Include structural details and hydraulic calculations for the controlling outfall structure and emergency spillway. UDC 15.9



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- 7.9** Provide volume calculations and state design methodologies. UDC 15.9. I.1
- 7.10** Include detention elevation versus storage curves and elevation versus discharge curves. UDC 15.9.
- 7.11** Show and label all fencing, drainage, and access easements for detention ponds from ROW along the accessible route. UDC Table 17-2.
- 7.12** Obtain an approved detention basin inspection and maintenance/management plan before the pre-construction meeting. The plan must note the responsibility of the Owner/HOA, provide periodic inspection, and provide for minimum maintenance and repair needs that include, but are not limited to, removal of silt, litter, and other debris, cutting of the grass, and vegetation removal, and replacement of landscape vegetation in detention or retention ponds and inlets and drainage pipes and any other stormwater appurtenance. UDC 15.7.
- 7.13** Retention ponds will be required to have the ability to drain out to empty the pond for maintenance. UDC 15.7. B.
- 7.14** Provide all electronic design files and state which program was used to run the design calculations. UDC 15.
- 7.15** Enclosed detention pond outfall structures must be analyzed for buoyancy. UDC 15.

REQUIRED FOR GRADING PLANS:

- 8.1** Show and label existing and proposed contours that address lot-to-lot drainage in intervals of not more than two feet. Show and label the proposed limits of land-disturbing activities. UDC Table 13-3.
- 8.2** Plan and profile all proposed channels/ditches/swales showing existing contours and proposed centerline, top-of-bank, channel bottom, stationing, and the 100-year water surface elevation with 1 foot of freeboard. Include all hydraulic calculations. UDC 7.6.11.C & Table 17-2
- 8.3** Provide cross sections of typical swales, berms, channels, and any other such improvement. Provide slopes and alignment on plans including improvements. Provide capacity with a minimum of 1-foot of freeboard. UDC Table 17-2.
- 8.4** Provide structural details for channel lining treatments (seeding, sodding, concrete, gabions, etc.). UDC 15.7.B.3 & 7.6. C.6



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- 8.5** Show and label proposed fences, required screen walls, gates, and retaining walls. Label maximum heights. Retaining walls over 4 feet must include plans from a licensed Engineer. UCD 9.3.1.J & 9.3.2

REQUIRED FOR EROSION CONTROL PLANS:

- 9.1** Provide an erosion control plan by the City of Spring Hill’s National Pollution Discharge Elimination System (NPDES) and Municipal Separate Storm Sewer System (MS4) Phase II Program. UDC 15.19
 - a. Show and label the extents or limits of clearing, grubbing, and all land disturbing areas.
 - b. Show and label water wells, wellhead protection areas, and any other such critical area boundaries or existing utilities.
 - c. Provide details of temporary erosion/sediment control devices and best management practices for all phases of the development
 - d. Provide a plan view to show and label all temporary erosion/sediment control devices.
 - e. Show and label all natural drainage features for both existing and proposed conditions.
 - f. Show and label construction entrances, stockpiles, and concrete washouts.
 - g. Provide permanent stabilization details.
 - h. Provide locations and details of all temporary sedimentation basins, including drainage calculations, de-watering times, basin dimensions, and outlet/dewatering structure designs.
- 9.2** Show and label all streams and water quality buffer zone easements. The developer must dedicate water quality buffer zone easements of 30 feet on each side for unimpaired streams/ETW and 60 feet for impaired streams/ETW, as measured from the edge of the top-of-bank, on both sides of the creek. This stream buffer must not encroach onto any platted lots created by subdivision. No structures or improvements, as defined by TDEC, are allowed in this area. UDC 15.6.C.
- 9.3** Preliminary grading and drainage plans with reports are required for 2, 5, 10, 25, and 100-year 24-hour storm events. Sediment basin design is required for drainages of 10 acres or more. UDC 15.9.H



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- 9.4** 5yr/24hr storm event, is checked for ETW/Waters with unavailable parameters or the area is within CGP unavailable drainage. Sediment basins for drainages of 5ac or more. UDC 15.9.
- 9.5** 2yr/24hr storm event, is checked for non-ETW/Waters with available parameters. Sediment basins for drainages of 10ac or more. UDC 15.9
- 9.6** Provide the following notes on the final plat:
 - b.** All utility and drainage easements located on proposed lots are to be maintained by the individual property owners of said lot. UDC 15.9. B
 - d.** All Common Areas/Open Spaces are to be maintained by the Homeowners Association, their heirs, or assigns. UDC 15.5. D
 - e.** No HVAC Equipment is permitted in Public Utility and Drainage Easements where utilities are located. UDC 15.14. D.
 - f.** All Open Space areas are a Public Utility and Drainage Easement. UDC 15.5. D
- 9.7** Internal silt fence phased during development may be required to prevent perimeter silt fence blowouts. Silt fence to meet the following design requirements: UDC 7.6.C.11.E & 15.7.
 - a.** Max drainage area of 0.25 acre per 100 linear feet of silt fence
 - b.** Max 200 feet distance of flow to the silt fence; 50 feet if slope exceeds 10 percent.
 - c.** Min. of 3 feet overlap at fabric joints
 - d.** Turn ends of silt fence line upslope a min. of 10 feet.
 - e.** Install stone overflow structures at low points and approximately every 300 feet if no apparent low spot occurs within the max distance of 300 feet of the silt fence.



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