

## Unified Development Code Refinement Engagement Session Packet

**Summary:** The City of Spring Hill Development Services Engineering Department is holding engagement sessions on the Unified Development Code Refinement on January 22, 2024, from 3:00 P.M. to 5:00 P.M. and January 25, 2024, from 5:30 P.M. to 7:30 P.M. at City Hall 199 Town Center Parkway. The purpose is to receive public input as the City seeks to improve the development process and standards. These changes have been discussed internally and now the City is seeking specific input from the community before formal drafting of any revisions.

### Agenda Discussion Items:

1. Revision of Unified Development Code Article 10.9: Driveway Design
2. Revision of Unified Development Code Article 15.9: Drainage and Storm Sewers
3. Text amendment of Unified Development Code Article 15.10: Water Distribution Facilities of the adoption of International Building Code (IFC) 2018 in March 2023
4. Adoption of the Subdivision Regulations Appendix I within the Unified Development Code as Article 16.10: Specifications for Materials and Construction Procedures.

### Discussion Points:

1. Revision of Unified Development Code Article 15.9
  - Drainage and Storm Sewers is consistent with Federal regulations to the 100-year 24-hour storm event.
  - Detention pond volumes and storm sewer pipes will slightly increase in size or slope. Vast majority of sites already design detention to the 100-year 24-hour event and provide conveyance of the same.
2. Adoption of the Subdivision Regulations Appendix I within the Unified Development Code as Article 16.10: Specifications for Materials and Construction Procedures.
  - Creates consistency that fosters clarity and cohesion between regulations and regulatory agencies.

### Keynote:

IFC – International Building Code

UDC – Unified Development Code

**Yellow Highlights** – Proposed additions to Code

**Red Strikethroughs** – Proposed removed from Code

**Table of Contents:**

Memo Article 10.9: Driveway Design .....3  
UDC Changes - Article 10.9: Driveway Design .....4  
Memo Article 15.9: Drainage and Storm Sewers .....8  
UDC Changes - Article 15.9: Drainage and Storm Sewers .....11  
Memo Article 15.10: Water Distribution Facilities .....24  
UDC Changes - Article 15.10: Water Distribution Facilities .....25  
Memo Article 16.10: Specifications for Materials and Construction Procedures .....28  
UDC Changes - Article 16.10 Specifications for Materials and Construction Procedures .....30  
Memo Standard Details .....42  
Transportation Standard Details .....43  
Water Standard Details .....48  
Storm Standard Details .....53  
Sewer Standard Details .....56

## Memo Article 10.9: Driveway Design

**Discussion Item:** Revision of Unified Development Code Article 10.9: Driveway Design

**Request:** Staff is requesting to revise language within Article 10.9 Driveway Design to clear intent of the word and to add stacking distances for safety. Stacking distance is the distance between the back of curb and the first parking stall, intersection, or cross access. This change would include a section to add a stacking distance table to provide an adequate driveway throat length or connection depth in which there are no conflicting movements to help create smoother traffic flows in and near the driveway throat and avoid conflicts to which drivers may not have adequate time to react (which in turn may lead to collisions). Inadequate throat length can produce traffic situations that adversely affect the flow of traffic on the public roadway.

Along with the stacking distance addition, this section would also change the designee of approvals to the Public Work's director for all new and existing changes of curb cuts. This would include driveway widening connections within the right-of-way (ROW).

**History:** There have been development designs submitted to the City for construction that have short stacking distance or throat lengths, creating negative impacts to traffic flows. To aid staff in reviews and alleviate future traffic flow concerns, staff would like to add this requirement to the UDC.

**City Interdepartmental Cooperation:** Internal discussions between Public Works and Engineering have occurred and Public Works would like to take charge of all requests for curb cut changes within the ROW and driveway extensions. The Engineering Department agrees that curb cuts after initial construction design approvals for developments will be best handled by Public Works.

**Changes:** Staff has added language and strike-through text to update Article 10.9 language that staff finds necessary to provide clear information as well as include standard engineering practices necessary to complete reviews of the designs and resolve confusion and conflict that has been encountered.

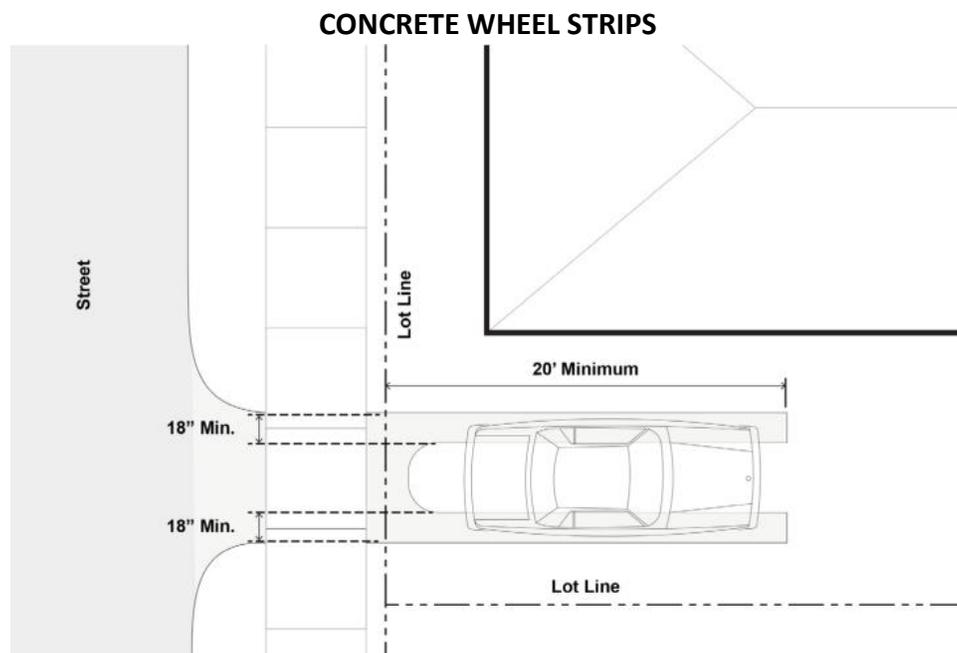
**Conclusion:** Staff recommends that we proceed with a formal text amendment to the UDC Article 10.9 Driveway Design.

## UDC Changes - Article 10.9: Driveway Design

### 10.9 DRIVEWAY DESIGN

#### A. Single-Family and Two-Family Dwelling Driveways

1. A residential driveway that provides access to a detached or attached garage or carport is limited to 26 feet in width in the required front setback. There is no limit on driveway width past the required front setback.
2. A residential driveway may be located one foot plus the width of the drainage swale from any interior side or corner side lot line, unless a shared driveway is established. A shared driveway location is only allowed if agreed to by the owners of each lot, and the agreement is recorded as a shared driveway easement on each plat of survey.
3. Single-family and two-family dwellings are permitted to construct driveways that consist of two concrete wheel strips, each of which is at least 18 inches wide and at least 20 feet long. Space between wheel strips must be planted with turf or groundcover; gravel is prohibited.



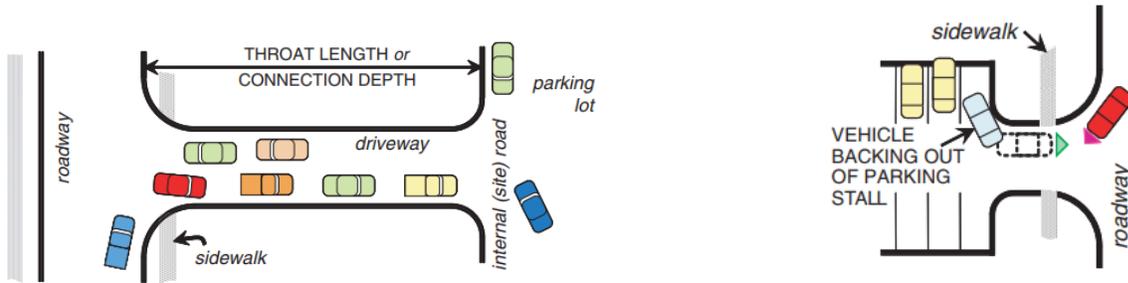
4. All driveways must be surfaced with a durable all-weather material, such as asphalt, concrete, or other product. Pervious paving is allowed. However, in the AG, R-A and R-R District, a gravel driveway is permitted with a paved driveway apron a minimum of 15 feet in depth, as measured from the right-of-way line.
5. Outdoor parking of vehicles is permitted on a residential driveway only.

#### B. Townhouse and Multi-Family Dwellings, and Non-Residential Driveways

1. All parking lots and associated driveways must be surfaced with a durable all-weather material, such as asphalt, concrete, or other product. Pervious paving is allowed. Gravel

is prohibited except in the AG, OS, and NA Districts. Historic pea gravel is permitted in the C-D District but edging is required to contain the gravel on the site.

2. Driveways to residences are limited to a maximum width of 16 feet for one-way drives, and a maximum of 24 feet for two-way drives.
3. Stacking distance or throat length must in accordance with the below table, as measured from the back of the curb (being the full buildout roadway section as set by roadway classification in accordance with the thoroughfare plan if the current roadway condition is not constructed to the standard roadway section) to the end of the driveway throat being defined as the point at which conflicting traffic movements are encountered.



\*Photos from NCHRP Report 659 – Guide for the Geometric Design of Driveways.

Minimum Throat Length (feet)	
Land Use(s) Served by Driveway	Connection Depth
Regional Shopping Centers or Office Complex (over 150,000 sq. ft.)	250 feet
Community Shopping Center or Office Center (supermarket, drug store, ect., 100-150,000 sq. ft.)	80 feet
Small Shopping Center or Other Small Commerical Developments, Townhouse and Multi-Family Dwellings	30 feet

### C. Curb Cuts

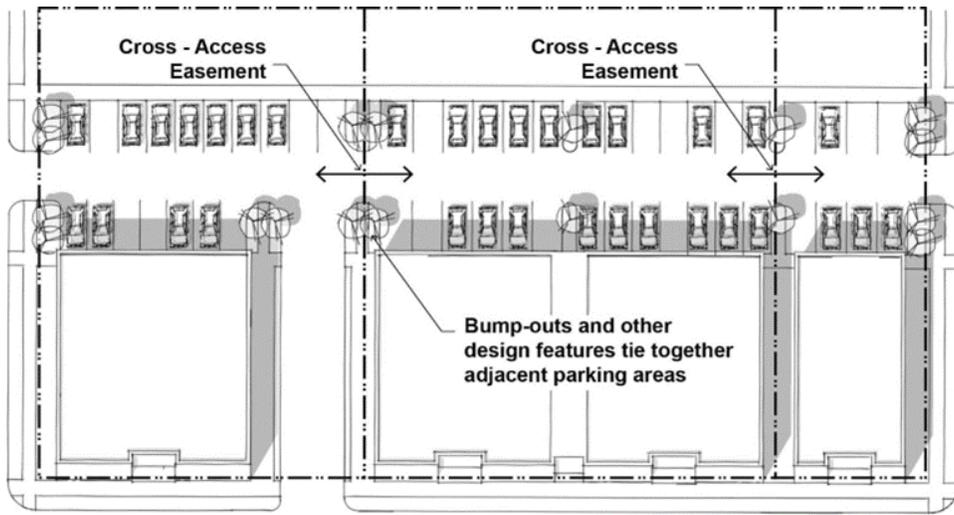
1. All residential curb cuts require approval of the ~~City Engineer~~ Public Works Director or designee. Curb cuts on numbered highways require permits from authorities having jurisdiction.
2. Single-family and two-family dwellings are limited to one curb cut. However, lots of 70 feet or more in width may have two curb cuts to create a circular drive. Corner lots may also have one curb cut on each street frontage.

3. Townhouse and multi-family dwellings are limited to one curb cut per frontage up to 100 feet of frontage, and two curb cuts where there is 100 feet or more of frontage. The Planning Commission must also approve all curb cuts during site plan review.
4. Lots for uses in all other districts are limited to one curb cut per street frontage. Such lots may also create additional curb cuts every 150 feet after the initial 150 feet. This does not apply to drive-through uses or gas stations, where the number of curb cuts is approved as part of site plan review and/or special use approval.
5. As of the effective date of this Code, no new curb cut may be closer than 25 feet to the projected curb line of the intersecting street. Pre-existing curb cuts closer than 25 feet are allowed to remain.

#### **D. Cross-Access Easements**

1. Adjacent non-residential developments (including mixed-use development) with dedicated parking areas are encouraged to provide a cross-access drive to allow circulation between sites. Property owners are encouraged to pursue cross-access with adjacent property owners at the time of development. If cross-access is provided, the Zoning Administrator may require that the property owner provide proof that adjacent property owners have been contacted in writing regarding the provision of cross-access.
2. Joint use driveways and cross-access easements must incorporate the bump-outs and other site design features to make it visually apparent that the abutting properties are tied together.
3. Pursuant to this section, property owners who establish cross-access easements must:
  - a. Record an easement allowing cross-access to and from properties served by the joint use driveways and cross-access easement.
  - b. Any pre-existing driveways must be closed and eliminated after construction of the joint-use driveway.
  - c. Record a joint maintenance agreement defining the maintenance responsibilities of each property owner.

# CROSS-ACCESS EASEMENTS



Street

## Memo Article 15.7: Stormwater Management & Article 15.9: Drainage and Storm Sewers

**Discussion Item:** Revision of Unified Development Code Articles 15.7: Stormwater Management & 15.9: Drainage and Storm Sewers

**Request:** Staff is requesting to revise language within Articles 15.7: Stormwater Management & 15.9: Drainage and Storm Sewers to change stormwater facility volume from the 25-year 24-hour storm to the 100-year 24-hour storm event to be consistent with the federal emergency management agency.

The required detention volume to be that volume necessary, given the hydraulic characteristics of the primary outlet structure, to attenuate the post-development not to exceed the pre-development outflow for the 2-year, 5-year, 10-year, 25-year, 50-year and 100-year 24-hour storms with 1 foot of freeboard. Detention storage volume must be drained within 72 hours.

Detention facilities to have a primary discharge structure capable of accommodating the 24-hour storms up through the 100-year with an emergency overflow capable of handling at least the 100-year 24-hour post development discharge. The estimated design rainfall amounts for twenty-four (24)-hour depths or intensities, can be found by accessing the following NOAA National Weather Service Atlas 14 data for Tennessee: [PF Map: Contiguous US \(noaa.gov\)](#)

Detention facilities to be designed with additional storage for sediment building up of 10% of additional volume and water quality. Detention facilities must follow state requirements of water quality. Water quality, sediment storage, and design capacity does not stack in the design and construction of the pond.

**History:** Storm water detention is defined as limiting the peak discharge rate for the post developed conditions to be no greater than the peak discharge rate for the predevelopment conditions.

**Changes:** Staff has added language and strike-through text to update Article 15.9 language that staff finds necessary to provide clear information as well as include standard engineering practices necessary to complete reviews of the designs and resolve confusion and conflict that has been encountered.

Most of the requested changes are additions from the Subdivision Regulations Appendix I that is being requested to be added to the Unified Development Code as Section 16:10 Specifications for Materials and Construction Procedures.

**Conclusion:** Staff recommends that we proceed with a formal text amendment to the UDC Article 15.9: Drainage and Storm Sewers to comply with state and federal regulations.



## UDC Changes - Article 15.9: Drainage and Storm Sewers

### 15.7 STORMWATER MANAGEMENT

- A. ~~Subdivision is subject to Title 18, Storm Water Management Ordinance of the Municipal Code. Per Section 18-404,~~ Management of storm water runoff from developments must comply with the City of Spring Hill's latest established Storm Water Management Ordinance. Land Disturbance Permits, are required prior to the start of construction. ~~Per Title 18,~~ and a performance agreement or letter of credit may be required.
- B. Maintenance of onsite stormwater facilities must execute an inspection and maintenance agreement that operates as a deed restriction binding on the current property owner or the applicable management association, such as a Homeowners or Property Owners Association, or Condominium Association. The maintenance agreement must:
1. Assign responsibility for the maintenance and repair of the stormwater facility and landscaping to the owner or management association.
  2. Provide for a periodic inspection.
  3. Provide for minimum maintenance and repair needs that include, but are not limited to, removal of silt, litter and other debris, cutting of grass, and vegetation removal, and replacement of landscape vegetation in detention or retention ponds and inlets and drainage pipes and any other storm water appurtenance.
  4. Storm water pollution prevention plans and notice of coverage documents must be reviewed and approved by the City of Spring Hill as well as TDEC in accordance with the latest Storm Water Management Ordinance.
  5. Storm management measures must be installed in accordance with manufacturer recommendations. Internal silt fence phased during development will be required to prevent perimeter silt fence blowouts. Silt fence must be designed to meet the manufacturer's requirements and the following:
    - i. Max drainage area of 0.25 acre per 100 linear feet of silt fence.
    - ii. Max 200 feet distance of flow to the silt fence; 50 feet if slope exceeds 10 percent.
    - iii. Min. of 3 feet overlap at fabric joints,
    - iv. Turn ends of silt fence line upslope a min. of 10 feet.
    - v. Install stone overflow structures at low points and approximately every 300 feet in no apparent low spot occurs within the max distance of 300 feet of silt fence.
- C. The City will not be responsible for maintenance of the open ditches, swales, or swales between properties. The City will be responsible for maintenance of physical structures such as, but not limited to, headwalls, catch basins, and piping.

## UDC Changes - Article 15.9: Drainage and Storm Sewers

### 15.9 DRAINAGE AND STORMWATER SEWERS

All stormwater drainage systems must be separate and independent from any wastewater sewer.

#### A. Accessibility to Public Stormwater Sewers

1. Where a public storm sewer is accessible, generally within 300 feet, the developer must install connections to stormwater sewer facilities. Stormwater sewer lines must be extended through and to the end of the development as determined by the City Engineer.
2. If a connection to a public stormwater sewer will be provided eventually, as verified by the City Engineer, the developer must make arrangement for future stormwater disposal by that public system at the time the plat receives final approval. Provisions for such connection must be incorporated into the performance bond required for the final plat.
3. All underground stormwater conveyances will be inspected by the City to ensure proper installation prior to acceptance by the City. All DVD recording, or other electronic format acceptable to the City, and inspection must be performed by the developer for verification. Prior to installation of the binder course of asphalt, under roads built at 1% or less, any run of pipe between structures that has any part of any joint of pipe with over five (5) feet of cover will be verified with a TV inspection and a copy given to the City for review and approval. Video inspections will verify correct joint construction, review for damages, and manufactures' installation specifications to review that the finished product is acceptable. All installations shall conform to the manufacturer's installation requirements. (Res. 20-18)
4. All underground stormwater conveyances that are found to be contaminated with sediment must be cleaned by equipment suitable for the work performed and by the Public Works Director and all material or installation defects must be repaired to the satisfaction of the City at the developer's expense. All final work will be re-verified by pipe camera inspection on DVD recording, or other electronic format acceptable to the City, by the developer.
5. If no access to public stormwater sewers are within a reasonable distance, adequate provision must be made for the disposal of stormwater, in compliance with the Storm Water Management Ordinance.
6. Storm sewer lines must be extended through and to the end of the development when requested by the City Engineer to service future development.
7. Public stormwater sewer pipe must be installed in public rights-of-way or public dedicated easements. Pipe or other stormwater structures must be placed in the center of easements and no closer than five feet from the edge of any public right-of-way.

8. Surface swales draining multiple lots cannot flow over sidewalks or curbs. Surface water flow must be intercepted by area drains or headwalls and piped to the nearest underground storm sewer system.

#### **B. Storm Water Drainage Calculations Specifications**

All stormwater drainage calculations must be submitted to the City Engineer as part of the plan approval process for site plans, preliminary plats, and planned developments. Calculations must include the following:

1. Surface water drainage calculations for each drainage sub-basin within the development. This must include the 100-year and 25-year maximum discharge in accordance with Title 18 of the Municipal Code. Other information must include runoff coefficients and time of concentration for each drainage sub-basin associated with stormwater inlets or other conveyance systems to channel and or intercept surface water flows.
2. Time of concentration calculations must follow the latest methods for calculating. Example being the use of McCuen and Spiess flow length limitation as presented in USDA NRCS Part 630 Chapter 15 – Time of Concentration manual.
3. Inlet capacity of stormwater inlets along with any storm water bypass. Inlets capacity calculations must include the clogging factor used by the engineer in the design.
4. Width of surface water spread on streets prior to interception of flows by inlets.
5. Maximum flow capacity for each stretch of stormwater sewer pipe between manholes along with the HGL associated with anticipated flows.
6. Pipe roughness coefficient used for design.
7. Sub-basin characteristics such as max flow, runoff coefficients, time of concentration, peak discharge.
8. Hydrological methods used for surface water calculations must follow the methodologies and practices outlined in the Tennessee Department of Transportation Division Drainage Manual, except where design standards are otherwise described in this article.

#### **C. Dedication of Drainage Easements**

1. Where a subdivision is traversed by a watercourse, drainage way, channel, or stream, either a stormwater easement or drainage way conforming substantially to the lines of such watercourse, and of appropriate width and construction, must be provided. Where open drainage ways are utilized, they must be designed for a ~~25-year flood~~ 100-year, 24-hour design storm. In addition, the 50-year and 100-year storm events must be evaluated by the developer's engineer to determine if additional capacity is necessary due to the potential of flooding during high-intensity storm events.
2. Where topography or other conditions make the inclusion of drainage facilities within a public way impractical, perpetual unobstructed easements are required. Such easements must be 20 feet wide. Easements containing storm sewer,

sanitary sewer and or water lines must have a minimum width that is adequate to provide for a ten-foot separation between pipelines and allow ten feet from the centerline of the outside pipes to the easement boundary. Easements must be indicated on the preliminary and final plats. Drainage easements must be carried from the public way to a natural watercourse or other drainage facilities.

3. When a new drainage system is to be constructed that will carry water across private land outside the subdivision, appropriate drainage rights and easements must be secured and indicated on the plat.
4. The applicant must preserve an area parallel to the watercourse, containing a width **as outlined in the Storm Water Management Ordinance** ~~equal to~~ and not less than two times the water course width (as measured from top-of-bank to top-of-bank). This area will be designated as a water quality buffer zone easement and cannot be disturbed by the proposed development. Details of this requirement are located within the City's Water Quality Buffer Zone Policy.
5. Along watercourses, low-lying lands within any floodway, as determined by the Planning Commission whether or not included in areas for dedication, must be preserved and retained in their natural state as drainage ways.
6. **Storm water easements shall not be blocked with fences, sheds, pools, trees, shrubs or any other structures or items that may block proper drainage or that may affect storm water capacity and or flow rates or otherwise inhibit access for maintenance or inspection of the easement.**

**D. Accommodation of Upstream Drainage Areas**

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.

**E. Effect on Downstream Drainage Areas**

The Planning Commission will also study the effect of each subdivision and development of single lots on existing downstream drainage facilities outside the area of the subdivision. Where it is anticipated that the additional runoff incident to the development of the subdivision will overload an existing downstream drainage facility, the Planning Commission may withhold approval of the subdivision until provision has been made for adequate improvement of such drainage facilities in such sum as the Planning Commission determines. No subdivision will be approved unless adequate drainage is provided to an adequate drainage watercourse or facility. (Res. 20-11)

**F. Spring or Surface Water On Site**

The developer may be required by the Planning Commission to transport by pipe or open ditch any spring or surface water that may exist prior to or as a result of the subdivision. Such drainage facilities must be located in the public way, where feasible, or in perpetual

unobstructed easements of appropriate width, and must be constructed in accordance with the storm water construction specifications.

**G. Floodplain Areas**

The Planning Commission may prohibit, when it deems it necessary for the health, safety, or welfare of the present and future population of the area or necessary to the conservation of water, drainage, and sanitary facilities, the subdivision of any portion of the property that lies within the floodplain of any stream or drainage course. The regulatory floodway must be preserved from any and all destruction or damage resulting from clearing, grading, or dumping of earth, waste material, or stumps.

**H. Areas of Poor Drainage**

Whenever a plat is submitted for an area which is subject to flooding, the Planning Commission may approve such subdivision provided that the applicant fills the affected floodway fringe area of said subdivision so that public right-of-way elevations are at no less than two feet above the regulatory flood elevation and first floor elevations (including basements) at no less than two feet above the regulatory flood elevation. The plat of such subdivision must provide for a floodway along the bank of any stream or watercourse of width sufficient to contain or move the water of the regulatory flood, and no fill may be placed and no building nor flood-restrictive structure may be erected or placed in the floodway.

**I. Design Standards**

**1. Detention Volume**

The required detention volume must be that volume necessary, given the hydraulic characteristics of the primary outlet structure, to attenuate the post-development of mass outflow of water from the structure ~~from hour 11 to hour 18 of the 24-hour storm to a level~~ not to exceed the pre-development mass outflow for the same time period for the ~~2-year and 5-year~~ 2-year, 5-year, 10-year, 25-year, 50-year and 100-year 24-hour storms and must include 1 foot of freeboard. Detention storage volume must be drained within 72 hours. Detention volume must include water quality in addition to the required detention volume based on hydraulic characteristics. Developments should follow MS4 requirements for water quality.

**2. Maximum Release Rate**

The release rate from any detention pond must be for the site for the same storm prior to the proposed development. The peak outflow rate from the 2-year 24-hour storm, 10-year 24-hour storm, and 25-year 24-hour storm ~~50-year 24-hour storm, 100-year 24-hour storm~~ cannot exceed that of the site prior to development. Detention facilities must have a primary discharge structure capable of accommodating the 24-hour storms up through the ~~25-year~~ 100-year with an emergency overflow capable of handling at least the 100-year 24-hour post-development discharge unless waived by the Planning Commission.

**3. Storm Sewer Design Requirement**

Storm Sewer frequency design storm is the 100-year 24-hour event. Design storm frequency for all land use/development. ~~type for storm systems must be as follows:~~

- a. ~~Residential 25-year storm~~
- b. ~~Commercial/Business/industrial 25-year storm~~
- c. ~~For drainage swales, lined channels and natural channels, the system must be designed to carry the 100-year storm and have the capacity to convey storm runoff without life hazard or property damage.~~

For drainage swales, lined channels and natural channels, the system must be designed to carry the 100-year storm and have the capacity to convey storm runoff without life hazard or property damage.

#### 4. Existing Water Facilities

- a. Existing streams, lakes, and wetland cannot be modified for use as stormwater detention or retention ponds.
- b. On-stream impoundments are prohibited.

#### 5. Stream Buffer Requirements

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.

#### 6. Stormwater Detention and Surface Infiltration Basins

Stormwater detention and surface infiltration basins must be design as naturalized basins for multiple uses, including stormwater detention, habitat enhancement and passive recreation use. Basins cannot be designed solely for stormwater detention purposes.

- a. Large regional stormwater basins must be designed and incorporated into usable open space, accessible and open to the public as determined by the Planning Commission.
- b. 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.
- c. If fish are to be supported at least 25% of the permanent pool of water must be a minimum of ten feet in depth.
- d. Detention and outlet structure must be located at opposite ends of the basin to maximize water quality benefits.
- e. For wet detention basins, water entry slopes between one foot above and one foot below cannot exceed ten to one (10:1) to minimize shoreline erosion. Shallow entry angle will improve water quality treatment and increase aquatic habitat.
- f. The drainage area for wet detention ponds is a 15-acre minimum, to ensure hydrologic input sufficient to maintain a permanent pool. Ten acres or less may be acceptable, particularly if the groundwater table is

intercepted and a water balance indicates that a permanent pool can be sustained.

- g. All basins, trap embankments, swales, perimeter dikes, and permanent slopes steeper or equal to 3:1 shall be stabilized with sod or other approved stabilization measures, within seven (7) calendar days of establishment. Extensions may be approved by the inspector due to weather. All areas disturbed outside of the perimeter sediment control system must be minimized and stabilized immediately. Maintenance must be performed as necessary to ensure continued stabilization. Re-stabilization or over-seeding may be required as determined by the City. (Res. 20-18)
- h. All final grades and elevations are to be verified by the design engineer on all retention and detention basins. Drainage easement alignments are also to be verified by the design engineer. A written letter is required to be submitted by the design engineer for the verification of the elevations and grades. Each basin shall have a permanent concrete benchmark for reference with the location identified on the plan. As built plans with these grades and elevations are to be submitted to Public Works to be maintained as permanent record prior to the acceptance under maintenance bond's and during final inspection.
- i. All retention and detention basins shall be designated as common ground on the final plats for subdivisions and other residential and commercial developments. All such storm water basins shall be the responsibility of the Home Owners Association to maintain. Easements for adequate access to accomplish maintenance and inspection shall be provided.

#### 7. Stormwater Inlets

- a. Stormwater Inlets must be in accordance with the approved City of Spring Hill storm water details for ~~be John Bouchard 3103 V Curb Inlet or 3300 V~~ Curb Inlet. Curb types shall match the inlets as specified on the construction drawings. (Res. 20-11)
- b. Clogging factor for design and spacing must be 50%.
- c. Inlets cannot be spaced in the pathway or ADA ramps and must intercept surface water before ADA ramps.
- d. All stormwater inlet boxes must be precast with inlet and outlet pipes grouted inside and outside to make the joint watertight.

#### 8. Stormwater Manholes

- a. Manholes must be installed at the end of each line, at all changes in grade, size or alignment at all sewer main intersections and at distances not greater than 400 feet apart for sewers 18 inches in diameter and not greater than 450 feet apart for sewer greater than 18 inches in diameter.

- b. Floor troughs must be furnished for all sewers entering manholes. A larger diameter manhole must be utilized in order to properly construct floor troughs where the incoming sewer inverts are substantially higher than the outgoing sewer invert. At all manholes with a change of direction, a drop from the entrance to the outlet of at least 0.1 feet must be provided to account for head loss through the manhole. Additional drop in elevation may be required for sewer mains 12 inches and larger. Inverts must be U-shaped to the pipe crown before sloping at a one to twelve (1:12) slope to the manhole walls.
- ~~c. 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.~~ Manholes must be designed to follow recommendations and guidelines as outlined by the National Precast Concrete Association (NPCA).
- d. Manhole frame and cover must be in accordance with the approved City of Spring Hill storm water details. ~~John Bouchard 1111 or approved equal.~~

**9. Stormwater Pipe, Manholes, Catch basins, Inlets and Pipe End Walls, and Bedding Aggregate**

- a. Reinforced Concrete Pipe (RCP) and Dual wall Polypropylene (HDPP) may be used in all areas within the ROW and within all Public Utility and or Drainage Easements. High-density Polyethylene (HDPE) may be used in areas outside the ROW. HDPE is not allowed in paved areas. See plans for pipe materials required for each location on project.
- b. HDPP may only be used in the Public ROW in streets with maximum pipe size of 36", and only in street locations where more than 24 inches of cover can be met from top of pipe to bottom of pavement subgrade and in areas where total fill height above pipe does not exceed 12 feet of cover as shown on the plans or within paved areas on private property. Any HDPP pipe exhibiting structural distress (wall bucking, inverse curvature, or excessive deflection) shall be removed and replaced. Re-rounding of flexible pipe is not allowed.
- c. Reinforced concrete pipe must conform to the minimum standards for Class III, ASTM C76, ~~and must be utilized under roadways and all paved areas whether public or private development.~~ All RCP stormwater pipe and structure joints ~~and connections must be grouted with non-shrink grout and/or otherwise sealed both inside and out~~ will be sealed with flexible joint sealant meeting ASTM C990 and pipe to structure connections must be sealed by appropriate masonry practice with combination of clay brick or concrete brick with non-shrink grout and sealed neatly both inside and out. ~~Butylene gasket materials must also be utilized within pre-cast manholes and structures to further seal the joints and connections.~~

- d. Driveway culverts must be a minimum diameter of eighteen (18) inches, and a minimum length of twenty (20) feet.
- e. Cross drains must be a minimum diameter of eighteen (18) inches.
- f. All public storm pipe must be a minimum of eighteen (18) inches.
- g. All storm piping connections must be sealed with proper collar rings as per the manufacturer's specifications. (Res. 20-11).
- h. All catch basins, area drains, storm water manholes and junction boxes, etc. shall be constructed of pre-cast concrete, no brick shall be allowed. All risers are also to be constructed of concrete, either pre-cast or poured in place.
- i. ~~Dual wall polypropylene (PP) storm drainage pipe (18" to 60") is also allowed for use within paved areas (public and private) only if the installation requirements and backfill materials are utilized as recommended by the manufacturer. Dual walled smooth interior PP pipe must be in accordance with AASHTO HB Section 30, T-341, R-16 and MP-21-11 along with ASTM C969, C1103, D2321, D3212, F477, F1417, F2487, F2736, and F2881. Detectable warning tape must be utilized in the trench of the PP pipe when installed.~~ Dual wall High Density Polypropylene (HDPP) shall comply to ASTM F2881 or AASHTO M330. The use of recycled or reground material in HDPP is not allowed. Joint sealant material shall comply with ASTM F477
- j. ~~HDPE pipe is permitted outside of paved areas as long as its installation is in accordance with the manufacturer's recommendations.~~ High Density Polyethylene Pipe (HDPE) and appurtenances shall be high density polyethylene conforming to the requirements of AASHTO M294. The pipe shall have a smooth interior and annular-corrugated exterior or profile wall pipe smooth interior for large diameter pipe. Joint sealant material shall comply with ASTM F477.
- k. Flexible-leak resistant connections shall be provided for all HDPP and HDPE to structure connections, connections shall be compression connector type or boots and shall conform to ASTM C923, ASTM C1478, and ASTM F2510. All structure connections with flexible pipe shall also be supplied and installed with an exterior filter fabric jacket.
- l. All stormwater piping must have a minimum velocity of three feet per second when flowing full.
- m. All pipe headwall must be of TDOT Class A Concrete. Poured in place headwalls cannot be less than 12 inches thick for pipes 18 inches through 30 inches. Precast discharge structures must meet the requirements of TDOT standard drawings. The tops of all headwalls shall be installed with no more than 6" of concrete exposed on the inlet side. (Res. 20-11)

- n. Length of wingwalls and height of headwalls for all pipes shall be determined by the amount of fill, the size of pipe, and the general conditions surrounding the pipe.
- o. If decorative or ornamental headwalls are desired, approval of such structures shall be given by the City of Spring Hill upon review and such headwalls should be shown in detail on the plan.
- p. Headwalls for driveway pipe on each individual lot will be inspected and approved by the City of Spring Hill or their authorized representative prior to or concurrently with the Building Inspector's inspection for issuance of an occupancy permit.
- q. Nyloplast (H20) structures are permitted in turf areas.
- r. All underground storm water conveyances shall be inspected by the City to ensure proper installation prior to acceptance by the City. Digital recording and inspection shall be performed by the contractor and sent to the City for verification.
- s. All underground storm water conveyances that are found to be contaminated with sediment shall be cleaned by Jet-Vac and all defects shall be repaired to the satisfaction of the City of Spring Hill Storm Water Department at the developer's expense. All final work shall be re-verified by pipe camera inspection recorded on Digital by the contractor for the City.
- t. Upon completion of storm water infrastructure construction all property owners and Home Owners Associations shall enter into a storm water maintenance agreement to maintain both private easements and common ground containing retention and detention basins, swales and other storm water structures. This agreement shall be permanently attached to the property deed requiring new owners to adhere to the agreement.

**10. Excavation, Bedding, and Backfill**

- a. A minimum cover of two feet to final subgrade elevation when under pavement or final surface elevation outside pavement is required on all PP pipe. Six inches of pipe bedding of TDOT No. 67 stone is required for all PP pipe. (Res. 20-11)
- b. ~~A minimum cover of two feet is required for all storm drainage pipe installation whether RCP or PP pipe. Approved~~ Bedding and structural embedment backfill soil material must be free of any rock material greater than two inches or shall have a total depth backfill with TDOT No. 67 stone allowed. The structural embedment of RCP is from top of bedding to mid-point (springline) of the pipe. The structural embedment zone for PP is from the top of bedding to a minimum of 6" above the top of pipe. Approved soil backfill must be at maximum lifts of eight inches compacted

to 98% density or as directed by a geotechnical engineer. Outside of the right of way, the final 8 inches to grade must be topsoil unless approved by the City Engineer. (Res. 20-11)

- c. When in the public right of way, no soil back fill shall be utilized unless inspected and tested by a geotechnical engineer and reports provided to the City inspector. If soil backfill is utilized out of the right of way, a two-year maintenance bond is required instead of the standard one-year maintenance bond to assure no settlement or pipe failures occur. (Res. 20-11)
- d. Pipe bedding for HDPE must be as per manufacturer's requirements. ~~Backfill for HDPE pipe must be free of rocks.~~ Approved backfill soil material may be used above the bedding; soil must be free of any rock material greater than two inches or total depth backfill with TDOT No. 67 stone is allowed. Approved soil backfill must be at maximum lifts of eight inches compacted to 95% density. ~~Minimum cover above HDPE pipe is two feet.~~
- e. Drainage and stormwater utility trenches excavated into existing public arterial or collector streets shall be backfilled with flowable fill as directed by the City Engineer. Trench limits shall be saw-cut into the existing pavement the width of which shall be limited to the minimum required to perform the work and accomplish backfilling. The use of flowable fill shall meet the requirements of Section 204 of the TDOT "Standard Specifications for Road and Bridge Construction". Streets, concrete curbs, gutters, driveways, median pavement, and sidewalks shall be restored as required to match existing construction. Base stone and asphalt paving shall be placed over the trench backfill with thicknesses and gradations equal to the existing pavement section. Each course of base stone and asphalt shall be thoroughly compacted with mechanical tampers. All repairs shall include full lane width resurfacing except when utilizing infrared technology as approved by the City Engineer.

## 11. Roadway Drainage Systems

Drainage structures to be constructed within streets and driveways are to be installed prior to construction of the pavement base. Roadway drainage systems must provide adequate capacity so that the spread of water in the roadway:

- a. Be limited so that not more than one traffic lane is inundated in either direction for arterial roadways.
- b. Leave at least one lane free of water in each direction for collectors.
- c. Be limited so as to maintain a minimum of one lane (eight feet total) free of water for local roads.

- d. All stormwater sewer improvements under roads constructed at 1% slope or less shall be as built surveyed for verification and a letter provided by the engineer before base stone is applied. (Res. 20-18)
- e. Storm sewer does not surcharge during the 100-year design storm event. (Res. 20-18)
- f. Cross drains shall be built on straight line and grade, and shall be laid on a firm base, but not on bedrock. Pipes shall be laid with the spigot end pointing in the direction of the flow and with the ends fitted and matched to provide tight joints and a smooth uniform invert. Headwall will be constructed at both ends of the cross drain.

**12. Culverts**

The design flow for culverts shall be based on the 100-year storm event ~~is based on the following return frequencies:~~

- a. ~~24-hour for residential collector and arterial road crossings. (Res. 20-11).~~
- b. ~~25-year, 24-hour for local roads and crossings. (Res. 20-11)~~

Driveway pipes shall be built on straight line and grade, and shall be laid on a firm base, but not on bedrock. Pipes shall be laid with the spigot end pointing in the direction of the flow and with the ends fitted and matched to provide tight joints and a smooth uniform invert. Headwall will be constructed at both ends of the driveway pipes.

c.

**13. Drainage Ditches**

- a. Through lot drainage ditches must be built to a grade that will provide positive drainage, and in no case may the slope of the ditch be less than 0.5% slope with a preferred slope of 1%.
- b. Drainage on individual residential and commercial lots within a larger development shall be complimentary to those engineered for the larger development that they neighbor and those that they fall within. Stormwater cannot be directed in such a manner that it flows outside of the designated easements or rights of way during a 25 100-year rainfall event or less or as directed by the City Engineer. (Res. 20-11).
- c. If excessive grades or elevations dictate, gutters and downspouts must be directed in a manner to prevent stormwater drainage onto neighboring property at lower elevations.
- d. All drainage ditches must be stabilized to prevent erosion as indicated by the protection shown in the Table 15-1: Erosion Protection.

Table 15-1: Erosion Protection			
Upstream	Seed and Erosion Blanket (Res. 20-11)	Sod	Concrete Lined
18" pipe	Grades less than 3%	Grades 3 to 12%	Grades greater than 12%

21" to 24" pipe	Grades less than 1.5%	Grades 1.5% to 7%	Grades greater than 7%
30" to 36"	Grades less than 1%	Grades 1% to 4%	Grades greater than 4%
42" and greater	Not applicable.	Grade 1% to 2.5%	Grades greater than 2.5%

- e. Where culverts empty into ditches with grades exceeding the grade of the culverts, the minimum requirements set forth above may not be satisfactory. In this case, the treatment shall be specified by the City of Spring Hill Engineer or his representative.
- f. Ditches that require lining with concrete must be lined to a height above the bottom of the ditch no less than one-half the diameter of the nearest culvert (upstream). However, in no case can the lining extend less than one foot above the bottom of the ditch.
- g. Lined ditches must be constructed of TDOT Class A. Concrete or approved alternate. (Res. 20-11)
- h. Ditches that require sodding must be sodded to the top of the slope of the ditch. The sod must consist of a live, dense, well-rooted growth of permanent grasses free from Johnson grass and other objectionable grasses, and suitable for the soil in which it is to be placed. All sod and erosion blankets shall have full contact with soil underneath and installed per the manufacturer's specifications. (Res. 20-11)
- i. All swales not requiring sod will be required to use erosion blankets. (Res. 20-11)
- j. Ditches that require lining with concrete shall be lined to a height above the bottom of the ditch no less than one-half (1/2) the diameter of the nearest culvert (upstream). However, in no case shall the lining extend less than one foot above the bottom of the ditch.
- k. Lined ditches shall be constructed of Class "B" concrete (3000 p.s.i. 28 day strength). The lining shall be firmly bedded and securely attached to adjacent drainage structures. Concrete mixture used will be such as to attain a smooth, monolithic, and reasonably watertight lining, and be placed upon a firm subgrade which will be void of all objectionable matter (grass, roots, etc.).
- l. The finished lined ditch shall conform to designated lines and grades and shall add rather than detract from the appearance of the roadway.
- m. Ditches that require sodding shall be sodded to the top of slope of the ditch. The sod shall consist of a live, dense, well-rooted growth of permanent grasses, free from Johnson grass, Nut grass, and other objectionable grasses, and suitable for the soil in which it is to be placed. The sod shall be eight (8) inches wide, not less than eighteen (18) inches long, and have at least three (3) inches in thickness of soil in its roots. The sod shall be placed only when the soil is moist and favorable to growth. No

sodding shall be done between November 1st and April 1st unless otherwise directed by the City of Spring Hill. The area to be sodded shall be constructed to the designated lines and grade, and the surface loosened to a depth of not less than 3 inches with a rake or other device. If necessary, it shall be sprinkled until saturated at least one inch in depth and kept moist until the sod is placed thereon. It will not be required but it is recommended that immediately before placing the sod, commercial fertilizer (6-12-12) shall be uniformly applied at the rate of 18 pounds per 1,000 square feet. However, the City of Spring Hill will hold the Developer responsible for an acceptable stand of grass in the ditches for stabilization.

- n. The sod shall be placed on the prepared surface with the edges in close contact and shall be pounded into place with wooden tamps, or other satisfactory equipment. On steep slopes, pinning or pegging will be required to hold the sod in place.
- o. The area to be seeded shall be constructed to the proper line and grade, and the surface loosened to a depth of not less than 3 inches with a rake or other device. After the top 3 inches of soil has been rendered loose, friable, and reasonably free from large clods, rocks, large roots, or other undesirable matter, lime and fertilizer shall be carefully worked into the soil in the following amounts:
- p. Agricultural Limestone (85% Calcium Carbonate Equivalent, 85% through a 10-mesh screen; 50% through a 40-mesh screen; 3 tons per acre, 140 pounds per 1,000-square feet). Commercial Fertilizer shall be (6-12-12) at 1,300 pounds per acre (30 pounds per 1,000 square feet.)
- q. Seeds shall be uniformly sown on the prepared seedbed in accordance with the following schedule and raked, dwelled, or harrowed approximately one-quarter inch into the soil.
- r. Mulched areas shall be mulched with one and one-half (1 ½) to two (2) tons per acre of small grain straw of fescue, orchard grass or native grass hay of less than 20% moisture, so that 25 – 30 % of the ground is visible. The mulched area shall be watered if necessary to maintain a reasonably moist condition until germination and continued growth is insured.

## Memo Article 15.10: Water Distribution Facilities

**Discussion Item:** Text amendment of Unified Development Code Article 15.10: Water Distribution Facilities of the adoption of International Building Code (IFC) 2018 in March 2023

**Request:** Staff is requesting to revise language within Article 15.10: Water Distribution Facilities to update the UDC to match the language of the previously adopted IFC 2018 in March 2023. This revision to the UDC would change the current length of hose lay from 500 to 400 feet.

**City Interdepartmental Cooperation:** The Engineering Department is bringing this forward on behalf of the Fire Department to make a formal change amendment to the UDC. The standards have been being enforced since March of 2023.

**Changes:** Staff has added language and strike-through text to update Article 15.10: Water Distribution Facilities language that staff finds necessary to provide clear information as well as include standard engineering practices necessary to complete reviews of the designs and resolve confusion and conflict that has been encountered.

**Conclusion:** Staff recommends that we proceed with a formal text amendment to the Article 15.10: Water Distribution Facilities.

## UDC Changes - Article 15.10: Water Distribution Facilities

### 15.10 WATER DISTRIBUTION FACILITIES

- A. Necessary action must be taken by the developer to extend a water supply system capable of providing domestic water use and fire protection through the development and providing connection of the system to adjoining properties, as required by the Planning Commission.
- B. Where a public water main is within reasonable access of the subdivision, as determined by the Planning Commission and verified by the City Engineer, the developer must install adequate water facilities that are capable of providing the minimum protection flows (750 GPM @ a minimum residual psi of 30), including fire hydrants, subject to construction and material specifications of the Tennessee Department of Environment and Conservation and Spring Hill's Standard Specifications for Water Additions, and by any other applicable standards and specifications and additional requirements of the Planning Commission.
- C. Water lines must be extended to the property boundaries of the development to allow future connection of the adjacent property. An end-of-line fire hydrant with a line-sized gate valve and reverse thrust blocking must be installed to allow uninterrupted water service when a future connection is made. If an existing water line, extended to the boundary from the adjacent property, is present, then the proposed development must connect to the existing water line.
- D. All water line plans and calculations are required to be first submitted to Spring Hill's Water Department for review and approval prior to submitting to the Tennessee Department of Environment and Conservation. The City's Water Department representative is required to sign off on the signature block indicating the City has reviewed and approved the proposed water line additions of the development prior to submittal to the Tennessee Department of Environment and Conservation, whether the additions are proposed as private or public. TDEC-stamped approved plans must be submitted to the City's Water Department prior to any installation activities beginning for the proposed water additions.
- E. All water systems, whether public or private, located in a flood-prone area must be floodproofed to the regulatory flood protection elevation. All water supply facilities located below the regulatory flood protection elevation must be designed to prevent the infiltration of floodwaters into the water supply system and discharges from the system into floodwaters.
- F. All water lines must be located outside the pavement and curbing of roadways. They are permitted only within the roadway rights-of-way or within a designated water utility easement. Easements must be a minimum of 20 feet in width unless otherwise required by the City Engineer. (Res. 20-11)
- G. Water lines must be designed and constructed to provide a minimum of two water feeds to each development, as to allow uninterrupted water conveyance to the development should one feed connection line experience a break.

- H. Water mains must be no less than eight inches in diameter, except for fire hydrant leads. The Planning Commission may make exceptions to this subject to verification by the City Engineer.
- I. Fire hydrants are required in all subdivisions. They must be located no more than ~~1,000~~ 800 feet apart and be within ~~500~~ 400 feet of any part of a building. All hydrants must be located a minimum of ~~1,000~~ 800 feet apart. However, the Planning Commission may require closer spacing where physical conditions or types of structures so warrant. Fire hydrants must remain at the end of water mains in all cul-de-sacs. Hydrants at the end of cul-de-sacs shall not be measured as total hydrant distance in relation to the main roadway. To eliminate future public way cutting or openings, all underground utilities for fire hydrants, together with the fire hydrants themselves, and all other water supply improvements must be installed before any final paving of a public right-of-way shown on the subdivision plat, unless otherwise approved by the Planning Commission.
1. For buildings equipped throughout with an approved automatic sprinkler system, the hose lay from the hydrant to any part of a building distance requirement shall be increased to 600 feet.
- J. Individual (separate) water service lines and water meters will be required for each unit in a PUD or cluster-type development, regardless of operation and maintenance responsibilities for water lines within the development. Water service lines may be connected into one service line extending to a water main, if each service line has its own curb stop installed in a street or right of way granted to the city for access, and a curb stop exists on the one service line extending to the main.
- K. The City is not responsible for the operation and maintenance of water and sewer mains in a private street unless such utilities are located within a dedicated public utility easement and the responsibility has been formally accepted by the City and subsequently is recorded as part of the plat.
- L. Water pipelines and ancillary materials are subject to the following:
1. The type of water pipe for distribution pipelines is specified within the City of Spring Hill, Standard Specifications for Water Additions.
  2. The type of water valves and hydrants is specified within the City of Spring Hill, Standard Specifications for Water Addition.
  3. The type of service assemblies, such as corporation cocks, service pipes, meter yokes, and water meters, are specified within the City of Spring Hill, Standard Specifications for Water Addition.
- M. All pipelines and ancillary materials must be furnished and installed in accordance with the City of Spring Hill, Standard Specifications for Water Additions.
- Master water metering: a master meter is required for multi-tenant complexes. These meters must be placed inside public rights-of-way at the City's main point of service. There must also be a secondary point of connection with backflow device for emergency uses only if the primary source fails.

- N. Utility trenches excavated into existing public arterial, or collector streets shall be backfilled with flowable fill as directed by the City Engineer or Water Superintendent. Trench limits shall be saw-cut into the existing pavement the width of which shall be limited to the minimum required to perform the work and accomplish backfilling. The use of flowable fill shall meet the requirements of Section 204 of the TDOT "Standard Specifications for Road and Bridge Construction". Streets, concrete curbs, gutters, driveways, median pavement, and sidewalks shall be restored as required to match existing construction. Base stone and asphalt paving shall be placed over the trench backfill with thicknesses and gradations equal to the existing pavement section. Each course of base stone and asphalt shall be thoroughly compacted with mechanical tampers. All repairs shall include full lane width resurfacing except when utilizing infrared technology as approved by the City Engineer. (PC Res. 19-14, 2/11/19)
- O. **Water Capacity Analysis** - To determine adequacy and sufficient of existing water utilities to serve a proposed subdivision, a water capacity analysis shall be prepared to evaluate the capacity of existing water utility infrastructure to serve the subject subdivision and identify required public utility infrastructure improvements necessary to be constructed in order to adequately and sufficiently serve the subject subdivision if approved. The cost for preparation of the water capacity analysis shall be the responsibility of the applicant.
1. The applicant shall furnish the following information model inputs:
    - a. Site elevation and finish floor elevation of all proposed structures including multistory building elevations.
    - b. Water demand for all proposed uses and structures including irrigation and fire flow/pressure requirements.
  2. The **Water Capacity Analysis** model will provide the following:
    - a. Demands expressed in gallons per day, gallons per minute and minimum fire flow requirements.
    - b. Tank elevation at 50% of tank storage.
    - c. Location of primary water source main.
    - d. The results of the analysis will include, but not be limited to, static pressure available at the site and residual pressure with 750gpm fire flow and a determination if the site can meet minimum pressure requirements. (Ord. 21-14)

## Memo Article 16.10: Specifications for Materials and Construction Procedures

**Discussion Item:** Adoption of the Subdivision Regulations Appendix I within the Unified Development Code as Article 16.10: Specifications for Materials and Construction Procedures.

**Request:** Staff is requesting to adopt language from Appendix I from the Subdivision Regulations and add to the Unified Development Code (UDC). Appendix I would add additional information defining the UDC. Appendix I states the standards and quality of pavement for the construction of roadways. The problem of pavement design has been an ongoing issue that has taken city staff time and effort on concerns that could have been prevented with the adoption of these standard practices.

**History:** Appendix I was adopted on April 8<sup>th</sup>, 2013, and the UDC was adopted on August 20<sup>th</sup>, 2018. The UDC was adopted to be a unified code; however, the UDC does not currently have these standards for the construction of pavement within the city.

**City Interdepartmental Cooperation:** The Engineering Department and Public Works would like to adopt language from Appendix I from the old Subdivision Regulations and place it within Article 16: Subdivision Regulations – Right of Way Design and Access Management of the UDC. The Engineering department would like to create section 16.10 Specifications for Materials and Construction Procedures to add to the UDC.

Public Works and Engineering Departments jointly discussed the necessity for these regulations and the Engineering Department is bringing the discussion forward with support from Public Works. The need for regulations on pavement design and construction has arisen on several occasions and both departments have agreed this is a needed section within the UDC to help with the review, design, and construction of roadway sections. With the addition of this section to the UDC, city staff will review the items submitted to confirm adherence to the code and keep the means and methods left to the Engineer of record, Developer, and Contractor.

**Changes:** Staff has added language and strike-through text to update the Appendix I language that staff finds necessary to provide clear information as well as include standard engineering practices necessary to complete reviews of the designs and resolve confusion and conflict that has been encountered.

Many requirements revised in Appendix I are due to updated TDOT specifications, clarifying private and public standards and responsibility, and ensuring ease of review and inspection. Adding requirements such as roadway markers helps with staff inspections and estimating quantities. Geotechnical reports are needed for review purposes. Quality control plans are needed for clarification on testing guidelines. Mix designs, if presented to staff can be viewed and confirmed prior to the installation saving both the city and developer money and time. Controversy has been had over the base stone requirements. Per TDOT base stone must be sealed immediately after compaction is achieved to preserve the state of the roadway.

**Conclusion:** Staff recommends that we proceed with a formal text amendment to the UDC adding Section 16.10 Specifications for Materials and Construction Procedures. The adoption of this section will help city staff, design engineers, contractors, and developers understand the priority of pavement design and construction.

## UDC Changes - Article 16.10 Specifications for Materials and Construction Procedures

### 16.10 SPECIFICATIONS FOR MATERIALS AND CONSTRUCTION PROCEDURES

Except as may otherwise be required by law, these rules and regulations govern the construction of new streets, existing streets requiring improvement or rehabilitation, and all associated improvements and appurtenances, both public and private, installed in the City of Spring Hill, Tennessee (“the City”). The general procedure for building the subdivision roads required in these regulations shall begin with the clearing of the ~~rights-of-way~~ public or private roadway and then construction of the roadway by means of cut or fill grading. After completion and ~~approval of subgrade cut and fill grading, all utilities and drainage structures shall be installed~~ a subgrade letter containing a table with elevations of designed roadway, graded roadway and the difference shall be signed and sealed by the engineer of record certifying the subgrade is within five tenths of the designed elevations. All utilities and drainage structures shall be installed after acceptance of the subgrade letter by the City Engineer or designee. After utilities have been installed then the final subgrade shall be approved, and roadway base stone shall then be installed. Pug mill mix base shall be placed in maximum lifts of four (4) inches compacted to 98% density. The stone base shall be brought to grade with the proper crown before compaction tests are taken. The dimensions and compaction requirements of the typical section are minimums and shall be met or exceeded. After the base has been approved by the City of Spring Hill the roadway shall then receive the asphalt binder mix and curb and gutter/extruded curbing.

Roadway construction shall be in accordance with TDOT specifications and shall specifically refer to the Tennessee Department of Transportation Standard Specification for Road and Bridge Construction, latest edition, and any further amendments or additions. The State of Tennessee Department of Transportation Division of Design and Structures Standard Roadway and Structure Drawings with updates or revisions is hereby adopted as part of these regulations in addition to the standards specified herein, with these standards to be used as directed or approved by the City of Spring Hill or their authorized representative.

1. **Locations:** Contractors shall install stationing markers along new and existing roadways during construction in association with construction activities associated with the development.
2. **Curb Section:** The stone base shall be primed with a bituminous prime coat in its entirety prior to installation of the binder mix. The extruded curbs shall be laid directly on the asphalt binder surface and allowed to cure. Earth shall be placed behind all curbs so that within four (4) feet of the curb the ground slopes toward the roadway shall be swept from the surface and the asphalt topping mix shall be laid from curb to curb. At the completion of 80% of the development or the last paving season before the expiration of the maintenance bond, the surface mix shall be applied.

A. ~~Drainage~~

~~The overall drainage of the road or network of roads will be coordinated with, and approved by, the City of Spring Hill. Sizes and lengths of cross drains and driveway culverts, where required, shall be determined to be consistent with the following minimum requirements: For driveway culverts, a minimum diameter of eighteen (18) inches, and a minimum length of twenty (20) feet; for cross drains, a minimum diameter of eighteen (18) inches.—~~

- ~~1.— All requested revisions to previously approved plans and engineered storm water infrastructures shall be submitted to the City of Spring Hill **Director of Development Services or designee**. The Director will then transmit to the MS4 Department and City Engineer any other affected municipal department for review and approval consideration prior to commencement of such revisions.—~~
- ~~2.— All catch basins, area drains, storm water manholes and junction boxes, etc. shall be constructed of pre-cast concrete, no brick shall be allowed. All risers are also to be constructed of concrete, either pre-cast or poured in place.—~~
- ~~3.— Reinforced concrete pipe shall conform to the minimum standards for Class III reinforced pipe and shall be utilized under roadways and all paved areas whether public or private developments. All RCP storm water pipes and structure joints and connections shall be grouted, with non-shrink grout, and/or otherwise sealed both inside and out. Butylene gasket materials shall also be utilized within pre-cast manholes and structures to further seal the joints and connections. Concrete and HDPE storm piping connections shall be sealed with proper collar rings when applicable and directed by the City of Spring Hill.—~~
- ~~4.— Dual wall polypropylene (PP) storm drainage pipe (18"–60") shall also be allowed for use within paved areas (public and private) only if the installation requirements and backfill materials are utilized as recommended by the manufacturer. Dual walled smooth interior PP pipe shall be in accordance with AASHTO HB Section 30, T-341, R-16 and MP-21-11 along with ASTM C969, C1103, D2321, D3212, F477, F1417, F2487, F2736, and F2881. Detectable warning tape shall be utilized in the trench of the PP pipe when installed. A minimum cover of 2-feet is required on all PP pipe. Six inches of pipe bedding of TDOT #67 stone shall be required for all PP pipe. A minimum cover of two feet is required for all storm drainage pipe installation whether RCP or PP pipe. Approved backfill soil material, free of any rock material greater than 2", or total depth backfill with TDOT No. 67 stone shall be allowed. Approved soil backfill shall be at maximum lifts of 8" compacted to 98% density. Where in public or private roadways, if soil backfill is utilized, an additional 2-year maintenance bond is required above the standard one-year maintenance bond to ensure no settlement or pipe failures occur. Standard HDPE piping may be utilized outside of paved areas as long as its installation is in accordance with the manufacturer's recommendations. Suitable bedding and soil, free of rocks, and backfill will be required. The minimum cover above HDPE piping shall be 2-feet.—~~

- ~~5. Through lot drainage ditches shall be built to a grade that will provide positive drainage, and in no case shall the slope of the ditch be less than 0.5 percent (a fall of 0.5 foot in 100 feet). The design engineer should strive to achieve a minimum slope of 1% for all piping and drainage ditches.—~~
- ~~6. Drainage on individual residential and commercial lots within a larger development shall be complimentary to those engineered for the larger development that they neighbor and also those that they fall within. Storm water shall not be directed in such a manner that it flows outside of the designated easements or rights-of-way during 25-year 100-year rainfall events. If excessive grades or elevation dictate, gutters and downspouts shall be directed in a manner to prevent storm water drainage onto neighboring property at lower grade.—~~
- ~~7. Cross drains and driveway pipes shall be built on straight line and grade, and shall be laid on a firm base, but not on bedrock. Pipes shall be laid with the spigot end pointing in the direction of the flow and with the ends fitted and matched to provide tight joints and a smooth uniform invert. Headwall will be constructed at both ends of the cross drain and driveway pipes in accordance with of these regulations.—~~
- ~~8. All final grades and elevations are to be verified by the design engineer on all retention and detention basins. Drainage easement alignments are also to be verified by the design engineer. A written letter is required to be submitted by the design engineer for the verification of the elevations and grades. Each basin shall have a permanent concrete benchmark for reference with the location identified on the plan. As built plans with these grades and elevations are to be submitted to Public Works to be maintained as permanent record prior to the acceptance under maintenance bond's and during final inspection.—~~
- ~~9. All retention and detention basins shall be designated as common ground on the final plats for subdivisions and other residential and commercial developments. All such storm water basins shall be the responsibility of the Home Owners Association to maintain. Easements for adequate access to accomplish maintenance and inspection shall be provided.—~~
- ~~10. All underground storm water conveyances shall be inspected by the City to ensure proper installation prior to acceptance by the City. Digital recording and inspection shall be performed by the City of Spring Hill Storm Water Coordinator the contractor and sent to the City for verification.—~~
- ~~11. All underground storm water conveyances that are found to be contaminated with sediment shall be cleaned by Jet Vac and all defects shall be repaired to the satisfaction of the City of Spring Hill Storm Water Department at the developer's expense. All final work shall be re-verified by pipe camera inspection recorded on Digital by the City contractor for the City.—~~
- ~~12. Upon completion of storm water infrastructure construction all property owners and Home Owners Associations shall enter into a storm water maintenance~~

~~agreement to maintain both private easements and common ground containing retention and detention basins, swales and other storm water structures. This agreement shall be permanently attached to the property deed requiring new owners to adhere to the agreement.~~

- ~~13. Storm water easements shall not be blocked with fences, sheds, pools, trees, shrubs or any other structures or items that may block proper drainage or that may affect storm water capacity and or flow rates or otherwise inhibit access for maintenance or inspection of the easement.~~

**~~B. Stabilization of Ditches~~**

~~All drainage ditches shall be stabilized to prevent erosion as indicated in these regulations. All open ditches shall be stabilized in accordance with the following requirements:~~

<b>Table 16-7: Size of Nearest Culvert</b>			
<b>Upstream</b>	<b>Seed / Erosion Blankets</b>	<b>Sod</b>	<b>Concrete Lines</b>
<b>18"</b>	Grades Less than 3.0%	Grades 3-12%	Grades >12%
<b>21"-24"</b>	Grades Less than 1.5%	Grades 1.5-7.0%	Grades >7.0%
<b>30"-36"</b>	Grades Less than 1.0%	Grades 1.0%-4.0%	Grades >4.0%
<b>42"-72"</b>	-	-	Grades >2.5%

**Note:** ~~Where culverts empty into ditches with grades exceeding the grade of the culverts, the minimum requirements set forth above may not be satisfactory. In this case, the treatment shall be specified by the City of Spring Hill Engineer or his representative.~~

**~~C. Concrete Lining~~**

- ~~1. Ditches that require lining with concrete shall be lined to a height above the bottom of the ditch no less than one-half (1/2) the diameter of the nearest culvert (upstream). However, in no case shall the lining extend less than one foot above the bottom of the ditch.~~
- ~~2. Lined ditches shall be constructed of Class "B" concrete (3000 p.s.i. 28-day strength). The lining shall be firmly bedded and securely attached to adjacent drainage structures. Concrete mixture used will be such as to attain a smooth, monolithic, and reasonably watertight lining, and be placed upon a firm subgrade which will be void of all objectionable matter (grass, roots, etc.).~~
- ~~3. The finished lined ditch shall conform to designated lines and grades and shall add rather than detract from the appearance of the roadway.~~

**~~D. Sodding~~**

- ~~1. Ditches that require sodding shall be sodded to the top of slope of the ditch. The sod shall consist of a live, dense, well-rooted growth of permanent grasses, free from~~

~~Johnson grass, Nut grass, and other objectionable grasses, and suitable for the soil in which it is to be placed. The sod shall be eight (8) inches wide, not less than eighteen (18) inches long, and have at least three (3) inches in thickness of soil in its roots. The sod shall be placed only when the soil is moist and favorable to growth. No sodding shall be done between November 1st and April 1st unless otherwise directed by the City of Spring Hill. The area to be sodded shall be constructed to the designated lines and grade, and the surface loosened to a depth of not less than 3 inches with a rake or other device. If necessary, it shall be sprinkled until saturated at least one inch in depth and kept moist until the sod is placed thereon. It will not be required but it is recommended that immediately before placing the sod, commercial fertilizer (6-12-12) shall be uniformly applied at the rate of 18 pounds per 1,000 square feet. However, the City of Spring Hill will hold the Developer responsible for an acceptable stand of grass in the ditches for stabilization.~~

- ~~2. The sod shall be placed on the prepared surface with the edges in close contact and shall be pounded into place with wooden tamps, or other satisfactory equipment. On steep slopes, pinning or pegging will be required to hold the sod in place.~~

~~E. **Seeding**~~

- ~~1. The area to be seeded shall be constructed to the proper line and grade, and the surface loosened to a depth of not less than 3 inches with a rake or other device. After the top 3 inches of soil has been rendered loose, friable, and reasonably free from large clods, rocks, large roots, or other undesirable matter, lime and fertilizer shall be carefully worked into the soil in the following amounts:~~
- ~~2. Agricultural Limestone (85% Calcium Carbonate Equivalent, 85% through a 10-mesh screen; 50% through a 40-mesh screen; 3 tons per acre, 140 pounds per 1,000 square feet). Commercial Fertilizer shall be (6-12-12) at 1,300 pounds per acre (30 pounds per 1,000 square feet.)~~
- ~~3. Seeds shall be uniformly sown on the prepared seedbed in accordance with the following schedule and raked, dwelled, or harrowed approximately one-quarter inch into the soil.~~
- ~~4. Mulched areas shall be mulched with one and one-half (1 ½) to two (2) tons per acre of small grain straw of fescue, orchard grass or native grass hay of less than 20% moisture, so that 25 — 30 % of the ground is visible. The mulched area shall be watered if necessary to maintain a reasonably moist condition until germination and continued growth is insured.~~

~~F. **Headwall Requirements**~~

- ~~1. All headwalls for cross drains and driveway pipe shall be poured in place concrete (Class "A", 4000 p.s.i. 28 days).~~
- ~~2. Concrete headwalls shall be not less than 12" inches thick for pipes 18 inches through 30 inches, and shall be adequately reinforced for pipe larger than 30".~~
- ~~3. Length of wingwalls and height of headwalls for all pipes shall be determined by the amount of fill, the size of pipe, and the general conditions surrounding the~~

pipe.—

- ~~4. If decorative or ornamental headwalls are desired, approval of such structures shall be given by the City of Spring Hill upon review and such headwalls should be shown in detail on the plan.~~
- ~~5. Headwalls for driveway pipe on each individual lot will be inspected and approved by the City of Spring Hill or their authorized representative prior to or concurrently with the Building Inspector's inspection for issuance of an occupancy permit.—~~

**G. Curbs**

Machine-laid (extruded) 8" height by 12" base curbs are permitted which meet the following specifications:

**1. Concrete**

- a. Concrete Strength (28 day) 4,000 PSI
- b. Maximum Slump 1-1/2 inch

Table 16-8: Gradation of Aggregate (river gravel)	
Sieve Size	Percent Passing
4	96-100
8	80-100
16	55-80
30	45-65
50	10-25
100	2-7

**H. Alignment**

Curbs shall not vary from the specified alignment (on the plans) more than 0.10 feet.

**I. Typical Section**

Unless otherwise directed by the City Engineer, curbs shall conform to the typical section shown within the regulations. Curbs shall be continuous across driveways and shall be recessed to provide an entrance way of four (4) inch thickness.

**J. Clearing and Grubbing**

Before grading is started, the entire street right-of-way including side slopes, shall be cleared of all objectionable matter, such as trees, stumps, roots, weeds, heavy vegetation, debris, etc.: disposal of this material will be in accordance with current Local, State, or Federal regulations.

**K. Preparation of Subgrade**

1. For both public and private developments, a geotechnical report shall be submitted prior to the start of construction. Submit in writing the proposed Quality Control Plan for the City's approval. Include in this plan the sampling, testing, and inspection activities, and the anticipated frequencies of each, which the Contractor will follow to maintain quality control. For private developments

please include testing procedures referencing TDOT specs or testing procedures using a nuclear density testing along with proof rolling for approval by City staff.

2. Fill material shall be evenly and uniformly spread in layers not to exceed eight (8) inches in thickness over the entire width and thickness of the embankment section. Each layer shall be thoroughly rolled with an approved sheep's foot or pneumatic tired roller. If in the opinion of the City of Spring Hill the soil is too dry, water will be added by a pressure distributor or other approved method. Soils which are too wet will be allowed to dry before compaction and further filling is attempted.
3. Fills shall be compacted to ninety-five ~~eight~~ (98%) percent of the maximum dry density according to standard proctor density (ASTM-D-698-07) material used. Density tests shall be conducted by a local testing laboratory, approved by the City of Spring Hill and licensed by the State of Tennessee, and shall be at the expense of the developer. Reports shall be submitted directly to the City Engineer. A minimum of one density test per lift for each five-hundred (500) feet of roadway will be required.
4. If rock is encountered it shall be removed to a depth of at least twelve (12) inches below the subgrade of the road, and suitable backfill material will be used to build the cut section up to proposed grade.
5. The finished subgrade shall provide for super elevation and crown of the roadway.
6. All roadways shall be constructed to subgrade prior to installation of any utilities to located within the roadway.

**L. Base And Paving**

**1. Typical Section**

The type base and surface to be used shall be shown on the approved plans and shall not vary from the typical roadway sections of these specifications. The placement of all base and surface materials shall be at the expense of the developer. Test of the subgrade required under these specifications, by a private testing laboratory, shall be submitted to the City Engineer prior to placement of the base course. The developer/contractor shall submit all mix designs/job mix formulas to the City for review and approval. Crushed stone produced on site shall not be used in roadway construction. All materials used in the construction of roadways must be supplied from a TDOT approved vendor.

**2. Crushed Stone Pug Mill Mix to be Used in Roadway Base Construction**

- a. After the subgrade has been inspected and approved, by the City of Spring Hill or their authorized representative, a base shall be constructed of the width and thickness indicated in the roadway typical sections.
- b. Description: Crushed stone base (Pug Mill Mix) shall consist of a base course constructed with an approved mixture of crushed stone, water,

~~and calcium chloride~~, bonded by rolling and/or vibratory compaction; maintained under traffic; and in conformity with the lines, grades, and cross sections as indicated on the plans,

- c. Scope: These specifications cover the quality, gradation, and mixing of materials composing Pug Mill Mix to be used in roadway base courses.

#### M. Materials

All materials used in this construction, in addition to the general requirements of these specifications, unless otherwise stipulated, shall conform to the technical specifications as set forth below and by TDOT standards. Standards which conflict shall require adherence to the most restrictive standard of the two.

1. Aggregates for Mineral Aggregate Base and Surface Courses shall be crushed stone, crushed slag, crushed or uncrushed gravel, or crushed or uncrushed chert, together with such materials manufactured sand or other fine materials naturally contained, or added thereto as needed to conform with these specifications.
2. The aggregate for mineral aggregate base and surface courses shall consist of hard durable particles or fragments of stone, slag, gravel, or chert, and other finely divided mineral matter. Individual materials shall meet the requirements specified below:
  - a. Crushed stone shall be free of silt and clay. The coarse aggregate portion of the stone shall have a percentage of wear of not more than fifty, and when subjected to five alternations of the sodium sulfate soundness test, the weighted percentage of loss shall not exceed fifteen.
  - b. Crushed slag shall be free of silt and clay and shall meet the quality requirements of crushed stone. It shall be reasonably uniform in density and shall have a dry rotted weight of at least seventy pounds per cubic foot.
  - c. Crushed gravel and crushed chert shall be screened and all oversize material shall be crushed and fed uniformly back over the screen. The coarse aggregate portion (retained on the No. 4 sieve) shall have a percentage of wear of not more than thirty (30). The portion of the material passing the No. forty (40) sieve shall be non-plastic, or shall have a liquid limit of not more than twenty-five and a plasticity index of not more than six. If fine aggregate, coarse aggregate or binder, in addition to that present in the base material, is necessary in order to meet the gradation requirements, or for satisfactory bonding of the material, it shall be uniformly blended with the base course material at the mixing plant by a mechanical feeder to maintain a uniform flow on the belt to the mixer. Blending of materials on the stockpiles or in the pits by bulldozer,

- d. clamshell, dragline or similar equipment will not be permitted.
- e. The composite gradation of this aggregate shall be as follows:

Table 16-9: Total Percent by Weight Passing Sieves	
Grading	D
1 1/2"	100
1"	85-100
3/4"	60-95
3/8"	50-80
No 4	40-65
No.16	20-40
No.10	9-18

- 3. ~~Calcium Chloride will be incorporated in the crushed stone aggregate base material mixture at a rate of approximately 0.06 bag of Type two (2) (concentrated) per ton of aggregate (based upon a bag weight of 80 pounds this will be approximately 5 pounds of calcium chloride per ton of aggregate). Calcium chloride used shall conform to the requirements of AASHOM-114.~~
- 4. Water shall be incorporated in the crushed stone aggregate base material mixture during the mixing operation in the amount necessary to provide moisture content satisfactory for compacting. Water used in the mixing process shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable matter, or other substances injurious to the finished product. ~~Water will be tested in accordance with AASHO. Water known to be of potable quality may be used without test.~~ Where the source of water is relatively shallow, the intake shall be so enclosed as to exclude silt, mud, grass, or other foreign materials. **Water used in mixing materials shall meet TDOT standards.**
- 5. The mixture shall be deposited uniformly on the subgrade ~~from spreader boxes~~ in a minimum of two layers. After each layer is deposited, it shall be smoothed to grade and cross-section with a power grader and rolled.
- 6. The compacted dry weight per cubic foot of material in each layer shall not be less than ninety-eight (98%) percent of that determined as an average of maximum compaction for the material in use. The determination of the average maximum compacted dry weight pounds per cubic foot shall be calculated by multiplying the Specific Gravity of the mineral aggregate by fifty-three (53). This compacted density requirement shall apply regardless of the type of compaction used. Testing shall be conducted by a State licensed testing laboratory, and test results shall be submitted to the City Engineer for approval. The crown, width, depth, and grade of the base stone shall be approved by the City Engineer prior to testing for compaction. **For private developments please include testing procedures**

referencing TDOT specs or testing procedures using a nuclear density testing along with proof rolling for approval by City staff.

#### **N. Paving Specifications and Procedures**

For both public and private please submit in writing the proposed Quality Control Plan for the City's approval. Include in this plan the sampling, testing, and inspection activities, and the anticipated frequencies of each, which the Contractor will follow to maintain quality control. For private developments please include testing procedures referencing TDOT specs or testing procedures using a nuclear density gauge along with proof rolling for approval by City staff. The stone base, prepared as outlined herein, shall be sprinkled lightly with water to settle any loose dust. A bituminous prime coat shall then be applied within 24 hours or before the next rain event, whichever is sooner, after compaction is achieved as specified below. If a prolonged period of time or major rain event has occurred, the City the right to require an additional proof roll to ensure the integrity of the base stone. After the crushed stone base and bituminous prime coat has been inspected by the City or their authorized representative, the base shall be primed and tacked (as necessary) and the asphaltic concrete binder mix shall be placed as indicated on the roadway typical section with the specifications as outlined below. After the binder mix has been inspected and approved by the City of Spring Hill or their authorized representative, a tack coat with specifications as stated below shall be applied and asphaltic concrete paving, surface mix will be installed as indicated in the roadway typical sections with the Specifications outlined below. Topping mix shall not be installed until 80% build-out is achieved.

The specifications for material and construction procedures for asphaltic concrete paving, grading B Modified Mix shall be as specified in Section 307, as subsections and special provisions pertaining thereto of the Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction ~~March 1, 2006 January 1, 2021~~ or latest edition and any further amendments or additions (TDOT specs.). The specification for material and construction procedures for Prime Coat shall be as specified in Section 402 and all subsections and special provisions pertaining thereto of TDOT specs. The specification for material and construction procedures for E Mix shall be as specified in Section 411, all subsections and special provisions pertaining thereto of the TDOT SPECS. The specifications for the Tack Coat between the 307 Binder Mix and the E Mix shall be as specified in Section 403 all subsection and special provisions pertaining thereto of the TDOT specs.

#### **O. Signs**

The developer shall furnish and install all roadway signs in accordance with the current edition of the Manual on Uniform Traffic Control Devices (MUTCD). These shall include signs for warning, regulation, the direction of traffic and the proper labeling of streets.

1. Street name signs shall be placed at every intersection and shall contain reflective silver on a green background engineering grade reflective sheeting. The name

plate shall be 0.80 – 0.100 aluminum. The name plate or plates as necessary shall be placed by use of a properly fitting adapter on a 2½ inch round galvanized post or a two (2) pound per foot painted U-Channel railroad steel post.

2. Traffic warning and regulation signs shall be placed as required at all appropriate intersections or on the roadside in accordance with the Traffic Plan which shall be submitted to the City of Spring Hill Engineer to be approved with the construction plans. The size and placement of all traffic signs shall conform to the requirements of the current edition of the MUTCD.

#### **P. Testing of Public Roadway Infrastructure**

Submit in writing the proposed Quality Control Plan for the City's approval. Include in this plan the sampling, testing, and inspection activities, and the anticipated frequencies of each, which the Contractor will follow to maintain quality control. Testing shall be conducted by a State licensed testing laboratory, approved by the City of Spring Hill, and shall be at the expense of the developer. ~~This requirement shall be implemented when the stability of the roadway subgrade or roadway base is not acceptable by the City of Spring Hill's proof rolling technique, of a fully loaded tandem dump truck, and prior to the asphalt binder mix being installed.~~ Should the City determine that the roadway subgrade, base, and/or fill materials are unsuitable then the developer shall retain a state licensed geotechnical engineer and testing laboratory to perform analysis of the soils to determine if they are suitable for such use and also determine if the materials can reach the required compaction density for the said uses.

Compaction and density testing shall be performed at **random** intervals or **areas chosen by the City or City representative** not to exceed 100-feet and shall meet a compaction of 98% density for each tested location. Should the compaction not pass the density testing requirements, then the developer shall remove the unsuitable materials and rebuild the section of subgrade and base with approved suitable materials. Retesting of the compaction will then take place on the new subgrade and roadway base materials. Reports showing locations of testing and all test data shall be provided to the City Engineer, throughout the duration of the roadway repairs and reconstruction. A detailed letter from a state-licensed geotechnical engineer attesting that all roadway improvements have been constructed in accordance with the specifications contained within the City of Spring Hill Subdivision Regulations will be required prior to allowing the asphalt binder layer to be installed. The letter shall contain the seal of the engineer, and be in report form, including all associated testing results.

#### **Q. Testing and Inspection of Backfill at Utility and Storm Sewer Trenches**

Backfill materials utilized for utilities located within the roadways, drives, paved areas, concrete areas and parking lots shall be TDOT #67 stone for utility beddings and envelopes in accordance with these regulations and the City of Spring Hill's Water and Sewer Specifications. Backfill material of such trenches shall be full trench depth of TDOT #67 stone with the upper most 12-inches being pug mill mix (two 6-inch lifts) compacted to

98% density. The upper 12-inches of compacted pug mill can be included within the requirements of the compacted roadway base stone. Should the developer choose to backfill with approved compacted suitable soils, free of organic root materials, grass, or other foreign materials, he shall install the soil in maximum compacted lifts of 8-inches with the upper most 12-inches being compacted pug mill mix (two 6-inch lifts). ~~Should the City of Spring Hill determine the materials being utilized are unsuitable then the developer shall have~~ A certified geotechnical engineer and testing laboratory shall perform an evaluation of the soils to determine if the soils are an approved roadway subgrade and trench fill material along with compaction testing of the soils during each lift of the trench backfill. These compaction tests shall be a minimum of 98% density. The developer shall be required to post a maintenance bond for an additional two years, in addition to the standard one-year maintenance bond if soil backfill is utilized in place of full depth stone backfill. In either case the utilities shall contain a 6-inch bedding and 12-inch envelope over and around the pipe prior to backfill with soils materials. Test data shall be provided by a licensed Geotechnical Engineer prior to approval of such roadway subgrade and base, and prior to installation of the asphalt binder layer.

## Memo Standard Details

**Discussion Item:** The Engineering Department has put together Standard Details for the City of Spring Hill.

**Request:** Staff is requesting to adopt the Standard Details for the ease of contractors, engineers, developers, and city staff.

**History:** The City has details in specifications throughout departments such as in the water and sewer specifications and the Unified Development Code. Staff has combined the details onto sheet sets that can be easily inserted into all plan sets this will ensure that developments use the City details in the field.

**City Interdepartmental Cooperation:** The Engineering, Utilities, and Public Works Department have agreed that putting the standard details in one combined location would ease the confusion between code intent and materials to be used.

**Look Ahead:** Public Works is working on a Specifications Book that will include more details that will need to be published with the Standard Details set. Both departments believe the current details are needed now since city staff has had many developments with issues onsite and believe this section will bridge the interpretation of the installation methods until the Public Works department can release a specifications book.

**Conclusion:** Staff recommends that we proceed with publishing the Standard Details. The details will help city staff, design engineers, contractors, and developers understand the priority of pavement design and construction.

# Transportation Standard Details



<p>NOTES</p> <ol style="list-style-type: none"> <li>REFERENCE "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION, SECTION 702 - "SMOOTH CONCRETE CURBS, GUTTERS, AND COMBINED CURB AND GUTTER"</li> <li>THE FRONT FACE OF THE CONCRETE CURBS FOR ALL DEGREES OF CURVATURE SHALL CONFORM TO THE CONTOUR OF THE CURVE. NO CHORD SECTIONS WILL BE PERMITTED.</li> <li>CONCRETE: CLASS A (4,000 PSI, 0% AIR)</li> <li>EXPANSION JOINTS: 1/2" THICK U.N.O. (SEE ALSO DRAWING RP-10)           <ol style="list-style-type: none"> <li>RUBBERIZED EXPANSION JOINT FILLER (AASHTO M153, TYPE 1)</li> <li>POLYPROPYLENE FOAM JOINT FILLER (ACTM D8130)</li> </ol> </li> <li>EXPANSION JOINTS SHALL BE PLACED AS FOLLOWS:           <ol style="list-style-type: none"> <li>AT TANGENT POINTS OF CIRCULAR CURBS</li> <li>BETWEEN CURBS AND ABUTTING ROAD OBJECTS</li> <li>AT OTHER PLACES WHERE STRESSES MAY DEVELOP</li> <li>TO LINE UP WITH PAVEMENT JOINTS WHERE THE ADJACENT PAVEMENT IS CONCRETE.</li> <li>AT A MAXIMUM SPACING OF 10 FEET</li> </ol> </li> <li>CONTRACTION JOINTS: SPACED AT 10 FEET. SPACING MAY BE REDUCED FOR CLOSURES, BUT NOT LESS THAN 6 FEET.</li> <li>COMBINED CURB AND GUTTER BASED ON TDOT STD. DRAWING RP-VI-10</li> <li>INLET CASTINGS: JIS 3302-V OR APPROVED EQUAL WITH DIRECTIONAL VANE GRATES AND SURFACE MOUNTED ENFRONTRONIC PLATES STATING "DUMP NO WASTE DRAINS TO RIVER". MODIFY TDOT STRUCTURES AS NEEDED TO PROVIDE FULL BEARING AT CASTING.</li> </ol> <p><b>24" CURB AND GUTTER</b> N.T.S. <b>RP-1</b></p>	<p>NOTES</p> <ol style="list-style-type: none"> <li>CONTRACTION JOINTS: 1" WIDE FULL DEPTH AT MAXIMUM OF 50' CONDITIONAL INTERVALS, AT ALL ABUTTING STRUCTURES, DRIVEWAYS AND TANGENT POINTS OF RADIUS RETURNS.</li> <li>TOOLED CURB CONTROL JOINTS: 2" WIDE 1" DEEP, 5' O.C.</li> <li>ALL CONCRETE TO COMPLY WITH ACI 318 WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAY TEST</li> <li>CONCRETE TO BE AIR-ENTRAINED WITH AN AIR CONTENT OF 4-6%</li> <li>JOINTS TO BE FILLED WITH RECYCLED RUBBER EXPANSION JOINT MATERIAL CONFORMING TO ASTM D1751 AND ASTM 1752.</li> </ol> <p><b>8" EXTRUDED CONCRETE CURB</b> N.T.S. <b>RP-2</b></p>	<p>NOTES</p> <ol style="list-style-type: none"> <li>REFERENCE "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION, SECTION 702 - "SMOOTH CONCRETE CURBS, GUTTERS, AND COMBINED CURB AND GUTTER"</li> <li>THE FRONT FACE OF THE CONCRETE CURBS FOR ALL DEGREES OF CURVATURE SHALL CONFORM TO THE CONTOUR OF THE CURVE. NO CHORD SECTIONS WILL BE PERMITTED.</li> <li>CONCRETE: CLASS A (4,000 PSI, 0% AIR)</li> <li>EXPANSION JOINTS: 1/2" THICK U.N.O. (SEE ALSO DRAWING RP-10)           <ol style="list-style-type: none"> <li>RUBBERIZED EXPANSION JOINT FILLER (AASHTO M153, TYPE 1)</li> <li>POLYPROPYLENE FOAM JOINT FILLER (ACTM D8130)</li> </ol> </li> <li>EXPANSION JOINTS SHALL BE PLACED AS FOLLOWS:           <ol style="list-style-type: none"> <li>AT TANGENT POINTS OF CIRCULAR CURBS</li> <li>BETWEEN CURBS AND ABUTTING ROAD OBJECTS</li> <li>AT OTHER PLACES WHERE STRESSES MAY DEVELOP</li> <li>TO LINE UP WITH PAVEMENT JOINTS WHERE THE ADJACENT PAVEMENT IS CONCRETE.</li> <li>AT A MAXIMUM SPACING OF 10 FEET</li> </ol> </li> <li>CONTRACTION JOINTS: SPACED AT 10 FEET. SPACING MAY BE REDUCED FOR CLOSURES, BUT NOT LESS THAN 6 FEET.</li> <li>INLET CASTINGS: NEENAH R-302-TR / R-301-1L OR APPROVED EQUAL WITH TYPE L GRATES. MODIFY TDOT STRUCTURES AS NEEDED TO PROVIDE FULL BEARING AT CASTING.</li> </ol> <p><b>LOCAL STREET ROLLOVER CURB AND GUTTER (RESIDENTIAL AREAS ONLY)</b> N.T.S. <b>RP-4</b></p>	<p>NOTES</p> <ol style="list-style-type: none"> <li>SIDEWALK CROSS SLOPE: 1.5% DESIRABLE, 2.0% MAX.</li> <li>APRON RAMP SLOPE:           <ol style="list-style-type: none"> <li>0% MAX, 1.5% MIN. AT RESIDENTIAL DRIVEWAYS, EXCEPT MULTI-FAMILY RESIDENTIAL</li> <li>0% MAX, 1.5% MIN. AT ALL OTHER DRIVEWAYS</li> </ol> </li> <li>MINERAL AGGREGATE BASE: 4" MIN. THICK 303-01 MINERAL AGGREGATE, TYPE A BASE, GRADING D</li> <li>CONCRETE: CLASS A (4,000 PSI) WITH SYNTHETIC FIBER REINFORCEMENT           <ol style="list-style-type: none"> <li>8" MIN. THICK AT RESIDENTIAL DRIVEWAYS, EXCEPT MULTI-FAMILY</li> <li>EXPANSION JOINTS: 1/2" THICK U.N.O. (SEE ALSO DRAWING RP-10)               <ol style="list-style-type: none"> <li>RUBBERIZED EXPANSION JOINT FILLER (AASHTO M153, TYPE 1)</li> <li>POLYPROPYLENE FOAM JOINT FILLER (ACTM D8130)</li> </ol> </li> <li>DETECTABLE WARNING: YELLOW (EXCEPT PER SECTION 2.4 B), CAST-IN-PLACE (ADA SOLUTIONS OR APPROVED EQUAL)               <ol style="list-style-type: none"> <li>PROVIDE AT DRIVEWAYS WITH YIELD OR STOP CONTROL ONLY</li> </ol> </li> </ol> </li> </ol> <p><b>STANDARD CONCRETE DRIVEWAY APRON</b> N.T.S. <b>RP-5</b></p>
<p>NOTES</p> <ol style="list-style-type: none"> <li>SIDEWALK CROSS SLOPE: 1.5% DESIRABLE, 2.0% MAX.</li> <li>MINERAL AGGREGATE BASE: 4" MIN. THICK 303-01 MINERAL AGGREGATE, TYPE A BASE, GRADING D</li> <li>CONCRETE: 4" MIN. THICK CLASS A (4,000 PSI, 0% AIR) WITH SYNTHETIC FIBER REINFORCEMENT, BROOM FINISH</li> <li>EXPANSION JOINTS: SEE DRAWING RP-10</li> <li>PROVIDE TRANSVERSE JOINTS FORMING BLOCKS AS NEARLY TO SQUARE AS PRACTICAL</li> <li>PROVIDE A LONGITUDINAL JOINT CENTERED ON WALK WHERE SIDEWALK WIDTH IS 6' 0" OR GREATER</li> </ol> <p><b>CONCRETE SIDEWALK</b> N.T.S. <b>RP-8</b></p>	<p>NOTES</p> <ol style="list-style-type: none"> <li>CROSS SLOPE: 1.5% DESIRABLE, 2.0% MAX.</li> <li>MINERAL AGGREGATE BASE: 4" MIN. THICK 303-01 MINERAL AGGREGATE, TYPE A BASE, GRADING D</li> <li>ASPHALT: 4" BASE STONE, 2" ASPHALT</li> <li>EXPANSION JOINTS EVERY 20 FEET</li> <li>PROVIDE TRANSVERSE JOINTS FORMING BLOCKS AS NEARLY TO SQUARE AS PRACTICAL</li> <li>PROVIDE A LONGITUDINAL JOINT CENTERED ON WALK WHERE PATH IS 6' 0" OR GREATER</li> </ol> <p><b>MULTI-USE PATH</b> N.T.S. <b>RP-9</b></p>	<p>NOTES</p> <ol style="list-style-type: none"> <li>EXPANSION JOINTS           <ol style="list-style-type: none"> <li>RUBBERIZED EXPANSION JOINT FILLER (AASHTO M153, TYPE 1)</li> </ol> </li> <li>1/4" MIN. THICK EXPANSION JOINTS SHALL BE PLACED AS FOLLOWS:           <ol style="list-style-type: none"> <li>TRANSVERSE TO SIDEWALK AT 20 FEET APART</li> <li>TRANSVERSE TO SIDEWALK AT CURB EXPANSION JOINTS WHERE SIDEWALK IS BUILT DIRECTLY AGAINST CURB</li> <li>BETWEEN CURB AND SIDEWALK WHERE SIDEWALK IS BUILT DIRECTLY AGAINST CURB</li> <li>AT ABUTTING ROAD DRIVEWAYS OR OTHER SIDEWALKS</li> <li>AT CHANGES IN SIDEWALK DIRECTION, INCLUDING AT STREET CORNERS AND AT CURVED SECTIONS</li> <li>AT OTHER PLACES WHERE STRESSES MAY DEVELOP</li> </ol> </li> <li>1" THICK EXPANSION JOINTS SHALL BE PLACED WHERE SIDEWALK ABUTS CIRCULAR CURBS, BUILDINGS, AND WALLS.</li> </ol> <p><b>SIDEWALK EXPANSION JOINT</b> N.T.S. <b>RP-10</b></p>	<p>NOTES</p> <ol style="list-style-type: none"> <li>SIDEWALK CROSS SLOPE: 1.5% DESIRABLE, 2.0% MAX.</li> <li>RAMP SLOPE: 8.3% MAX, 0% MIN. SLOPE SHALL NOT REQUIRE RAMP LENGTH TO EXCEED 15 FEET.</li> <li>MINERAL AGGREGATE BASE: 4" MIN. THICK 303-01 MINERAL AGGREGATE, TYPE A BASE, GRADING D</li> <li>CONCRETE: CLASS A (4,000 PSI, 0% AIR) WITH SYNTHETIC FIBER REINFORCEMENT           <ol style="list-style-type: none"> <li>8" MIN. THICK AT RAMP CONNECTION TO STREET</li> <li>4" MIN. THICK AWAY FROM RAMP CONNECTION TO STREET. TAPER THICKNESS ACCORDINGLY.</li> </ol> </li> <li>EXPANSION JOINTS: 1/2" THICK U.N.O. (SEE ALSO DRAWING RP-10)           <ol style="list-style-type: none"> <li>DETECTABLE WARNING: MIN. 7' LENGTH. YELLOW, CAST-IN-PLACE TRUNCATED DOME ADA SOLUTIONS OR APPROVED EQUAL</li> <li>RAMP FINISH: COARSE BROOM FINISH TRANSVERSE TO SLOPE</li> </ol> </li> <li>RAMPS SHALL BE PROVIDED AT ALL STREET INTERSECTIONS, WALK LOCATIONS, AND MID-BLOCK CROSSINGS AND COMPLY WITH THE PROPOSED ACCESSIBILITY GUIDELINES FOR PEDESTRIAN FACILITIES IN THE PUBLIC RIGHT-OF-WAY.</li> <li>POSTIVE DRAINAGE SHALL BE PROVIDED ACROSS ALL ELEMENTS SUCH THAT WATER DOES NOT ACCUMULATE.</li> </ol> <p><b>COMBINATION CURB RAMP - FLARED SIDES</b> N.T.S. <b>RP-12</b></p>



<p><b>NOTES</b></p> <ol style="list-style-type: none"> <li>SIDEWALK CROSS SLOPE: 1.5% DESIRABLE, 2.0% MAX.</li> <li>RAMP SLOPE: 8.3% MAX, 5% MIN. SLOPE SHALL NOT REQUIRE RAMP LENGTH TO EXCEED 15 FEET.</li> <li>MINERAL AGGREGATE BASE: 4" MIN. THICK 303-01 MINERAL AGGREGATE, TYPE A BASE, GRADING D</li> <li>CONCRETE: CLASS A (4,000 PSI, 0% AIR) WITH SYNTHETIC FIBER REINFORCEMENT       <ol style="list-style-type: none"> <li>8" MIN. THICK AT RAMP CONNECTION TO STREET.</li> <li>4" MIN. THICK AWAY FROM RAMP CONNECTION TO STREET. TAPER THICKNESS ACCORDINGLY.</li> </ol> </li> <li>EXPANSION JOINTS: 1/2" THICK U.O.C. (SEE ALSO DRAWING RP-10)</li> <li>DETECTABLE WARNING: YELLOW (EXCEPT PER SECTION 2.4.8), CAST-IN-PLACE (ADA SOLUTIONS OR APPROVED EQUIV.)       <ol style="list-style-type: none"> <li>EXTEND SURFACE FULL WIDTH OF RAMP (EXCLUDING FLARED SIDES) AND 2'-0" IN THE DIRECTION OF TRAVEL.</li> </ol> </li> <li>RAMP FINISH: COARSE BROOM FINISH TRANSVERSE TO SLOPE.</li> <li>RAMPS SHALL BE PROVIDED AT ALL STREET INTERSECTIONS, WALK LOCATIONS, AND MID-BLOCK CROSSINGS AND COMPLY WITH THE PROPOSED ACCESSIBILITY GUIDELINES FOR PEDESTRIAN FACILITIES IN THE PUBLIC RIGHT-OF-WAY.</li> <li>POSITIVE DRAINAGE SHALL BE PROVIDED ACROSS ALL ELEMENTS SUCH THAT WATER DOES NOT ACCUMULATE.</li> </ol> <p><b>COMBINATION CURB RAMP - 6" CURB</b> N.T.S.</p> <p style="text-align: right;"><b>RP-13</b></p>	<p><b>NOTES</b></p> <ol style="list-style-type: none"> <li>SIDEWALK CROSS SLOPE: 1.5% DESIRABLE, 2.0% MAX.</li> <li>RAMP SLOPE: 8.3% MAX, 5% MIN. SLOPE SHALL NOT REQUIRE RAMP LENGTH TO EXCEED 15 FEET.</li> <li>MINERAL AGGREGATE BASE: 4" MIN. THICK 303-01 MINERAL AGGREGATE, TYPE A BASE, GRADING D</li> <li>CONCRETE: CLASS A (4,000 PSI, 0% AIR) WITH SYNTHETIC FIBER REINFORCEMENT       <ol style="list-style-type: none"> <li>8" MIN. THICK AT RAMP CONNECTION TO STREET.</li> <li>4" MIN. THICK AWAY FROM RAMP CONNECTION TO STREET. TAPER THICKNESS ACCORDINGLY.</li> </ol> </li> <li>EXPANSION JOINTS: 1/2" THICK U.O.C. (SEE ALSO DRAWING RP-10)</li> <li>DETECTABLE WARNING: YELLOW (EXCEPT PER SECTION 2.4.8), CAST-IN-PLACE (ADA SOLUTIONS OR APPROVED EQUIV.)       <ol style="list-style-type: none"> <li>EXTEND SURFACE FULL WIDTH OF RAMP (EXCLUDING FLARED SIDES) AND 2'-0" IN THE DIRECTION OF TRAVEL.</li> </ol> </li> <li>RAMP FINISH: COARSE BROOM FINISH TRANSVERSE TO SLOPE.</li> <li>RAMPS SHALL BE PROVIDED AT ALL STREET INTERSECTIONS, WALK LOCATIONS, AND MID-BLOCK CROSSINGS AND COMPLY WITH THE PROPOSED ACCESSIBILITY GUIDELINES FOR PEDESTRIAN FACILITIES IN THE PUBLIC RIGHT-OF-WAY.</li> <li>POSITIVE DRAINAGE SHALL BE PROVIDED ACROSS ALL ELEMENTS SUCH THAT WATER DOES NOT ACCUMULATE.</li> </ol> <p><b>PARALLEL CURB RAMP</b> N.T.S.</p> <p style="text-align: right;"><b>RP-14</b></p>	<p><b>NOTES</b></p> <ol style="list-style-type: none"> <li>SIDEWALK CROSS SLOPE: 1.5% DESIRABLE, 2.0% MAX.</li> <li>RAMP SLOPE: 5% MAX.</li> <li>MINERAL AGGREGATE BASE: 4" MIN. THICK 303-01 MINERAL AGGREGATE, TYPE A BASE, GRADING D</li> <li>CONCRETE: CLASS A (4,000 PSI, 0% AIR) WITH SYNTHETIC FIBER REINFORCEMENT       <ol style="list-style-type: none"> <li>8" MIN. THICK AT RAMP CONNECTION TO STREET.</li> <li>4" MIN. THICK AWAY FROM RAMP CONNECTION TO STREET. TAPER THICKNESS ACCORDINGLY.</li> </ol> </li> <li>EXPANSION JOINTS: 1/2" THICK U.O.C. (SEE ALSO DRAWING RP-10)</li> <li>DETECTABLE WARNING: YELLOW (EXCEPT PER SECTION 2.4.8), CAST-IN-PLACE (ADA SOLUTIONS OR APPROVED EQUIV.)       <ol style="list-style-type: none"> <li>EXTEND SURFACE FULL WIDTH OF RAMP (EXCLUDING FLARED SIDES) AND 2'-0" IN THE DIRECTION OF TRAVEL.</li> </ol> </li> <li>RAMP FINISH: COARSE BROOM FINISH TRANSVERSE TO SLOPE.</li> <li>RAMPS SHALL BE PROVIDED AT ALL STREET INTERSECTIONS, WALK LOCATIONS, AND MID-BLOCK CROSSINGS AND COMPLY WITH THE PROPOSED ACCESSIBILITY GUIDELINES FOR PEDESTRIAN FACILITIES IN THE PUBLIC RIGHT-OF-WAY.</li> <li>POSITIVE DRAINAGE SHALL BE PROVIDED ACROSS ALL ELEMENTS SUCH THAT WATER DOES NOT ACCUMULATE.</li> </ol> <p><b>BLENDED TRANSITION RAMP</b> N.T.S.</p> <p style="text-align: right;"><b>RP-15</b></p>
	<p style="text-align: center;"><b>Legend:</b></p> <ul style="list-style-type: none"> <li>▲ SLOPE 8.3% MAX (1.0% CROSS SLOPE)</li> <li>■ TRUNCATED DOME DETECTABLE WARNING SURFACE</li> </ul>	<p style="text-align: center;"><b>Legend:</b></p> <ul style="list-style-type: none"> <li>▲ SLOPE 8.3% MAX (1.0% CROSS SLOPE)</li> <li>■ TRUNCATED DOME DETECTABLE WARNING SURFACE</li> </ul>
<p><b>COMBINATION PERPENDICULAR SIDEWALK RAMP LAYOUT</b> <b>INTERNAL DRIVE AISLE PRIVATE</b> N.T.S.</p> <p style="text-align: right;"><b>RP-17</b></p>	<p><b>PARALLEL CURB RAMP LAYOUT</b> <b>PUBLIC ROW W/W LIGHT</b> N.T.S.</p> <p style="text-align: right;"><b>RP-18</b></p>	<p><b>PARALLEL CURB RAMP LAYOUT</b> <b>RED LIGHT</b> N.T.S.</p> <p style="text-align: right;"><b>RP-19</b></p>

DATE OF PREPARATION: 08/20/2014  
 5000 SOUTH FIELD LANE, SUITE 600  
 SPRING HILL, TN 37174

**STANDARD DETAILS**  
**TRANSPORTATION**

<p style="text-align: center;"><b>CUL-DE-SAC</b> N.T.S.</p> <p style="text-align: right;">TR-1</p>	<p style="text-align: center;"><b>TEMPORARY CUL-DE-SAC</b> N.T.S.</p> <p style="text-align: right;">TR-2</p>	<p style="text-align: center;"><b>TEMPORARY DEAD END STREET STUB</b> N.T.S.</p> <p style="text-align: right;">TR-3</p>	<p style="text-align: center;"><b>TYPICAL STREET SIGN</b> N.T.S.</p> <p style="text-align: right;">TR-4</p>
<p><b>NOTES</b></p> <ol style="list-style-type: none"> <li>PAVEMENT SLOPE WITHIN CUL-DE-SAC SHALL NOT BE LESS THAN 1% OR GREATER THAN 3%.</li> </ol>	<p><b>NOTES</b></p> <ol style="list-style-type: none"> <li>TEMPORARY CUL-DE-SACS SHALL ONLY BE USED INTERNAL TO DEVELOPMENTS FOR CONSTRUCTION PHASING PURPOSES WHERE THE FINAL BUILD OUT OF THE OVERALL DEVELOPMENT ALLOWS THE TEMPORARY CUL-DE-SAC TO BE ELIMINATED.</li> <li>TEMPORARY CUL-DE-SACS SHALL NOT BE USED AT THE PERIMETER OF DEVELOPMENTS WHERE ELIMINATION OF THE TEMPORARY CUL-DE-SAC REQUIRES IMPROVEMENTS IN ADJACENT DEVELOPMENTS.</li> <li>TEMPORARY CUL-DE-SACS SHALL BE REMOVED WITHIN 3 YEARS FROM THE DATE CONSTRUCTION STARTS, UNLESS OTHERWISE APPROVED BY THE FIRE MARSHAL.</li> <li>PAVEMENT SLOPE WITHIN CUL-DE-SAC SHALL NOT BE LESS THAN 1% OR GREATER THAN 3%.</li> </ol>	<p><b>NOTES</b></p> <ol style="list-style-type: none"> <li>TEMPORARY DEAD END STREET STUBS ARE ALLOWED FOR LOCAL STREETS ONLY.</li> <li>TEMPORARY DEAD END STREET STUBS ARE NOT ALLOWED FOR ALLEYS OR MEWS.</li> <li>TEMPORARY DEAD END STREET STUBS SHALL EXTEND A MAXIMUM OF ONE SINGLE-FAMILY RESIDENTIAL LOT.</li> <li>TYPE 3 BARRICADES SHALL BE ANCHORED USING PERMANENT INSTALLATION METHODS.</li> </ol>	<p><b>GENERAL NOTES</b></p> <ol style="list-style-type: none"> <li>ALL BLACK ART SHALL BE RAISED FROM THE BACKGROUND TO CREATE A SUBSTANTIAL EMBOSSED APPEARANCE AND SHALL BE MANUAL BRUSH COLOR FINISH.</li> <li>SUBMIT SHOP DRAWINGS TO CITY FOR APPROVAL PRIOR TO FABRICATION.</li> <li>FINISH FRAME AND POST PER SPEC. FINISH COLOR OF STEEL FRAME, 2" AND 2.25" KNEEDOUT SH. STEEL TUBE TO MATCH SHERWIN WILLIAMS (PUSH-IN) (SEE CLUSE).</li> <li>GRAB ALL WELDS SMOOTH.</li> <li>FINISH ENDS OF ALL TRAFFIC SIGNS PER CITY STREET SIGNS. FINISH COLOR TO MATCH SHERWIN WILLIAMS (PUSH-IN) (SEE CLUSE).</li> <li>TEXT HEIGHT OR SIZE TO MEET REQUIREMENTS OF MUTCD.</li> </ol>

**BIKE PATH DETAIL**  
N.T.S.

TR-7

**GENERAL NOTES**

- BIKE LANES ARE DELINEATED FROM TRAVEL LANES BY A MINIMUM OF 6" WHITE STRIPE.
- ALL PAVEMENT MARKING MATERIALS SHOULD BE DURABLE, SUN-RESISTANT, AND RETROREFLECTIVE.
- BIKE LANES ON ROADWAYS WITH OR WITHOUT CURB AND GUTTER SHOULD HAVE A MINIMUM WIDTH OF FOUR FEET.

ON STREETS, PAINT RED PARALLEL LINE ALONG THE EDGE OF THE ROADWAY. EVERY FIFTY (50) FEET ALONG THE RED LINE, WHITE LETTERS SHALL BE PAINTED WITH "NO PARKING FIRE LANE". ALL LETTERS AND NUMBERS SHALL BE A MINIMUM OF THREE (3) INCHES.

(FACE OF CURB)

6" RED NO PARKING FIRE LANE (WHITE LETTERS)

STREET OR DRIVE (WIDTH MAY VARY)

**FIGURE 2**

**CURB FIRE STRIPING**  
N.T.S.

TR-8

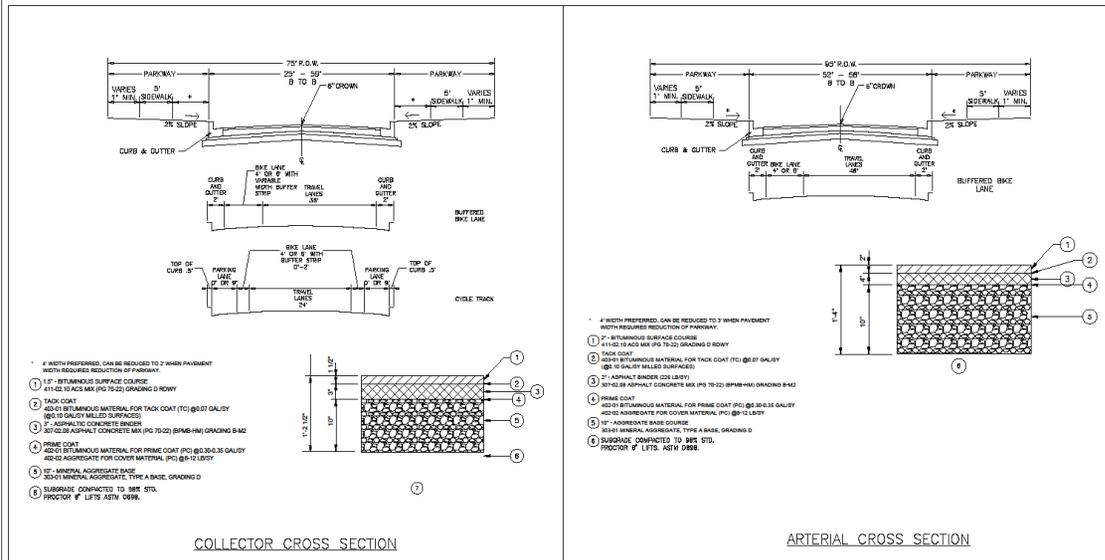
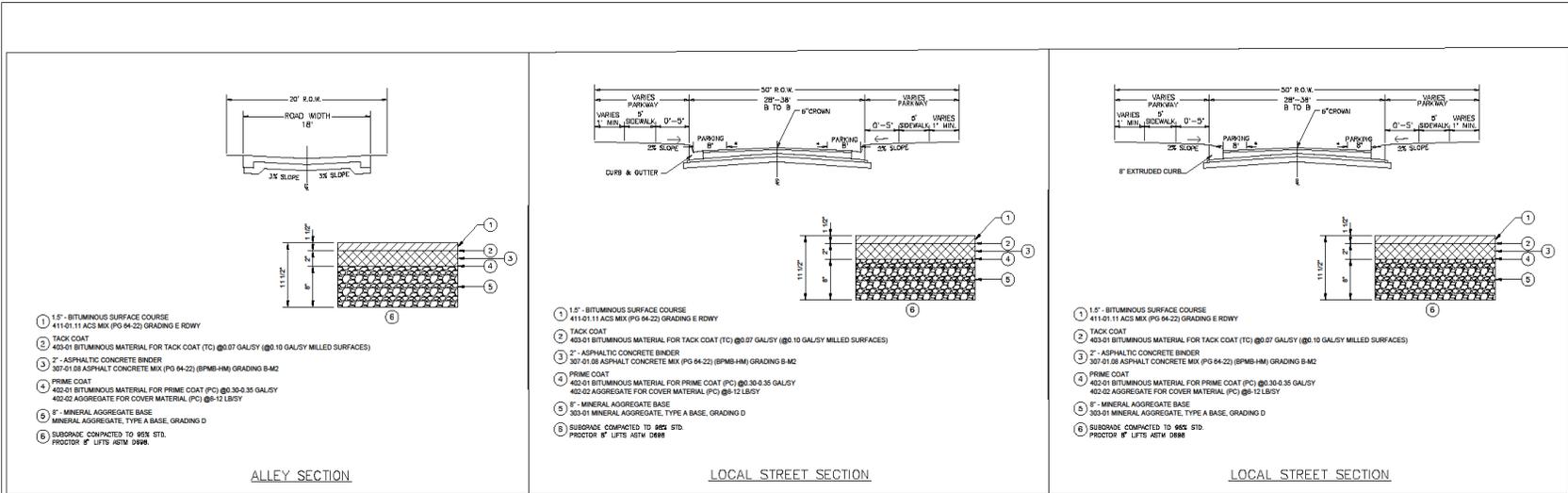
**PIERCE 100' MID-MOUNT PLATFORM**

**APPARATUS AND TURNING INFORMATION**

- NUMBER OF FRONT AXLES = 1
- FRONT TRACK WIDTH = 8.333 FT
- WHEELS ON EACH FRONT AXLE = 2
- NUMBER OF REAR AXLES = 2
- REAR TRACK WIDTH = 8.333 FT
- WHEELS ON EACH REAR AXLE = 4
- WHEELBASE = 22.8 FT
- REAR AXLE SPACINGS = 4.750 FT
- LOCK-TO-LOCK TIME = 6 SEC
- TURNING RADIUS WALL TO WALL = 43.4 FT
- BODY LENGTH = 43.750 FT
- BODY WIDTH = 8.333 FT
- REAR OVERHANG = 11.2 FT
- MINIMUM DESIGN SPEED = 5 MPH

**FIRE APPARATUS TURNING TEMPLATE**  
N.T.S.

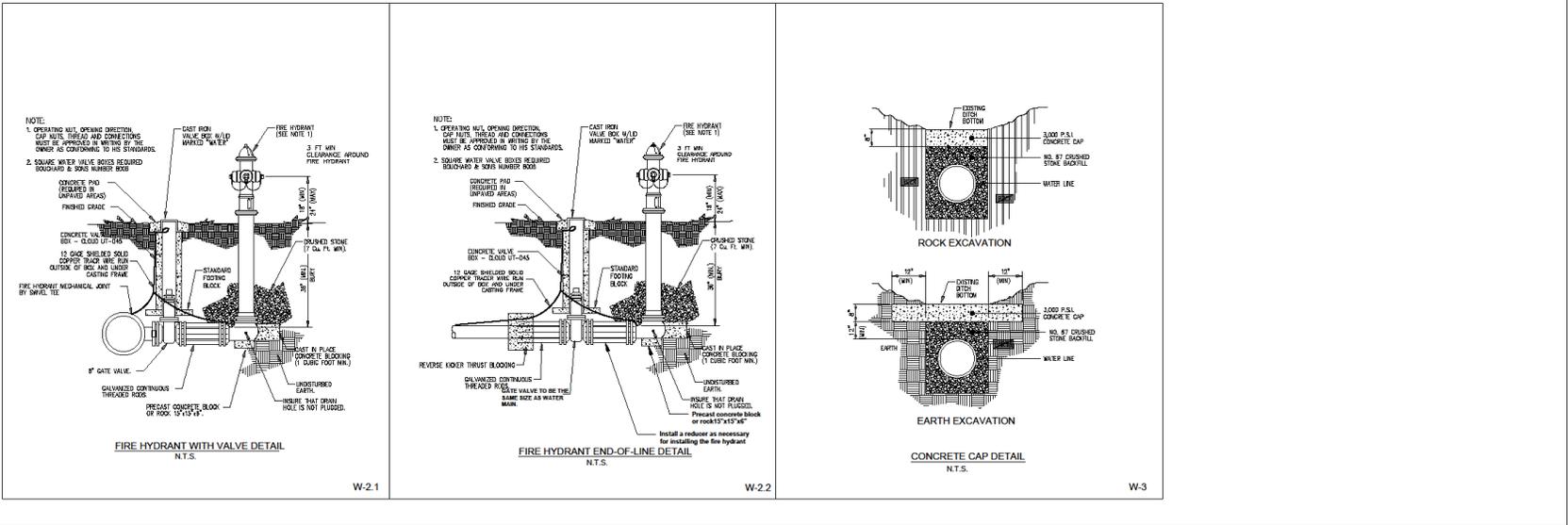
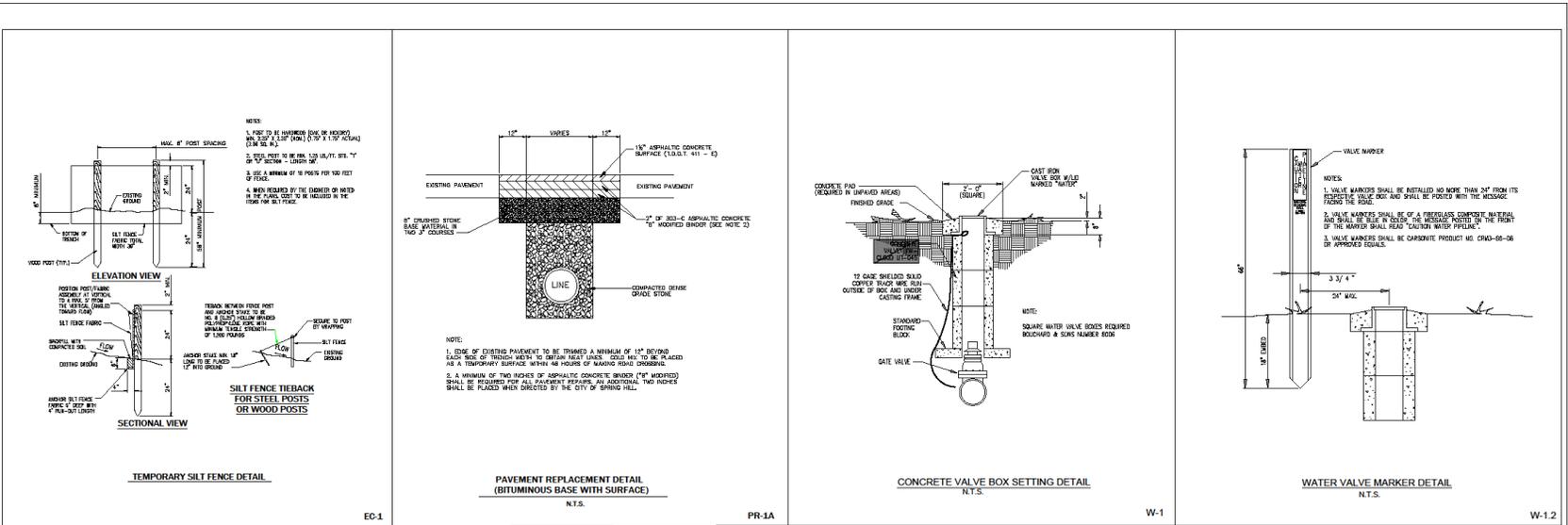
TR-9



# Water Standard Details



CITY OF SPRING HILL  
 500 NORTH DELAWARE BLVD  
 SPRING HILL, TN 37074-1206

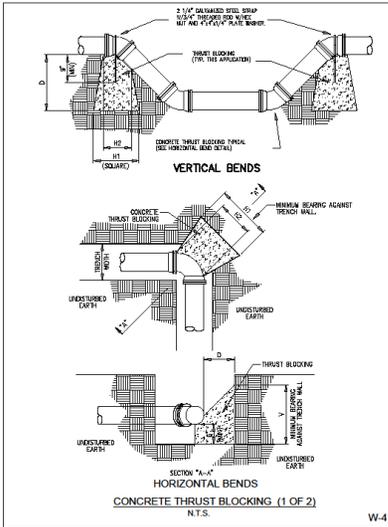


24 x 36

CITY OF SPRING HILL  
 500 NORTH DELAWARE BLVD  
 SPRING HILL, TN 37074-1206

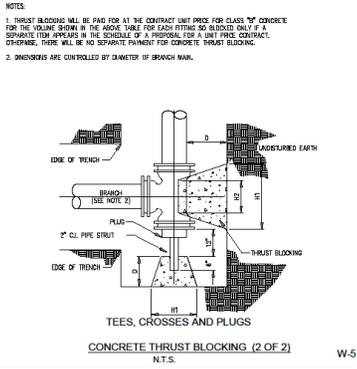
**STANDARD DETAILS**  
**WATER**

IN COMPANY DEVELOPMENT SERVICES, CAD STANDARDS/STANDARD DETAILS STANDARD DETAILS WATER/ENGINEERING  
 2017.04.14 PM 12:06:23

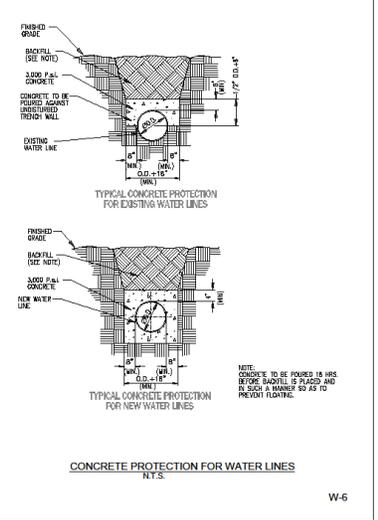


W-4

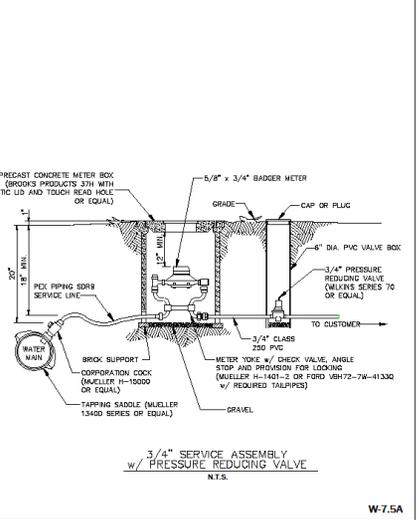
MIN. COVER (IN.)	1/2" DIA. PIPE	3/4" DIA. PIPE	1" DIA. PIPE	1 1/4" DIA. PIPE	1 1/2" DIA. PIPE	2" DIA. PIPE	3" DIA. PIPE	4" DIA. PIPE	6" DIA. PIPE	8" DIA. PIPE	10" DIA. PIPE	12" DIA. PIPE
1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"
2"	2"	2"	2"	2"	2"	2"	2"	2"	2"	2"	2"	2"
3"	3"	3"	3"	3"	3"	3"	3"	3"	3"	3"	3"	3"
4"	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"
5"	5"	5"	5"	5"	5"	5"	5"	5"	5"	5"	5"	5"
6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"
7"	7"	7"	7"	7"	7"	7"	7"	7"	7"	7"	7"	7"
8"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"
10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"
11"	11"	11"	11"	11"	11"	11"	11"	11"	11"	11"	11"	11"
12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"



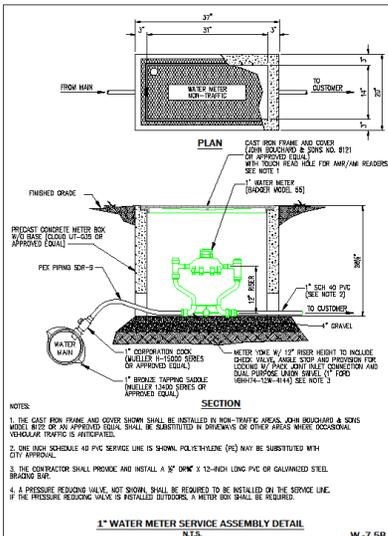
W-5



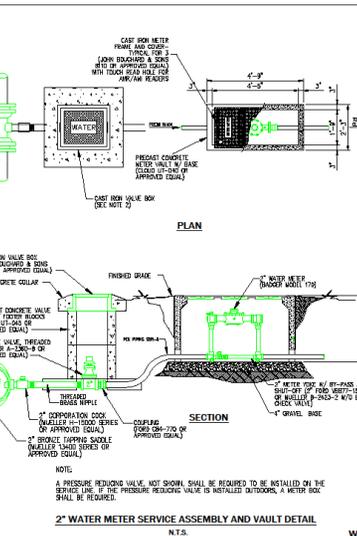
W-6



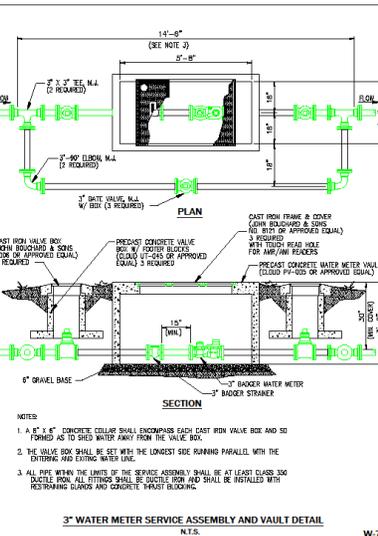
W-7.5A



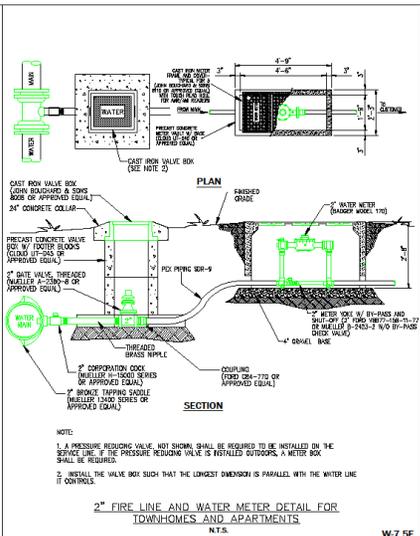
W-7.5B



W-7.5C



W-7.5D



W-7.5E

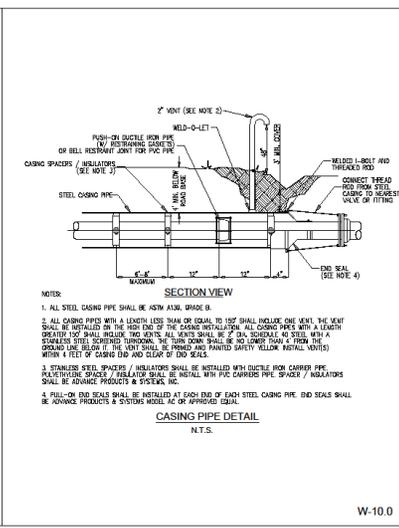
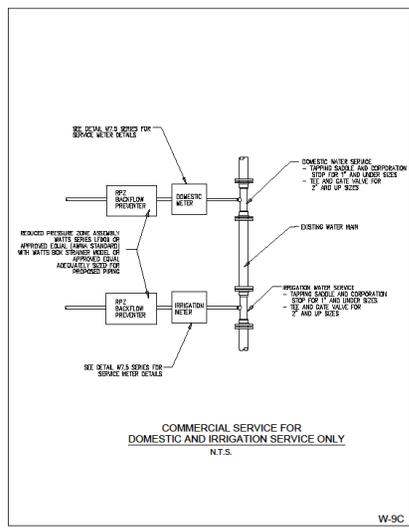
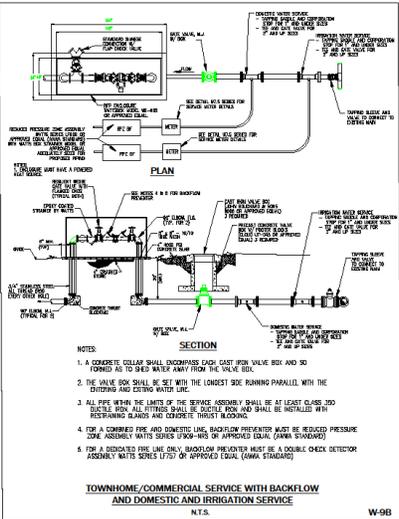
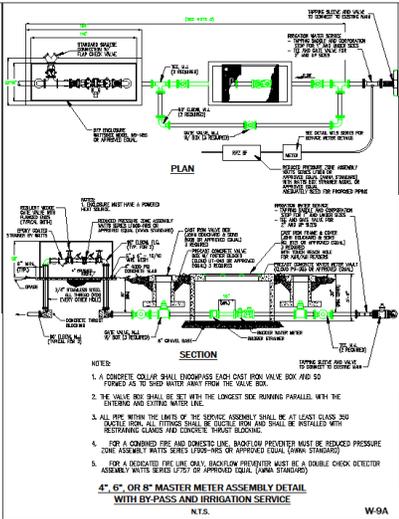
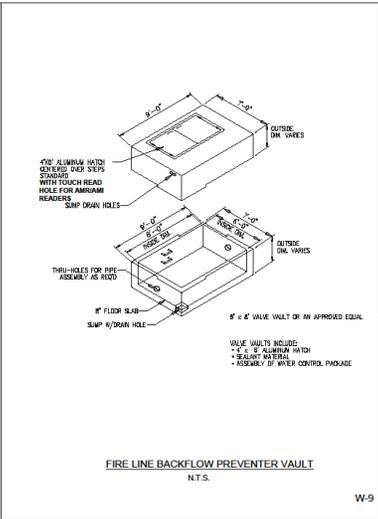
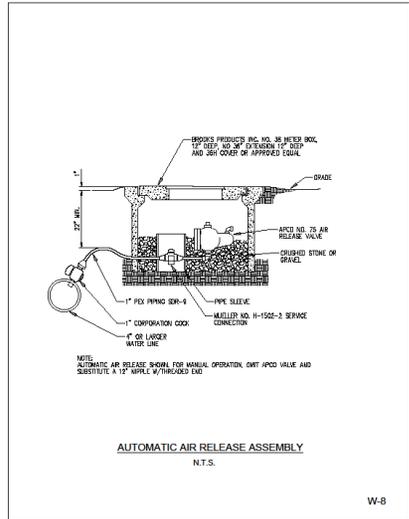


SPRING HILL  
CONSTRUCTION

24 X 30  
5000 INDUSTRIAL BLVD. SUITE 100  
SPRING HILL, TN  
N: COMPANY/DEVELOPMENT SERVICES/CAD/CADD STANDARDS/STANDARD DETAILS/STANDARD DETAILS/WATER/WDG  
3/1/2016 12:28:23  
CADDUSER

**STANDARD DETAILS**  
WATER

3/4





# Storm Standard Details

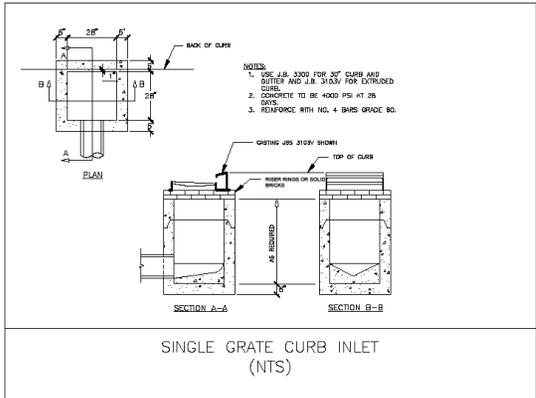


24 X 36

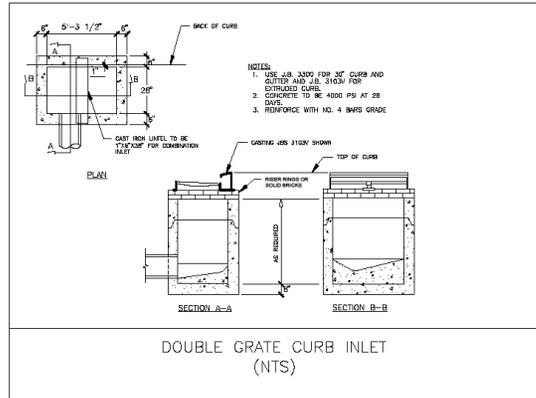
CITY OF SPRING HILL  
5000 NORTHFIELD LANE, SUITE 800  
SPRING HILL, TN

STANDARD DETAILS  
STORM

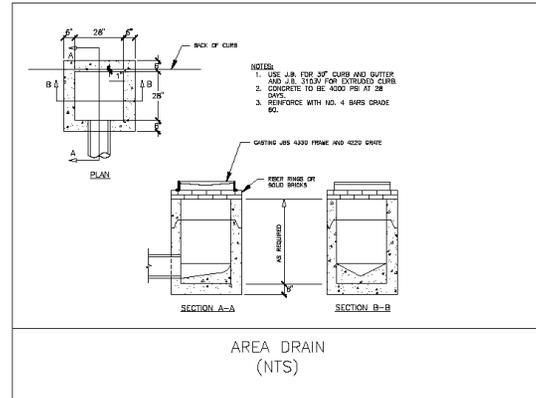
1/2



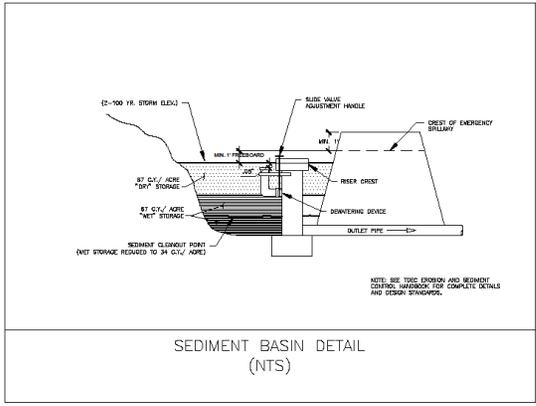
SINGLE GRATE CURB INLET  
(NTS)



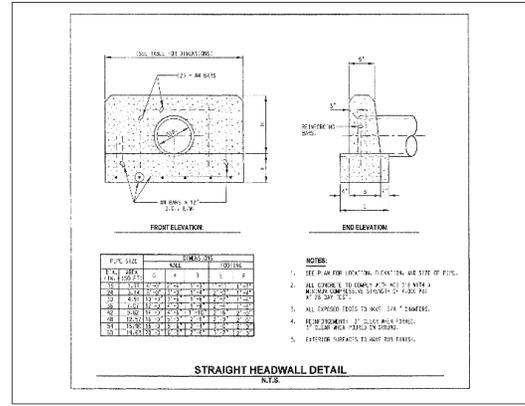
DOUBLE GRATE CURB INLET  
(NTS)



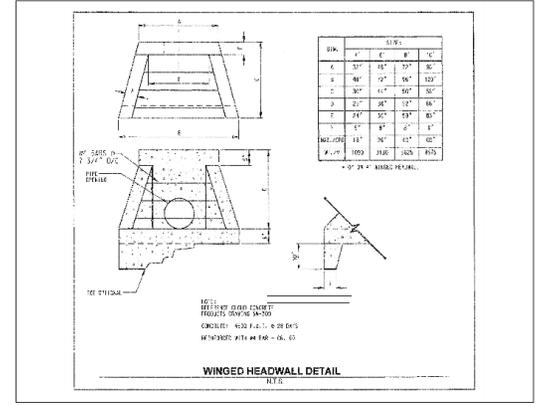
AREA DRAIN  
(NTS)



SEDIMENT BASIN DETAIL  
(NTS)



STRAIGHT HEADWALL DETAIL  
(NTS)

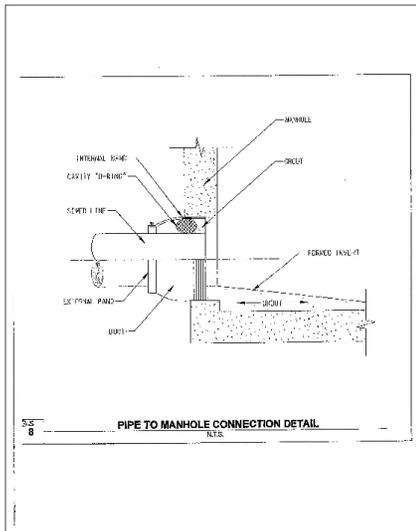
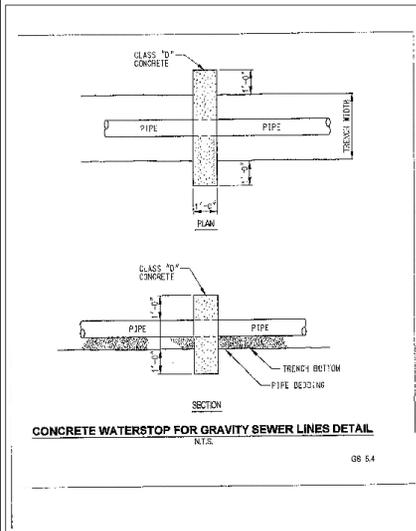
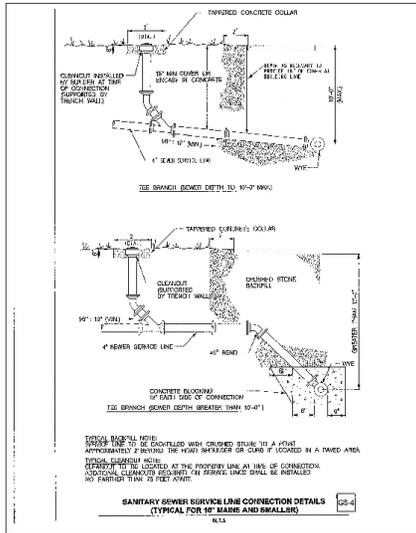
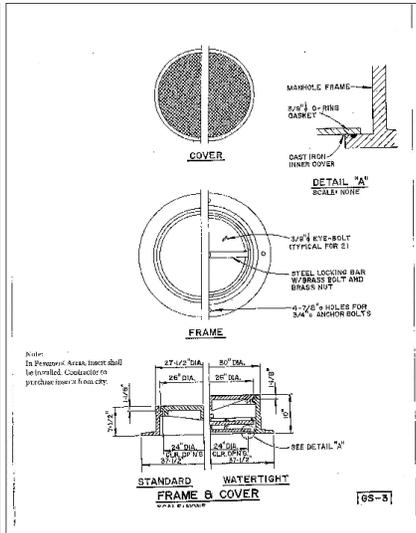
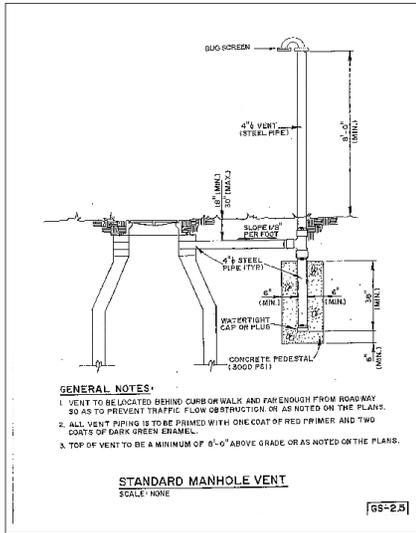
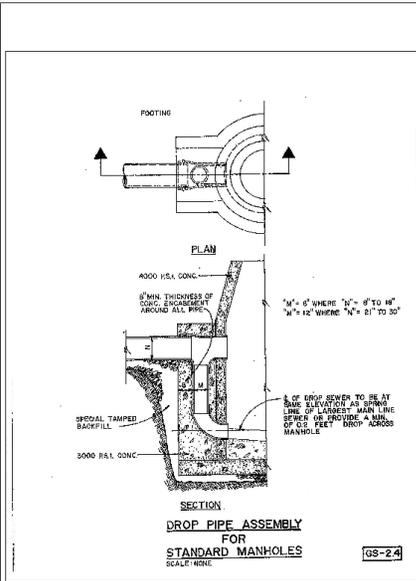


WINGED HEADWALL DETAIL  
(NTS)



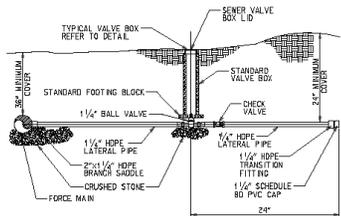
# Sewer Standard Details





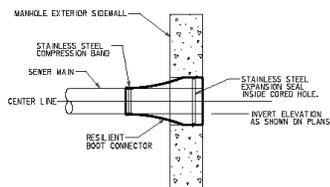
**STANDARD DETAILS**  
**SEWER**

CITY OF SPRINGFIELD  
 6000 HUNTERS LANE, SUITE 600  
 SPRINGFIELD, TN



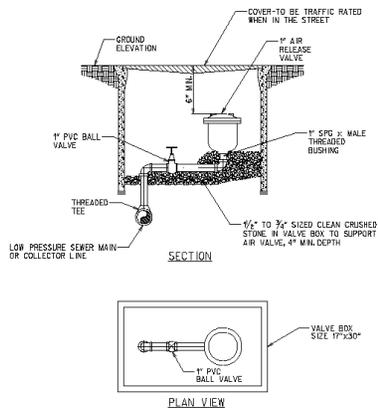
LATERAL SERVICE CONNECTION TO NEW SANITARY SEWER FORCE MAIN

WW - 7



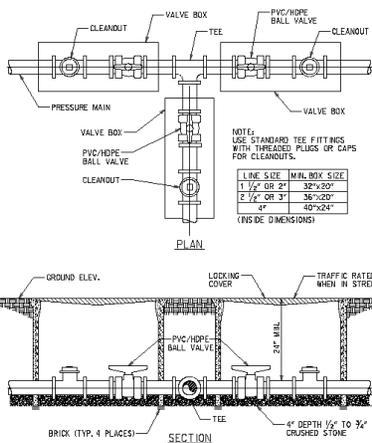
RESILIENT BOOT MANHOLE CONNECTION

WW - 4



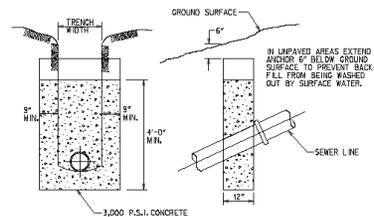
1" AUTO AIR RELEASE VALVE ON LOW PRESSURE SANITARY SEWER MAIN

WW - 9



VALVE BOX & CLEANOUT ARRANGEMENT AT JUNCTION OF LOW PRESSURE MAINS

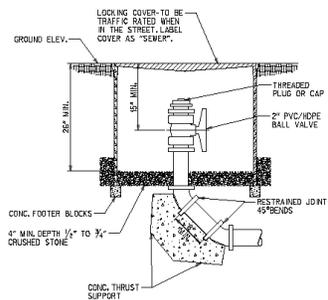
WW - 11



- NOTES:
1. PROVIDE NO ANCHOR ON GRADES LESS THAN 18% UNLESS NOTED.
  2. PROVIDE ANCHOR 3/4" CENTER TO CENTER ON GRADES BETWEEN 18% AND 25%.
  3. PROVIDE ANCHOR 2" CENTER TO CENTER ON GRADES BETWEEN 25% AND 35%.
  4. PROVIDE ANCHOR 16" CENTER TO CENTER ON GRADES 35% AND GREATER.
  5. CONTRACTOR MAY SUBMIT ALTERNATE DESIGN UTILIZING ROCK BOLTS TO KEY ANCHOR TO ROCK TROUGHS.
  6. FOR CONDITIONS OTHER THAN SHOWN HEREON, ANCHORS SHALL BE PROVIDED AS REQUIRED BY THE CONTRACT PLANS OR ORDERED BY THE ENGINEER.

CONCRETE ANCHORS FOR SEWERS ON STEEP GRADES

WW - 10



LOW PRESSURE SEWER SYSTEM END OF LINE FLUSHING ASSEMBLY

WW - 12

