Ordinance 19-02

AN ORDINANCE OF THE CITY OF WHITE HOUSE, TENNESSEE AMENDING THE MUNICIPAL CODE TITLE 16 STREETS AND SIDEWALKS, ETC., CHAPTER 2 STREET, SIDEWALK AND DRAINAGE DESIGN STANDARDS.

WHEREAS, for the purpose of keeping up with the current details and specifications for the city's infrastructure improvements and additions.

WHEREAS, this document describes transportation design requirements that present a comprehensive approach to designing new and modified streets within the City of White House, Tennessee.

WHEREAS, the Public Services Director and the City Administrator have determined after full review that these changes are beneficial to the city for current and future development.

TITLE 16: Streets and Sidewalks, Etc.
CHAPTER 2: Street and Sidewalks, Etc.

TITLE 16
Streets and Sidewalks, Etc.

CHAPTER
1. MISCELLANEOUS
2. ~~EXCAVATION AND CUTS~~

CHAPTER 2
STREET, SIDEWALK
AND
DRAINAGE DESIGN STANDARDS

SECTION
16-2.0 Purpose
16-2.1 Applicability
16-2.2 Jurisdiction/Regulations
16-2.3 General
16-2.4 Standards, Specifications and Resources
16-2.5 Definitions
16-2.6 Permits
16-2.7 Notification of Construction
16-2.8 Utility Coordination
16-2.9 Quality Control Testing
16-2.10 Inspection
16-2.11 Revision of Plans
16-2.12 Acceptance of Facilities
16-2.13 Modifications
16-2.14 As-Built Plan Submittal
16-2.15 Revisions to these Specifications
16-2.16 Pavement Design Overview

16-2.17 Requirements
16-2.17.1 Design Standards
16-2.17.2 Pavement Type
16-2.17.3 Treated Subgrade
16-2.17.4 Approval
16-2.18 Rehabilitating / Repairing Existing Streets
16-2.18.1 General
16-2.18.2 Permits/Fees
16-2.18.3 Materials
16-2.18.4 Execution
16-2.19 Pavement Structure Components
16-2.19.1 Sub-base
16-2.19.2 Sub-base Proof-Roll
16-2.19.3 Base Course
16-2.19.4 Base Course Proof-roll
16-2.19.5 Graded Aggregate Base Course
16-2.19.6 Bituminous Prime Coat
16-2.19.7 Binder Course
16-2.19.8 Surface Course
16-2.20 Asphaltic Concrete Pavement Design
16-2.20.1 Material
16-2.20.2 Coordination
16-2.20.3 Final Surface Course
16-2.20.4 Asphalt Acceptance Requirements
16-2.20.5 Proof-Roll of Road Easement
16-2.21 Installation
16-2.21.1 New Subdivision Asphalt Application Process
16-2.21.2 Asphaltic Concrete Installation Procedure
16-2.22 Testing
16-2.23 Concrete Overview
16-2.24 Reference Specification
16-2.25 Submittals
16-2.25.1 Concrete Mix Designs
16-2.25.2 Reinforcing Steel
16-2.25.3 Miscellaneous Items
16-2.26 Concrete Classification
16-2.27 Curbing and Sidewalks
16-2.27.1 Residential Sidewalks
16-2.27.2 Commercial Sidewalks
16-2.27.3 Handicapped Ramps
16-2.27.4 Curb and Gutter Sections
16-2.28 Concrete Reinforcement
16-2.28.1 Reinforcing Materials
16-2.29 Concrete Placement
16-2.30 Concrete Inspection and Laboratory Testing
16-2.30.1 Testing Frequency
16-2.31 Stormwater Overview
16-2.32 Stormwater Reference Specifications
16-2.33 Pipe, Culverts, and Storm Sewers
16-2.33.1 Concrete Pipe

2.0 Purpose

This document describes transportation design requirements that present a comprehensive approach to designing new, and modified, streets within the City of White House (hereinafter referred to as "City"). These requirements will provide better streets throughout the City, reflecting best practices and providing more capacity with safe and comfortable travel for motorists, pedestrians, bicyclists, and transit riders. However, many streets have also come to symbolize the growing pains that can accompany growth and prosperity, with increased congestion in some portions of the City. Therefore, these street design guidelines have been developed in response to three basic issues:

- The City needs to plan for continued growth and development
- The people that reside in the City want quality streets with good traffic flow
- The City recognizes the connection between land use and street design

2.1 Applicability

These specifications shall apply to any person, developer, firm, business, or entity interested in, constructing additional streets, extending existing streets, or to do any other type of right of way (R-O-W) construction; such as curb cuts, that may affect the public and private streets within the City. These specifications are intended to apply to new streets within new development areas, and generally shall apply to existing streets, which is to include remedial work such as widening or rehabilitation of the existing streets as required. Design of streets, structures and associated elements such as traffic signals, signing, and lighting shall be sensitive to the character of the surrounding area and the impacts on historic resources.

By adhering to the principles set forth in this document, negative impact from growth and development will be reduced, thus preserving the community's quality of life, health, safety and welfare.

2.2 Jurisdiction / Regulations

Except as may otherwise be required by law, these rules and regulations govern the construction of streets and all associated improvements and appurtenances that shall be installed within the street system of the City of White House, Robertson County and Sumner County, Tennessee, and shall apply to all areas within the jurisdiction of the City.

2.3 General

The City of White House Public Services Department will approve all plans for construction and the upgrading of streets or roads in the City Street Index which shall include:

1. New construction;
2. Staged development of roadways (overlays);
3. Roadway widening;
4. Appurtenant roadway improvements such as storm drains and curb and gutter;
5. Encroachments.

To be eligible for acceptance into the City Street Index, a street or road must be designed and constructed in accordance with these standards and approved by the Public Services Director.

2.4 Standards, Specifications, and Resources

This document is the result of cooperation of many departments within the City. The following publications will be referred to in these specifications.

- "ADA Standards for Accessible Design", latest edition;
- "A Policy on Geometric Design of Highways and Streets", American Association of State Highway and Transportation Officials (AASHTO);
- "American Society for Testing and Materials Standards (ASTM), D2321 & D2774", latest edition;
- "AWWA Standards", latest edition, American Water Works Association.
- "Bridge Standards Manual", AASHTO;
- "Erosion and Sediment Control Handbook", latest edition, Tennessee Department of Environment and Conservation (TDEC);
- "Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT $\leq$ 400)" AASHTO;
- "Guidelines for Urban Major Street Design, a Recommended Practice", Institute of Transportation Engineers (ITE);
- "International Municipal Signal Association (IMSA) Wire and Cable Specifications Manual", latest edition; "International Building Code", latest edition;
- International Code Council (ICC);
- "Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways", latest edition,;
- U.S. Department of Transportation, Federal Highway Administration (FHWA);
- "National Electric Code", (NFPA 70), latest edition;
- The Tennessee Department of Transportation (TDOT), "Standard Specifications for Road and Bridge Construction", latest edition, technical specifications only, shall apply and become a part of these specifications whenever these specifications do not adequately cover the work to be done. In the event of a conflict between these and TDOT specifications, the City of White House Public Services specifications shall govern, unless the construction is on a state route.
- "The Tennessee Department of Transportation; Survey Manual";
- "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals (AASHTO-LT).

In the event of a conflict between this document and the aforementioned referenced specifications, the specifications contained in this document shall govern.

2.5 Definitions

AASHTO: American Association of State Highway and Transportation Officials.

APPROACH: The portion of an intersection leg which is used by traffic approaching the intersection.

ARMY CORPS OF ENGINEERS: Provides engineering services as a government agency as it relates to civil engineering projects.

ASTM: American Society for Testing and Materials.

AVERAGE DAILY TRAFFIC (ADT): The total bi-directional volume of traffic passing through a given point during a given time period (in whole days), divided by the number of days in that time period.

AWWA: American Water Works Association.

BOARD OF MAYOR AND ALDERMAN: Elected board of local citizens responsible for decision making related to growth and development within the City.

CAPACITY: The maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform segment of a lane or roadway during a given time period under prevailing traffic, roadway and control conditions.

CEMC: Cumberland Electric Membership Corporation.

CITY: The City of White House, TN.

CITY ADMINISTRATOR: City official appointed by the Board of Mayor and Alderman and responsible for overseeing all administrative tasks necessary for City operations.

CITY STANDARDS & SPECIFICATIONS: Those standards prescribed for the construction of streets, sidewalks, driveway access points, curb and gutter set out in the Subdivision Regulations.

CROSSWALK: (a) that part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs or in the absence of curbs, from the edges of the traversable roadway, and in the absence of a sidewalk on one side of the roadway, the part of a roadway included within the extension of the lateral lines of the sidewalk at right angles to the centerline; (b) any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines or other marking on the surface. (MUTCD)

CYCLE LENGTH: The time required for one complete sequence of signal indications. (MUTCD)

DETECTOR: A sensing device used for determining the presence or passage of vehicles or pedestrians. (MUTCD)

DEVELOPER: A site planner or sub-divider.

DEVELOPMENT OR DEVELOPMENT PLAN: Any site plan or subdivision.

DIRECTOR OF PUBLIC SERVICES: City official responsible for directing and overseeing construction, maintenance, traffic control and storm water implementation for improvements of City streets.

ENGINEER: A licensed professional engineer employed by the City or a duly authorized representative serving to direct and oversee engineering design, coordination and implementation of private and City capital improvements as well as public safety and welfare.

FHWA: Federal Highway Administration.

FLOW LINE: The transition point between the gutter and the face of the curb. For a valley curb it is the center of the pan. Where no curb exists, the flow line will be considered the edge of the traveled way.

IMSA: International Municipal Signal Association, Inc.

INTERSECTION: (a); the area embraced within the prolongation or connection of the lateral curb lines, or if none, the lateral boundary lines of the roadways of two highways that join one another at, or

approximately at, right angles, or the area within which vehicles traveling on different highways that join at any other angle may come into conflict; (b) the junction of an alley or driveway with a roadway or highway shall not constitute and intersection. (MUTCD)

ITE: Institute of Traffic Engineers.

LAND DISTURBANCE PERMIT: Permit issued by the City of White House Public Services Department that allows the contractor to begin grading work.

MAJOR STREET: A street normally carrying the higher volume of vehicular traffic. MUTCD)

NFPA: National Fire Protection Agency.

NCHRP: National Cooperative Highway Research Program.

PAVEMENT MARKINGS: All lines, words or symbols, except signs officially placed within the roadway or parking area to regulate, warn or guide traffic.

PEAK-HOUR VOLUME: Hourly traffic volume used for roadway design and capacity analysis, usually occurring during one or more peak travel hours during a 24-hour period.

PEDESTRIAN: People who travel on foot or who use assistive devices, such as wheelchairs, for mobility.

PLANNING AND CODES DIRECTOR: City official responsible for directing the enforcement and interpretations of the provisions of national and local building codes.

PRESCRIPTIVE EASEMENT: An easement claimed by the City upon an owner's real property by continuous, uninterrupted, open, visible, and exclusive use of the land for a period of twenty years or more with the true owner's knowledge and acquiescence.

R-O-W, (ROW): An interest in land to the City which provides for the perpetual right and privilege of the City and its agents, franchise holders, successors, and assigns to construct, install, improve, repair, maintain, and use a public street, including related and customary uses of street R-O-W such as sidewalk, bike path, landscaping, traffic control devices and signage, sanitary sewer, storm water drainage devices, water supply, cable television, electric power, gas, and telephone transmission and related purposes in, upon, over, below, and across the R-O-W. The City is authorized to remove, and keep removed from the R-O-W all trees, vegetation, and other obstructions as is determined to be necessary by the City to maintain, repair, and protect facilities located in the R-O-W.

ROADWAY: See definition of street.

SIDEWALK: Any public or private pedestrian or bicycle walkway or path.

SIGNAL PHASING: The right-of-way, yellow change, and red clearance intervals in a cycle that are assigned to an independent traffic movement or combination of movements. (MUTCD)

SIGNAL TIMING: The amount of time allocated for the display of a signal indication. (MUTCD)

SIGNAL WARRANT: A threshold condition that, if found to be satisfied as part of an engineering study, shall result in analysis of other traffic conditions or factors to determine whether a traffic control signal or other improvement is justified. (MUTCD)

STATE ROUTE: An arterial highway designated and signed with a route number, which is primarily funded for construction and administered by TDOT. Improvements and maintenance of state routes is under the jurisdiction of TDOT.

STORMWATER PERMIT: If approaches to handling storm water are not standard or specified in the storm water ordinance, a storm water permit may need to be applied for by the contractor/developer.

STREET: A public or private roadway, but is not considered a driveway access point.

SUBDIVISION REGULATIONS: Documents initiated by the City of White House to establish guidelines for subdivision plans.

TIA: Traffic impact analysis.

TN DEPARTMENT OF ENVIRONMENT AND CONSERVATION (TDEC): A regulatory board that monitors pollution.

TRAFFIC CONTROL SIGNAL (TRAFFIC SIGNAL): Any highway traffic signal by which traffic is alternately directed to stop and permitted to proceed. (MUTCD)

TRAFFIC SIGN: A device mounted on a fixed or movable support conveying a message or symbol to regulate, warn or guide traffic.

VOLUME: The number of vehicles passing a given point during a specified period of time.

In the event of a conflict between this document and the aforementioned referenced specifications, the specifications contained in this document shall govern.

2.6 Permits

Prior to beginning any construction, the Developer and/or Contractor, shall obtain all necessary permits as required by law. Such permits may include, but are not limited to, those required by State of Tennessee, Robertson County, Sumner County, and other City of White House agencies.

The Developer shall obtain a "Land Disturbance Permit", "Stormwater Management Permit", "Sewer Fees Receipt" and Landscape Plan Approval (when necessary) from the City prior to beginning any construction activities. The "Land Disturbance Permit" is issued by the City of White House Public Services Department upon presentation of proof of required approvals of drawings and specifications and upon payment of required fees.

2.7 Notification of Construction

In addition to any other notices required by law (e.g., TN One Call, notices to non-participating utilities), before commencing any street construction operations, a ten (10) day notice must be given during regular business hours to the Public Services Department. This advance notice is required for all street construction

projects to ensure proper inspection staff scheduling. Demolition permits, if required for the project, shall be obtained from the Planning and Codes Office.

2.8 Utility Coordination

Locating and coordination for the relocation of existing utilities within the City's right-of-way is the responsibility of the contractor. Tennessee's One-Call and the City of White House utility location service shall be utilized in addition to coordination with local utility owners. The contractor shall at all times protect existing utilities and will be responsible for costs due to damage caused to any utility lines.

2.9 Quality Control Testing

Construction materials, including ~~aggregate base stone~~, asphalt, concrete, and roadway subgrades shall be fully tested in accordance with the designations and requirements within the referenced "TDOT Standard Specifications" sections. Unless otherwise noted within the "Standard Specifications" section, the type and number of tests called for by the referenced standards shall be performed.

Testing shall be done by an independent testing laboratory whose qualifications are approved by the City. Testing results will be submitted to and approved by the Director of Public Services. The City reserves the right to require industry standard certifications of testing and inspections by the testing laboratory, mills, shops, and factories. Such certifications required shall be submitted in duplicate.

The Developer shall provide the necessary labor and supervision required to support field testing by the independent testing firm and inspections by City officials at no cost to the City. Test reports of field testing if applicable shall be submitted directly to the Director of Public Services. Defects disclosed by tests shall be rectified at no cost to the City. The Developer is required to have the design engineer or a certified quality control inspector present during all phases of construction. A daily log of work performed should be kept by this individual and submitted to the City upon request.

2.10 Inspection

All projects shall be subject to inspection during and upon completion of construction by an authorized representative of the City. Presence or absence of an inspector during construction does not relieve the Developer and/or Contractor from adherence to approved plans and material contained in these specifications or from liability. Materials and/or workmanship found not meeting requirements of approved plans and specifications shall be immediately brought into conformity with said plans and specifications.

An authorized representative of the City shall make a final inspection of the project after completion to determine acceptability of the work and for release of performance bonds if required. Before this final inspection can be made, the Engineer responsible for the project shall certify in writing to the Public Services Director that the work has been completed in accordance with approved plans and specifications.

The cost for inspection during construction is covered by the "Sewer Fee Schedule" fee. Additional inspection fees will be required only when an inspection requiring City approval fails and requires subsequent re-inspections. The Inspection Fee (current prices may be requested from the Public Services Department) shall be paid to the City before issuance of the "Land Disturbance Permit".

2.11 Revision of Plans

Should, during construction, necessary changes be anticipated that would in the opinion of the City staff constitute significant revision of the plans already approved by the City, said plans shall be revised with said changes shown and resubmitted as required by the City, along with a letter stating why such changes are believed necessary. Changes deemed to be minor in nature by the Public Services Director may be made during construction with the changes noted for inclusion in the "as-built" drawings to be submitted to the City prior to final acceptance.

The Public Services Director shall have the right to re-review the entire set of Plans should a revision of the plans be required.

2.12 Acceptance of Facilities

After construction has been completed, a final inspection will take place by the City. A Certificate of Acceptance shall be issued once all contractual agreements have been met and construction meets the extents considered satisfactory under these specifications and deemed as such by the City. Acceptance of Facilities will only be issued after As-Built plans that adhere to requirements listed in Section 2.14 have been submitted and approved by the Public Services Director.

2.13 Modifications

Occasions may arise where the minimum standards are either inappropriate or cannot be justified economically. Modifications from the standards in this ordinance will be considered by the Public Services Director on a case-by-case basis using the following criteria:

1) Whether the modification requested complies with acceptable engineering standards;

2) Whether the modification requested does not present a danger to the general health, safety or welfare to the traveling public or pedestrians; and;

3) Whether the modification is necessary and meets or exceeds the standard using acceptable alternative design or methods.

If the developer, contractor, or utility responsible to the City for public improvements desires to design and construct such improvements in modification to these standards, such modification(s) should be identified in a written attachment to the initial submittal of plans. A request for modification shall be denied if the following information is not provided:

a.) Identification of the standard provision to be modified

b.) Identification of the alternative design or construction standards proposed.

c.) A thorough justification of the modification request including impact on short- and long-term capital and maintenance requirements and cost.

d.) Request shall be prepared and sealed by a professional civil engineer licensed to practice in the State of Tennessee.

2.14 As-Built Plan Submittal

Final as-built plans should be submitted immediately following completion of construction activities. If the project is developed in phases, as-built plans for each phase shall be submitted once the work is complete in that phase. Acceptance of facilities will not be issued until satisfactory as-built plans have been approved by the Public Services Director.

All aspects of the project that have been affected by construction should be verified and appear on the as-built plans. This would include, but is not limited to the following items:

- All property lines and easements;
- Existing structures (include patio covers, decks, trellises, sheds, pools, fences, poles, etc.);
- Location of all "as-built" work with station and offsets;
- Height and location of all fences, walls, screens, trees, and hedges over 42" tall;
- All commercial driveways, paved areas, and required parking spaces;
- All concealed components with station and offsets (include known buried cables, utilities, drainage structures, etc.);
- CCTV documentation of storm drainage and/or sewer systems installed;
- Stormwater BMP's (Detention / Retention ponds, Bio-retention Areas, etc.).

Concealed components will require documented proof to be submitted with the as-built plans in the form of a certified construction log that has been generated by the design engineer or a certified quality control inspector.

As-built plans are required to be endorsed by a Tennessee registered professional engineer and/or a registered land surveyor.

2.15 Revisions to these Specifications

These specifications will be adopted, in ordinance form, by the City's Board of Mayor and Alderman, and shall be revised by ordinance. However, forms and administrative procedures or regulations to effectuate the intent of these specifications are subject to change as deemed necessary by the Public Services Director with thirty (30) days' notice from posting on the City's website or advertising in a publication of general circulation within Robertson and Sumner County and placed on file at the City Hall for public inspection and written comment.

2.16 Pavement Design Overview

The Contractor/Developer shall provide all plant, labor, material and equipment to furnish and construct the bituminous concrete pavements in reasonable close conformity with the lines, grades, thickness and typical cross sections shown on the standard drawings and specified herein, or as called for on the approved plans and specifications.

The specifications referenced for each material shall fully apply and no deviations from said specifications limits or quality will be permitted unless specifically stated otherwise in this Section. The failure of any component of a product to comply with the referenced specifications shall constitute failure of the whole product.

The Contractor/Developer shall obtain approval of the subgrade and stone base from the Public Services Director prior to commencing with the paving operations.

For all paving operations, the Contractor/Developer will be required to provide testing from an independent geotechnical firm pre-approved by the City.

2.17 Requirements

2.17.1 – Design Standards: The design criteria and procedures presented follow the TDOT Standard Specifications for Road and Bridge Construction, Sections 307 (Bituminous Plant Mix Base (Hot Mix)), 407 (Bituminous Plant Mix Pavements (General)), 411 (Asphaltic Concrete Surface (Hot Mix)), & 907 (Concrete Reinforcement), dated January 1, 2015 and AASHTO 1993 Guide for the Design of Pavement Structures.

1) ADT & Equivalent Daily Load Applications (EDLA): Loading values can be calculated using TDOT approved ADT numbers or Equivalent Daily Load Applications (EDLA) and Equivalent Single Axle Loads (ESAL) units if available. AASHTO's "A Policy on Geometric Design of Highways and Streets" and/or "Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT $\leq$ 400)", whichever design method is appropriate, should be used if ADT, EDLA, or ESAL units are available.

2) Minimum Pavement Section: The standard drawings in the Subdivision Regulations Appendix provide the default acceptable pavement sections for each street classification based on assumed subgrade support and traffic values. These pavement thicknesses may be used for preliminary planning purposes, cost estimates, or final pavement designs when approved by the Public Services Director. All pavement thickness designs must be based on actual subgrade support test results and traffic projections for the specific project. In specifying layer thickness, the designer shall consider how the pavement section will be physically constructed (e.g. Specify how to construct 2' of treated subgrade.)

2.17.2 Pavement Type: Streets are to be constructed of asphaltic concrete pavement, base course material, or subbase material (where required), placed on compacted subgrade. Non-standard design coefficients may be used, only if approved in advance by the Public Services Director. In addition, design values must be verified by pre-design mix test data and supported by daily construction tests.

2.17.3. Treated Subgrade: The use of treated subgrade, treated base, and/or full depth asphalt pavement may be acceptable when designed and submitted by the designer, and approved by the Public Services Director in accordance with these standards as well as the TDOT Standard Specifications for Road and Bridge Construction, Sections 302 (Subgrade Treatment), 304 (Soil-cement Base) & 306 (Portland Cement Concrete Base).

2.17.4 Approval: A Pavement Design Report shall be submitted with final construction plans. The Pavement Design Report must include the pavement design calculations, methodology, typical sections selected, and basis for assumptions. The Public Services Director shall review and approve the Pavement Design Report prior to construction.

2.18 Rehabilitating / Repairing Existing Streets

On paved surfaces, within public R-O-W, do not use or operate excavators, tractors, bulldozers, off-road trucks or other power-operated equipment, the treads or wheels of which are so shaped as to cut or otherwise damage such surfaces. Damaged roadways shall be repaired to the City's satisfaction by the

Contractor/Developer. Placing of mats or using other methods of protection may be allowed subject to the approval of the Public Services Director.

Any roadway surface damaged shall be promptly restored to a condition at least equal to that in which they were found immediately prior to the beginning of operations. Suitable materials and methods shall be used for such restoration, with an emphasis on using the infra-red process for making repairs. All dirt and mud tracked on existing roadways shall be removed promptly.

Prior to overlaying existing asphalt, the Public Services Director may require nondestructive testing to determine the amount of overlay necessary to bring the street to current standards. The method of nondestructive testing and the data obtained must be in a form compatible with the pavement management system for the Public Services Director.

All "pot-holes," utility trench settlement, cracking, and any similar imperfections shall be repaired to the Public Services Director satisfaction prior to overlaying. The following should serve as a guideline for the rehabilitation and repairing of existing asphalt streets in the City:

2.18.1 General: The contractor is to provide the necessary labor materials and equipment to restore and maintain the various street and driveway surfaces of all types, pavement and driveway bases, curbs, curbs and gutters, and sidewalks disturbed, damaged, or demolished during the performance of the work.

2.18.2 Permits/Fees: Before starting any work, secure the necessary permits to work within the City or State R-O-W and easements when surface materials will be disturbed or demolished. Separate street excavation permits for street cutting and road subsurface boring / jacking operations are issued at a cost of $1,000.00 each and expire after three (3) months from the date of issue. Additionally, all public utilities shall be required to maintain, on file with the Public Services Department, an annual bond in the amount of $10,000.00 for utility cuts and/or directional bores located within City's R-O-W.

2.18.3 Materials: The quality of materials used in the restoration of existing streets, parking areas and driveways shall produce a finish surface equal to or better than the condition before work began. Compacted crushed stone backfill shall be in conformance with the TDOT Standard Specifications for Road and Bridge Construction.

2.18.4 Execution: Where trenches have been opened in any roadway or street that is a part of the State of Tennessee highway system, restore surfaces in accordance with the requirements of TDOT. All other restorations shall be done in accordance with the City standards and these Specifications and the City's Standard Details.

Before trenching in paved areas, the Contractor shall saw-cut the pavement in a straight line along the sides of the proposed trench to allow for pavement removal and trench excavation without damage to adjacent pavement. During construction, suitable precautions shall be taken to protect the pavement edges and surfaces and to minimize damage.

Upon completion of the utility installation, the cut shall be full trench backfilled with #67 stone, 12" of pug/crusher run, four (4) inches of BMOD binder and two (2) inches of 411E topping. The damaged asphalt will be straight cut, with no castle cuts allowed, regardless of how much asphalt is required to be removed to attain a straight edge cut.

Contractor may fill the top 12" of the trench with crusher run and temporary pavement patch until such time that the permanent pavement patch will be constructed. The temporary patch shall be placed the same day or within 24 hours. The temporary pavement patch shall consist of at least twelve (12) inches of compacted stone base brought to within six (6) inches of the surface of the existing permanent pavement.

A four (4) inch layer of cold mix asphaltic concrete shall then be applied to protect the base, prevent "pot holes" or "chuck holes", and provide a reasonably smooth pavement surface until the permanent patch is made. The temporary pavement patch shall be placed within twenty-four (24) hours of the completion of the utility installation. Permanent Hot Mix patching shall only be applied after the Cold Mix patch has been completely removed and adequate subbase is installed.

When installing the permanent repair, the contractor must use the infra-red method to ensure the joints are sealed properly. An inspector from the Public Services Department must be onsite during the infra-red process. The finished patch must be a smooth transition from the existing asphalt to the infra-red repaired asphalt.

Concrete curbs, gutters and sidewalks shall be restored as required to match existing construction. Replace damaged sections with completely new sections or squares. Patching of damaged sections will not be permitted.

When a manhole or valve box frame and cover, or other utility casting, requires adjustment to an elevation one inch or more above the existing pavement grade and is exposed to traffic before final paving is completed, a temporary ramp shall be constructed by feathering a cold mix for 360 degrees around the casting. A taper slope of not less than two feet per one inch shall be used. During the final paving operation, the temporary ramp shall be removed from around the casting to allow for the permanent paving installation.

2.19 Pavement Structure Components:

2.19.1 Sub-base: The layer(s) of specified or selected material of designed thickness placed on a subgrade to support a base course, surface course, or both. A minimum of one boring shall be obtained for any roadway segment. The distance between borings shall not exceed 250 feet. A second boring shall be required in the trench of any installed utilities. Therefore, where utility trenches exist, the contractor shall be required to do two (2) borings per locations, one boring in the trench and one in compacted subgrade. Multiple samples shall be taken alternately among lanes and shall be evenly spaced. The Public Services Director may require more frequent testing to ensure that the subbase meets the adequacies presented in the design report.

However, if borings have already been completed by the underground utility contractor, then additional utility borings shall not be required.

2.19.2 Sub-base Proof-Roll: Prior to scheduling a sub grade proof-roll, the Public Services Department must be in receipt of all density testing data required to be completed at this stage of construction (sub grade should have been tested every 250 ft., alternating lanes testing to be completed on cut or fill).

It is the responsibility of the contractor to provide independent density verification *prior to* proof-rolling, and at no cost to the City.

After fine grading of sub grade, but prior to placing base material, the sub grade must be proof-rolled with a loaded tandem axle dump truck or pan. The contractor shall schedule this inspection. The geotechnical engineer, Public Services Department and contractor shall be represented. The Public Services Department reserves the right to conduct or require additional testing at any time. The minimum acceptable sub grade density is 95% of maximum proctor density.

No base course material or curbs should be placed prior to written approval of the sub grade from the Public Service's department office.

NOTE: Any completed and approved sub grade left exposed for over two weeks or damaged by inclement weather must be re-inspected and approved by the Public Service's department. This may include another proof roll if necessary in the judgment of the Public Service's department.

Any excavation within a tested and City approved sub grade shall be treated as new excavation and complete density testing and proof-rolling requirements must be met.

2.19.3 Base Course: The mineral aggregate base (stone base) shall be crushed stone as manufactured by local quarries in accordance with TDOT Standard Specifications.

The composite gradation of aggregate for the mineral aggregate base and for surface courses shall be Class A, Grading D, Pug Mill Mix, as specified in the TDOT Standard Specifications for Road and Bridge Construction.

Placement of base course material is only permitted on a City approved sub grade. All base course materials are to be density tested every 250 feet in alternating lanes with a minimum of 2 tests on any road no matter the length. Thickness of base course material must be verified at each density test location.

The following compaction requirements **must be met:**

- **Graded Aggregate Base Course (98% of modified proctor density)**

It is the responsibility of the contactor to provide independent density verification at no cost to the City.

2.19.4 Base Course Proof-roll: Prior to scheduling a Base Course Proof-Roll the City must be in receipt of all base course density testing and thickness verification reports. If the average base course thickness is found to be deficient by more than ½ inch or any individual measurement deficient by more than 1 inch, the deficiency will be corrected by scarifying, adding base material, re-compacting and density testing.

Upon completion of the curbing and base course, the contractor shall schedule an inspection to proof-roll the base with a loaded tandem axle dumptruck. The geotechnical engineer, Public Services Director and contractor shall be represented. The contractor will provide proctor and gradation information on the base material from an independent testing firm as well as verification that all applicable compaction and depth requirements have been satisfied.

2.19.5 Graded Aggregate Base Course: If the base course is eight (8) inches or thicker, than it shall be placed and compacted in equal lifts (8 inches, compact and test at 4 inches and 8 inches), if the base course is less than 12 inches it can be tested as one (1) lift. If base course is 12 inches or greater it must be placed compacted and density tested in equal lifts (12 inches, compact and test at 6 inches and 12 inches).

NOTE: Any completed and approved stone base left exposed for over one week or damage by inclement weather must be re-inspected and approved by the Public Service's department. This may include another proof roll if necessary in the judgment of the Public Service's department.

2.19.6 Bituminous Prime Coat: A Bituminous Prime Coat shall be applied uniformly over the surface of the crushed stone base by means of a pressure distributor at an approved uniform rate. The Contractor shall maintain the prime coat and the surface intact until it has been covered by the following stage of construction. The prime coat shall be Emulsified Asphalt RS-2 AE-P (TDOT Standard Specifications, Subsection 904.03), applied at the rate of three-tenths (0.3) gallon per square yard, and shall be maintained at an application temperature between 60° and 140° Fahrenheit (F). No succeeding stage of construction shall be placed upon the prime coat until it has properly cured.

The use of prime coat on base course material shall be done solely at the discretion of the Public Services Director.

2.19.7 Binder Course: The binder course shall be installed to the compacted thicknesses shown on the plans or in the Standard Drawings. Bituminous mixtures shall be delivered and spread on the roadway in ample time to secure thorough compaction during daylight hours. ~~Prior to installing the binder and surface courses of asphalt, a Bituminous Trackless Tack Coat shall be applied uniformly by means of a pressure distributor at a uniform rate. The tacked surface shall be allowed to dry until it is in a proper condition to receive the next course. The Trackless Tack coat shall only be applied as far in advance of the paving operations as is necessary to obtain the proper condition of tackiness. The contractor shall protect the tack coat from damage until the next course is placed.~~ The bituminous plant mix shall be placed upon the approved stone base or asphalt course, spread and struck off to established line, grade and elevation by means of an approved asphalt paving machine. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture shall be taken from the hopper of the spreading machine and shall be distributed into place by means of shovels and spread with rakes and lutes in a uniformly loose layer of such depth as will result in a completed course having the required thickness.

2.19.8 Surface Course: One or more layers of a pavement structure designed to accommodate the traffic load; the top layer of which resists skidding, traffic abrasion and the disintegrating effects of climate. For asphalt pavement the top layer is sometimes called the "Wearing Course." Asphalt thicknesses for surface courses are typically 1-1/2" to 2" thick. For asphalt overlay projects, the total thickness of asphalt should be no more than 4". See section 2.20.1 for material specifications.

Prior to installing the surface course of asphalt, a Bituminous Trackless Track Coat shall be applied uniformly to the binder course by means of a pressure distributor at a uniform rate. The minimum rate of application for tack on a new binder course shall be a 0.05 gallons/square yard. The tacked surface shall be allowed to dry until it is in a proper condition to receive the next course. The Trackless Tack coat shall only be applies as far in advance of the paving operations

as is necessary to obtain the proper condition of tackiness. The contractor shall protect the tack coat from damage until the next course is placed.

2.20 Asphaltic Concrete Pavement Design

2.20.1 Material: All pavement designs shall adhere to the specifications set forth in the TDOT Standard Specifications for Road and Bridge Construction. Aggregate for the plant mix surface course shall be sized, graded and combined in such proportions that the resulting composite blend meets the requirements of TDOT 903.05. Aggregate for Mineral Aggregate Base and Surface Courses, of the Standard Specifications, together with the stipulations pertaining to the constituents of the blend hereinafter specified in the TDOT Standard Specifications for Road and Bridge Construction.

Unless another type has been approved in advance by the Public Service's department for a specific project, hot mix asphalt pavements will be:

Binder Type BM2 ACS mix (PG64-22) (TDOT Standard Specifications, Section 307-01.08). Wearing Surface Grading 411E ACS mix (PG70-22) (TDOT Standard Specifications, Section 411-02.11), or, 411D ACS mix (PG64-22) (TDOT Standard Specifications, Section 411-01.10).

~~For flexible pavements, the graded subgrade or the top granular base layer shall be prepared with a prime coat.~~ A prime coat is a sprayed application of a cutback asphalt or asphalt emulsion (AE) applied to the surface of untreated subgrade or base layers. The prime coat serves several purposes:

- Fills the surface voids and protects the base from weather;
- Stabilizes the fines and preserves the base material integrity, and;
- Promotes bonding to the subsequent pavement layers.

The project plans shall specify the rate at which the prime coat is applied. A prime coat is a sprayed application of an asphalt emulsion (AE) applied to the surface of untreated subgrade or base layers. Generally, however, prime coat is applied at a rate between 0.30 to 0.50 gallons/sq. yd.

Trackless tack shall be used on all paving projects, new or overlay. For an overlay project, the initial tack volume is surface dependent. For scarified or heavily alligator cracked roads, the tack is to be put down at an application rate of 0.11 gallons/sq. yd. For smoothed surfaces, recently paved roads or on leveling courses, the trackless tack application rate is 0.05 gallons/sq. yd.

2.20.2 Coordination: After approval of the base or subgrade, there shall be coordination between the paving contractor and the Public Services Department with regard to the schedule for paving. A City inspector is required to be present during paving operations.

1) Asphalt is only to be placed on a City approved base.

2) A Prime Coat shall be used on base rock material, and shall be applied 24 hours prior to paving.

3) If more than one week passes or there is 1/4 inch or more rain prior to paving an approved base, the base must be re-inspected by the City visually, and possibly proof-rolled at the discretion of the City.

4) Minimum Asphalt thickness for initial/first lift is 2 inches for residential streets.

5) Asphaltic concrete surface course may not be placed during the months of December, January, and February except with the written permission of the Director of Public Services. Placement of hot mix Asphalt will not be authorized when surface, and ambient, temperatures are less than 52 degrees Fahrenheit (F).

6) Public Services Department to visually inspect pavement and review asphalt core test data at all phases of paving, binder, intermediate and surface course.

7) Asphalt trackless tack coat to be placed between binder, or leveling, course and wearing course, with no exceptions.

2.20.3 Final Surface Course: An existing asphalt concrete binder, or base course, must be inspected and approved prior to placement of the asphalt surface (wearing) course. Verification of in-place density and thickness of the binder or base course must be provided as a prerequisite to this approval. **Failure to obtain this approval will make the street ineligible for final approval and acceptance by the City.**

2.20.4 Asphalt Acceptance Requirements: The contractor shall be responsible for providing verification of the asphalt type, asphalt binder content, gradation and the average laboratory bulk specific gravity (BSG) for all asphalt mixes used on City projects, as well as the in-place asphalt density and thickness. The asphalt contractor must have an asphalt laboratory certified by TDOT.

For each day's production, the contractor's asphalt lab must provide:

- Average laboratory BSG
- Asphalt binder content
- Gradation
- Mix type

The in-place density and thickness determination of asphalt surface and binder courses will be based on the core data for each day's production. Cores will be obtained every 250 ft. in alternating lanes with a minimum of one core on any road no matter the length, immediately after completion and the holes patched with hot asphalt from the same day's production.

The cores will be taken and evaluated by either the asphalt contractor or an independent materials testing firm certified by the TDOT for state highway projects. The pavement will be rejected, removed and replaced if the average in-place core density is less than 96% of the average laboratory BSG with all cores exceeding 95%.

The average pavement thickness must be equal to or greater than the plan thickness with no individual core thin by more than 0.25". Pavements that are deficient with regard to thickness will either be removed and replaced or overlaid at the discretion of the Public Services Director. Documentation of the asphalt verification testing must be provided prior to requesting a final inspection.

The Public Service's department reserves the right to conduct, or require additional, verification testing at any time.

2.20.5 Proof-Roll of Road Easement: Easements should be properly graded and compacted according to plans.

2.21 Installation

The mineral aggregate base shall be constructed in one or more layers with the compacted thickness being that as shown on the approved plans or the construction standards. Prior to the spreading of any mineral aggregate, the subgrade shall be proof rolled with a fully loaded tandem dump truck of crusher run (or other approved equipment). Any areas which pump will require undercutting, backfill and compaction to specified limits. Additional proof rolling shall be required for all repaired areas.

Hauling over material already placed will not be permitted until it has been spread, shaped and compacted to the required density.

If the required compacted depth of the mineral aggregate base course exceeds six (6) inches, the base shall be constructed in two or more layers of approximate equal thickness. For total base thickness of 8", lifts shall be placed and compacted in 4" thicknesses. For 10" base thickness, lifts shall not exceed 5".

Except where mechanical aggregate spreading equipment is used to place the mineral aggregate base material, final shaping of each layer prior to compaction shall be accomplished by motor grader. In the event that mechanical spreading equipment fails to shape the base material properly, final shaping shall be done by motor grader or other approved means.

Immediately following spreading, the mineral aggregate base material shall be shaped to the required degree of uniformity and smoothness and compacted to the required density prior to any appreciable evaporation of surface moisture. Compaction of each layer shall be continuous until the minimum density requirement is achieved. Compacting equipment shall be smooth drum steel wheel vibratory rollers.

For density testing purposes, each completed layer is to be divided into lots of approximately 10,000 square yards. Five density tests are to be performed on each lot and the results averaged. Smaller lots may be considered when directed or approved by the Public Services Director.

The average dry density of each lot shall be not less than 100 percent of theoretical density based upon 83 percent of a solid volume, unless otherwise specified. Further, no individual test shall be less than 97 percent of theoretical. The theoretical density of aggregates shall be based on bulk specific gravity AASHTO T-99. The theoretical density of all other aggregates shall be based on bulk specific gravity AASHTO T-85 AND T-99.

When mineral aggregate base is used to widen an existing pavement, to construct shoulders for resurfacing projects, base placed on bituminous asphalt mix, or base used for structure backfill, the average density of each lot shall be not less than 95 percent if maximum density determine in accordance with AASHTO T-99, Method D, unless otherwise specified. Further, no individual test shall be less than 92 percent of maximum density.

The thickness of the completed mineral aggregate base shall be in reasonably close conformity to the thickness shown on the approved plans or as called for by the construction standards. The thickness shall be measured at such frequency as established by the Public Services Director by means of test holes, borings, or other approved methods.

The surface of the finished mineral aggregate base shall be in reasonably close conformity to the lines, grades and cross sections as shown on the approved plans or construction standards and shall have a satisfactorily smooth riding quality.

Upon completion of the mineral aggregate base, it shall be maintained, under traffic if required, smooth and uniform until covered by the following stage of construction.

The mineral aggregate base, prepared as outlined herein, shall be sprinkled lightly with water to settle any loose dust. The bituminous prime coat shall then be applied uniformly over the surface of the base by the use of an approved bituminous distributor. Any areas containing an excess or deficiency of priming material shall be corrected by the addition of blotter material or bituminous material, as directed by the Public Services Director.

The Contractor shall protect all structures and concrete surfaces from the bituminous material during construction. If after the bituminous prime coat has been applied, it fails to penetrate before traffic has to be turned back to the road, or paving is interrupted overnight, a dry cover material shall be spread at a rate of ten (10) pounds per square yard to prevent damage to the primed surface. An excess of cover material shall be avoided. The cover material shall be applied with suitable spreading devices to prevent the tires of the trucks from running over the fresh bituminous prime coat.

The asphaltic concrete base course or surface course, bituminous plant mix (Hot Mix), may be placed on properly constructed and accepted subgrade or previously applied layers provided the following conditions are met:

1) The subgrade or the surface upon which the hot mix is to be placed shall be free of excessive moisture.

2) The Hot Mix shall be placed in accordance with the temperature limitations specified on TDOT Table 407.09-1 of the Standard Specifications, and only when weather conditions otherwise permit the pavement to be properly placed, compacted and finished.

3) See TDOT 407.09, Weather Limitations, of the Standard Specifications for additional seasonal weather requirements.

4) The Contractor may request a variance from the above required temperature and seasonal limitations to pave at lower temperatures if there is a benefit to the public. Submit such requests in writing at least one week before the anticipated need, and include a Paving and Compaction Plan for Cold Weather that meets the Department's Procedure. The plan shall identify what practices and precautions the contractor intends to use to ensure the mixture is placed and compacted to meet the specifications.

5) Bituminous Trackless Tack Coat shall be placed between binder or leveling course and wear surface.

2.21.1 New Subdivision Asphalt Application Process: Subdivisions that are building new roads to be turned over (accepted) by the City, shall be required to do the following:

1. Install approved sub-grade of at least 8", or the minimum required thickness per street type detail specification, of Grading D Pug Mill Mix;

2. Prime coat (Type RS-2) the surface of the pug at least 24 hours prior to installing the binder;

3. Install at least 2" Asphaltic Concrete Base (B-Modified), or the minimum required thickness, per street type detailed specification;

4. Apply tack coat using trackless tack to binder layer prior to installing wearing course;

5. Install 2" Asphaltic Concrete Surface Mix (411E), or the minimum required thickness per street type detailed specification.

2.21.2 Asphaltic Concrete Installation Procedure:

1. The Asphaltic Concrete binder course, and wearing course, **shall be installed at the beginning of the development project, not in stages, or phase completion**;

2. Prior to the formal acceptance by the City, the developer shall provide a project performance bond, or letter of credit (LOC), provided to the City and shall include a percentage dedicated to the repair and/or replacement of the installed layers of asphaltic concrete. The City shall require a maintenance bond of an amount **equal to 10%** of the Public Services Department's original calculated construction costs for street surfacing prior to the formal acceptance by the City.

3. The street maintenance bond shall stay active for one (1) year after final acceptance by the City.

4. Streets shall not be accepted by the City until at least 75% of the lots in the development are completed and has been issued a certificate of occupancy.

5. The City may review and approve the acceptance by individual phases of the development when the street does not provide construction access to an additional phase of the project.

2.22 <u>Testing</u>

All pavement installations and repairs will require the contractor to submit material testing certifications to the Director of Public Services. Materials should meet the requirements found in the TDOT Standard Specifications for Road and Bridge Construction. The following shall be required for the submittal:

1) Liquid Asphalt: Certification is needed to show specification compliance including the performance grade of the material.

2) Aggregate: A completed mix design along with aggregate stockpile results with percent passing each sieve.

3) Completed Mix: Complete mix gradation should be documented by tests using one of the following methods: Hot Bins, Vacuum Extraction or Burnout Oven Testing.

4) Compaction: Density results shall be compliant with the TDOT Standard Specification Section 40 and field verified. The percent voids in the total mix and the theoretical gravity of the mix should be documented as bare minimum.

The Public Services Director reserves to right to request any additional tests deemed necessary for acceptance.

2.23 Concrete Overview

This Section includes all fabricated, installed and erected structures and appurtenances related to street construction including pipes, culverts, headwalls, box culverts, box and slab-bridge.
Unless modified by these specifications, all structure materials and construction requirements shall conform to the "Standard Specifications for Road and Bridge Construction" published by the TDOT (latest edition), hereinafter referred to as the "Standard Specifications".

2.24 Reference Specifications

Unless modified by these specifications, all concrete materials and construction requirements shall conform to the "Standard Specifications for Road and Bridge Construction" published by the Tennessee Department of Transportations (TDOT) (latest edition), hereafter referred to as the "Standard Specifications".

Where project plans and specifications refer to particular items, materials, equipment and construction requirements, the appropriate section of the Standard Specifications shall apply. Standard Specification sections regarding compensation shall not apply unless directed by the Engineer. The absence of a description or specification for any item of work shall automatically refer to the appropriate section of the Standard Specifications.

TDOT Specification Section 604 shall apply for all structural concrete to be used in load carrying structures including box and slab culverts, foundations including drilled caissons, traffic signal and overhead sign foundations, retaining walls and girder bridge members. Section 604 also specifies the requirements of concrete used in structures as well as other miscellaneous or incidental items.
Miscellaneous concrete items such as sidewalks, curbing and gutters, rigid street pavement, medians, driveways, paved ditches and roadside sign foundations, shall meet the requirements of TDOT Specification Sections 700 through 703.

All precast concrete including precast drainage structures, headwalls, box culverts, pipe, temporary barriers, noise and retaining walls, and bridge members shall meet the requirements of TDOT's Standard Operating Procedure 5-3 regarding the "manufacture and Acceptance of Precast Concrete Drainage Structures, Noise wall panels, and Earth Retaining wall products". This document requires that all producers of precast concrete products be certified in accordance with national quality standards developed by the National Precast Concrete Association (NPCA), the American Concrete Pipe Association (ACPA) and/or the Pre-stressed Concrete Institute (PCI). Certified producers must submit a copy of their certifications and documentation that have successfully completed the annual inspections. The Engineer may waive the requirements of precast concrete producer certification on a case-by-case basis. This waiver must be supplied by the City in writing and retained by the Contractor.

2.25 Submittals

Where required in the project plans, technical performance and/or quality certification of concrete materials proposed for the work shall be submitted to the Public Services Director for approval. Such submittals may include the following:

2.25.1 Concrete Mix Designs: Concrete mix designs are required for load carrying structures such as bridges, box culverts, large junction boxes within the roadway and retaining walls. Mix designs

shall be prepared and certified by approved materials testing company, or alternately, an existing TDOT approved design may be submitted provided the design is approved within the calendar year. Mix designs shall certify all admixtures and cement replacement such as fly ash proposed for the project concrete.

2.25.2 Reinforcing Steel: Certifications for reinforcing steel used in load carrying structures shall be submitted to the Public Services Director. Letter of certification shall bear the signature of the supplier's representative and shall certify that the reinforcing meets the requirements of the Standard Specifications.

2.25.3 Miscellaneous Items: Items included in concrete work such as handrails, anchors, joint materials, curing materials and other items may require submittals and/or representative samples at the discretion of the Public Services Director.

2.26 Concrete Classification

Use of the following classes of concrete per the TDOT Standard Specifications:

Application	Class	Min. 28-day Strength
Sidewalks & Bikeways	A	3000 psi
Curb and Gutters, Drainage Structures	D	4000 psi
Bridge Substructures, Box Culverts, Retaining Walls	D	4000 psi
Light and Traffic Signal Pole Foundations	A	3000 psi
Bridge Deck Slabs	D or L	4000 psi
Underwater Foundations Seals	S	3000 psi
Leveling Concrete	A	3000 psi
Flowable Fill (backfill)	Excav.EFF	30psi (140psi** @98days)
Rigid Concrete Pavement	CP**	3000 psi

** See Section 204 (Structure Excavation Foundation Preparation, and Backfill), and Section 501 (Portland Cement Concrete Pavement) of the TDOT Standard Specifications.

2.27 Curbing and Sidewalks

2.27.1 Residential Sidewalks: All residential street sidewalks within the City shall be constructed within the street right-of-way and shall meet all current City zoning district requirements and Standard Drawing RP-4. It is the contractor's responsibility to ensure safety and maintain access for pedestrians when sidewalks are under construction and to protect the in-place work from damage or vandalism. Traffic control devices including cones, barrels and signs may be required on high volume streets to warn vehicular traffic in advance and adjacent to the area of construction.

The sidewalk forms and base material shall be inspected prior to concrete construction. Contractor shall refer to the City of White House detail specification SD-211 for construction requirements.

1) All concrete sidewalks shall be a minimum uniform thickness of 4" using Class 'A' Concrete, minimum 28-day compressive strength of 3000 psi.

2) Sidewalks shall be constructed on a minimum of four (4") inches of compacted, granular aggregate based stone (TDOT size #57, #67, or Class A, Grade D Base Stone). The base stone shall be mechanically compacted to a firm, even surface in reasonably close conformity with the grade and cross section required.

3) Subgrade soil, which in the opinion of the Public Services Director, is soft or subject to large volume changes, shall be excavated and replaced with suitable material. The depth of removal will be based on the quality and depth of the unsuitable soil, as field verified, or as determined by Geotechnical investigation, and is subject to approval by the Project Engineer.

4) Where driveway and alley approaches cross the sidewalk, the minimum concrete thickness of the approach slab, and sidewalk, shall be six (6") inch uniform thickness. See Standard Drawings for details. Granular base material for driveways shall be compacted base stone material conforming to Class A, Grading D of TDOT Section 303.02 (Aggregate). A 2.25" lowered curb height above the gutter line shall also be maintained at the front edge of the driveway approach, TDOT Standard drawing RP-NMC-10.

5) Side flares for a residential driveway shall be a minimum of 3'-6" on both sides of the driveway.

6) Reinforcement of residential sidewalks is required and shall consist of fiber mesh, or wire.

7) Sidewalk cross slope shall be a maximum of 2% sloping toward the curb. Longitudinal sidewalk grades within the right-of-way shall not exceed the grade established for the adjacent roadway. Where pedestrian facilities are not contained within a right-of-way, the longitudinal ramp grade shall not exceed five (5%) percent.

8) A median strip of grassed or landscaped area at least four (4) feet wide shall separate all sidewalks from adjacent curbs. All sidewalks shall be a minimum of five (5) feet wide. The difference in elevation between the top of sidewalk and the top of curb at any adjacent location shall not exceed the grade difference produced by a maximum 4:1 slope.

9) Sidewalk surface is to receive a light broom finish, to achieve a sandy texture with texture lines perpendicular to traffic. Exposed aggregate sidewalk finishes are not acceptable within the street right-of-way.

10) All exposed concrete edges shall be rounded to a 1/2" radius.

11) Final longitudinal surface variations shall not exceed ¼" under a 12 ft. straight edge and transverse variation shall not exceed 1/8" in 5 feet. Low spots which allow water to pond will not be acceptable.

12) Transverse control joints shall be spaced every 5 feet and shall be placed at right angles to traffic. Joints shall also be placed to intersect all inside or re-entrant corners. Joints shall be formed with a grooving trowel to a depth of one (1) inch. The top edges of the grooves shall be rounded to 1/4" radius.

13) Longitudinal control joints are required for sidewalk widths greater than 6 feet and less than 10 feet. Two longitudinal joints are required for sidewalks greater than 10 feet.

Longitudinal joints shall be centered in the width of the sidewalk. Joints shall be formed with a grooving trowel to a depth of 1 inch. The top edges of the grooves shall be rounded to 1/4" radius.

14) Expansion joints shall be constructed with 1/2" thick pre-molded rubberized or felt expansion joint filler. Bituminous fiberboard shall not be used. Expansion joint material shall extend the full width of the sidewalk and the depth shall extend to within 1 inch of the top surface. Space expansion joints at 25 feet maximum spacing and at each driveway and at any cold joint. Expansion joints are also required at the back edge of driveway approaches between the approach and the private drive and at each side interface with the sidewalk.

15) 1" thick pre-molded expansion joints are required when sidewalks are adjacent to curved sections of the street curb and when curb is placed adjacent to buildings and/or retaining walls. Use 1/2" isolation joints around other fixed objects like utility poles and hydrants. Use 1/2" expansion joints between the curb and sidewalks where constructed adjacent to each other.

16) Sidewalks and bikeways shall not be opened to pedestrian or bicycle traffic for at least 24 hours after placement. The contractor shall provide and maintain measures to restrict use during the curing period.

17) Concrete driveway aprons ~~shall~~ ***should*** not be opened to vehicular traffic for at least 7 days after placement or until test cylinder breaks indicate an attained compressive strength of 2500 psi.

18) Backfill sidewalks flush with the surface of the walk and the surrounding ground line with soil. For detached sidewalks, backfill the area between the curb and the sidewalk on the straight line from the top of walk to the top of curb, but not to exceed a 4:1 slope.

2.27.2 Commercial Sidewalks: All commercial street sidewalks within the City shall be constructed within the street right-of-way and shall meet all current City zoning district requirements.

The sidewalk forms and base material shall be inspected prior to concrete construction. Contractor shall refer to the City of White House detail specification SD-211 for construction requirements.

In addition to, and including, the above requirements for residential street sidewalks, commercial sidewalks within the City shall be constructed to the following requirements:

1) Driveway and alley approaches crossing the commercial sidewalks shall be a minimum width of 14 feet and the minimum concrete thickness of the approach slab shall be 6 inches. See standard drawings for details. Granular base material for driveways shall be compacted base stone material conforming to Class A, Grading D of TDOT Section 303.02 (Aggregate). A 2.25" lowered curb height above the gutter line shall also be maintained at the front edge of the driveway approach, TDOT Standard drawing RP-NMC-10.

2) Side flares for a commercial driveway shall be a minimum of 7'-0", on both sides of the driveway.

3) Isolation joints are required around penetrations in the sidewalk such as fire hydrants, utility poles, manholes, and adjacent to any fixed structure such as a building or retaining wall. Use 1" thick joints against buildings and retaining walls and 1/2" thick pre-molded non- bituminous expansion joint material shall be used in all other locations.

4) All valve boxes, manhole covers and other castings in the sidewalk area shall be adjusted to the grade of the sidewalk.

5) Commercial sidewalk widths shall be specifically reserved for pedestrian travel. Furniture, planters, newspaper stands and other protruding obstacles shall be kept clear of a minimum required width of 4 feet, or as required by current City zoning district requirements. Obstacles in the pedestrian path shall be eliminated or a widened pathway around the obstacle will be required.

2.27.3 Handicapped Ramps: All sidewalks within the City shall include handicapped access ramps compliant with the latest edition of the ADA Standards for Accessible Design at all intersections, crosswalks and commercial driveways. Handicapped ramps shall be constructed in accordance with the TDOT Standard Drawings.

1) Concrete for ramps to be Class A and shall be finished by light broom finish texturing.

2) Install a 1/2" pre-molded, felt expansion joint between the ramp section and the sidewalk and between the ramp section and the curb.

3) Truncated dome detectable warning areas shall be installed using **yellow** detectable warning panels or approved equivalent.

4) Minimum concrete thickness for a Handicapped Ramp shall be six (6) inches.

2.27.4 Curb and Gutter Sections: All concrete curb and gutter sections shall be constructed in accordance with details shown in the City's Subdivision Regulations Standard Detailed Drawings and the project plans. Curb openings will be located as shown on the approved plans and will be evaluated based on acceptable access control requirements by the City.

1) Class "A" Concrete shall be used for all curb and gutter sections and the concrete mix shall be air entrained.

2) Curb and gutter sections shall be constructed on the compacted stone aggregate base for residential and commercial streets.

3) Curb and gutter sections shall be reinforced with fiber filament mesh reinforcing.

4) Control joints for curb and gutter sections shall be spaced at a maximum of 10 feet. Joints shall be formed with a grooving trowel to a depth of 1 inch. The top edges of the grooves shall be rounded to 1/4" radius.

5) Expansion joints are required at all tangent points in curved sections, between curbs and sidewalks and between curbs and other rigid objects such as buildings, catch basins and driveway aprons.

6) Where curbs are attached to the sidewalk, expansion joint spacing shall match the spacing of expansion joints in the sidewalk, which is every 25 feet.

7) Maximum expansion joint spacing for detached curbs shall be 100 feet.

8) Curbs and gutters shall be constructed to follow the geometry of the roadway unless noted otherwise on the plans. Curved sections of curb shall conform to the roadway curve geometry with smooth continuous curves with no chorded portions.

9) Flow lines of gutters shall be true to line and grade with no areas of ponding water. Final longitudinal surface variations shall not exceed ¼ inch under a 12 ft. straight edge.

10) Concrete finish for curb and gutter sections shall be a light broom finish with finish lines parallel to the flow of water.

11) Curb and gutter sections aprons shall not be opened to vehicular traffic for at least 7 days after placement or until test cylinder breaks indicate an attained compressive strength of 2,500 psi.

2.28 Concrete Reinforcement

Where indicated on the approved drawings, concrete for load carrying structures such as box and slab culverts, bridges and retaining walls shall be reinforced with steel bar reinforcement, welded wire fabric and pre-stressing strands. Sidewalks, curbs, combined curb and gutters and concrete pavement areas shall be reinforced with synthetic fiber reinforcement.

All steel reinforcing materials required for load carrying structures shall meet the requirements of the TDOT Standard Specifications unless noted. Sizes, spacing, gauges, locations and arrangements shall be as shown on the approved plans. Where project plans do not depict reinforcing placement plans or schedules, the contractor shall develop and submit reinforcing steel shop drawing to the Public Services Director for approval. All hooked bars shall conform to Concrete Reinforcing Steel Institute (CRSI) standard hook details.

In the case of bridge decks, top slabs of box and slab culverts used as riding surfaces, concrete barrier rails and bridge sidewalks, all reinforcing steel shall be epoxy coated per the Standard Specifications. In addition, the dowel bars projecting from the footing into the back face (backfill side) of the wall stem in retaining walls shall be epoxy coated.

2.28.1 Reinforcing Materials: Use the reinforcing materials below where indicated on the approved plans:

1) Steel Reinforcing shall be deformed steel bars conforming to ASTM A 615, Grade 60.

2) Steel reinforcement for bridge decks and top slab of box bridges when used as the riding surface shall be epoxy coated. All concrete bridge railing shall also require epoxy coated reinforcement.

3) Smooth steel dowel bars shall conform to ASTM A615.

4) Plain- Steel Welded Wire Fabric: ASTM A185, fabricated from as-drawn steel wire into flat sheets.

5) Pre-stressing steel shall be in accordance with ASTM A416.

6) Synthetic Fibers (fiber reinforced concrete): Fibrillated or monofilament polypropylene fibers engineered and designed for use in concrete, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.

2.29 Concrete Placement

All formwork shall be constructed using pre-manufactured metal forms or dressed form lumber and plywood. Formwork shall be adequately braced, mortar tight and true to line and grade. Provisions shall be made during placement of concrete to minimize aggregate separation and ensure proper consolidation throughout the pour. To highlight a few key requirements of Standard Specifications in particular, the contractor shall ensure the following placement operations are observed:

1) Elapsed time from truck loading to delivery and placement shall be limited to 90 minutes when the air temperature is 90 degrees or less. When the air temperature exceeds 90 degrees, this time is reduced to 60 minutes.

2) Concrete that does not meet the specified limits regarding slump, air content, temperature, and delivery time shall not be used unless approved by the Engineer.

3) Concrete shall be compacted with suitable vibrators operating within the concrete unless otherwise directed by the Public Services Director.

4) Concrete may not be placed from a chute discharge height greater than five (5) feet.

5) No concrete other than foundation seals shall be placed underwater.

6) Do not add water to concrete during delivery, at project site, or during placement unless the concrete delivery ticket indicates that mix water was withheld at the plant. In such cases only the amount withheld per cubic yard may be added at the jobsite.

7) Concrete shall be placed in cold weather only when the air temperature is 40 degrees and rising.

8) Protect newly placed concrete from air temperatures below 40 degrees with insulation blankets to maintain the concrete temperature at not less than 45 degrees for a period of 120 hours after placement.

2.30 Concrete Inspection and Laboratory Testing

It is the contractor's responsibility to ensure quality concrete meeting Section 604, Concrete Structures, of the TDOT Standard Specifications is delivered and placed on the project. All quality testing of the concrete shall be performed by an independent testing company pre-approved by the City in accordance with Section 1 of these specifications. All quality testing performed by the testing agency is subject to monitoring and review by the Public Services Director to ensure established procedures are followed. Reports of testing shall be certified and submitted to the City within ten days of actual testing to document the quality control

before final acceptance of the project. The Contractor may pursue additional testing per 604.15, Compressive Strength Tests of Concrete, of the TDOT Standard Specifications if concrete compression tests fail to meet the required strengths noted in Section 2.26 above. The contractor will be responsible for the costs associated with all testing and also re-testing due to failed acceptance tests.

Required tests for concrete construction to be performed by the testing agency include:

1) Slump
2) Yield
3) Entrained air content
4) Mix Temperature
5) Representative test cylinders

2.30.1 Testing Frequency

One composite sample (4 test cylinders) for each day's pour of each concrete mix exceeding 5 cu. yd. but less than 25 cu. yd. plus one set for each additional 50 cu. yd. or fraction thereof.

Concrete placement operations shall be inspected by an on-site superintendent to ensure placement of the concrete meets requirements of the Standard Specifications. On-site inspection is required to be documented by the contractor and recorded in a field book subject to review by the Public Services Director.

2.31 Stormwater Overview

This Section includes all fabricated, installed and erected structures and appurtenances related to street construction including pipes, culverts, headwalls, box culverts, box and slab bridges, and sign, signal and lighting supports.

2.32 Stormwater Reference Specifications

Unless modified by these specifications, all structure materials and construction requirements shall conform to the "Standard Specifications for Road and Bridge Construction" published by TDOT (latest edition), hereinafter referred to as the "Standard Specifications".

2.33 Pipe, Culverts, and Storm Sewers

Pipe used for cross drains under the street and within the City's R-O-W shall be reinforced concrete pipe (RCP). Side drains under driveways, or within the interior of the development, may be RCP or ADS plastic pipe. Driveway culverts and interior development piping shall be the responsibility of the property owner or the HOA.

2.33.1 Concrete Pipe: Concrete Pipe shall be reinforced Class III rigid pipe and shall be round, oval or flat based as shown on the approved plans. All precast concrete pipe shall be manufactured in accordance with the "TDOT Procedures for Manufacture and Acceptance of Precast Drainage Structures, Noise Wall Panels and Retaining Walls".

2.33.2 Plastic and Polyethylene Corrugated Pipe: This pipe shall be ADS dual wall HDPE, or, HP Storm high-performance polypropylene pipe (PP) corrugated outside with smooth finish inside wall. This pipe may be used for site drainage, but shall only be used under driveways, not under

streets. Plastic pipe may exit from the back side of a street drainage structure and extend off the City R-O-W. The development HOA shall be responsible for the maintenance of the ADS plastic pipe outside of the R-O-W.

2.33.3 Pipe Materials and Requirements: All storm sewer drainage pipes located within the roadway right-of-way shall be reinforced concrete pipe (RCP). The minimum size diameter for stormwater culverts is 15 inches. The minimum slope shall be one-half percent (0.5%) or that necessary to create a full-flow velocity of two (2) feet per second (fps).

2.33.4 Pipe Bedding: Pipe bedding for concrete pipe shall be #67 stone, requiring a minimum of 6 inches of stone below the pipe and shaped by a template to fit the lower part of the pipe exterior for at least 10 percent of its overall height. The depth of bedding material is predicated on soil conditions.

2.33.5 Pipe Sizes: Normal pipe sizes readily available from suppliers may be used to satisfy drainage requirements. Minimum pipe size for culverts, drains and storm sewers shall be 15-inch diameter.

2.33.6 Pipe Backfill: Pipe Backfill shall be #67 stone placed to the springline of the pipe in layers not to exceed 6". For pipe installed in solid rock cut, backfill shall be no less than 12" above the top of the pipe.

2.34 Storm Water End Walls and Inlets

Pipe culvert end wall treatments may be precast or cast-in-place concrete and are required for all pipe locations within the street right-of-way.

1) End walls for pipe diameters greater than 24 inches shall be concrete construction in accordance with the appropriate safety end wall standard drawing (TDOT D-PE series), and shall be fitted with a steel bar safety grate.

2) End walls for pipe diameters 24 inches or smaller shall be concrete construction in accordance with the straight end wall details as shown in the standard drawings. Type U head walls may be used for pipe diameters of 24 inches or less if approved by the Public Services Department.

3) To improve the aesthetics of pipe headwalls, textured concrete finishes simulating stacked stone may be used. Additionally, veneers of stone or brick may be applied to exposed surfaces to enhance the appearance from the street.

2.35 Storm Drainage Structures

Storm drainage structures consist of junction boxes, drop inlets, catch basins and manholes which may be constructed as precast concrete sections. Cast-in-place concrete may be used with approval by the Public Services Director. Inlet and outlet pipes shall extend through the walls of structures a sufficient distance to make connections, but shall be cut flush with the inside surfaces of the box structure.

2.35.1 Catch Basin Castings: Catch basin castings that are damaged during construction will be rejected. Castings shall be set true to line and grade. Standard catch basins shall meet the requirements of the Standard Drawings.

2.35.2 Concrete Catch Basins: Standard catch basins are precast concrete or cast-in-place where directed by the Public Services Director. Catch basins shall meet the requirements of the Standard Drawings.

2.35.3 Junction Boxes: Standard junction boxes for pipes where required may utilize single and double catch basin standard drawings by omitting the casting entrance in the top surface. Triple catch basins and specialty junction boxes may be used for unusual conditions. Details for these structures may be designed and detailed on the plans or may be referenced to the Standard Drawings. In either case, these special structures shall be submitted to the Public Services Director for approval.

2.35.4 Additional Pipe Openings: All boxes, existing or new installation, requiring additional pipe openings shall be neatly cored by means of mechanically core drilling through the wall of structure. Any damages caused to the structure may require replacement. This will be determined by the Public Services Director.

2.36 Concrete Box and Slab Culverts and Bridges

Box and slab culverts are required when design flows exceed the hydraulic capacity of dual pipe structures or when a clear waterway opening is required. All precast concrete structures must meet the requirements of TDOT Standard Specifications for, Concrete Structures and Non-metallic Pipe. All cast-in-place concrete structures must meet the TDOT requirements for Concrete Structures, and Concrete Reinforcement.

2.36.1 Box Culverts: Typically span 18 feet or less over water with a single or double barrel box structure.

2.36.2 Box Bridges: Box bridges are defined as a box culvert type structure with a single box or multiple boxes, but having a total horizontal distance measure parallel to the street centerline of 20 feet or more between inside faces of the outside walls.

2.36.3 Slab Culverts and Slab Bridges: Slab culverts and bridges are differentiated the same as box culverts and box bridges, but are constructed without a bottom slab. Slab culverts and bridges are typically used when bedrock is within three feet or less from the streambed elevation.

2.36.4 – Bottom Slab Placement: Box culverts and bridges are supported on a bottom slab foundation and may be founded on the natural gravel or sand streambeds. The top surface of the bottom slab of box structures shall be located a minimum of 2 feet below the natural streambed to allow for future streambed degradation.

2.36.5 – Precast Bridge Units: Box and slab culverts and bridges may be precast or cast in place. Precast units speed construction times since only the foundations are required to formed and poured in place and the units are set quickly on the foundations. Where aesthetics is to be considered, precast modular arch type units such as "Con/span" are available and often provide greater clear spans than precast box type structures. Both precast box and arch units may be used in multiple span arrangements to convey larger flows.

2.36.6 – Riding Surface: Where practical, the top surface of the box culvert or bridge should be used as the riding surface of the street. The absence of fill material or asphalt placed on the top slab

eliminates the detrimental effects of trapped moisture and extends the life of the concrete slab. Additional concrete thickness must be supplied to provide a clear concrete cover of 2 ½ inches over the top mat of reinforcing steel. When the top slab is used as the riding surface, the exterior curb portions of the standard box bridge designs should be omitted to allow surface water to rain off the slab. A bridge railing system of metal beam guardrail shall be thru-bolted to the top slab and extended off each end of the bridge. See TDOT standard drawings S-GRS-2, S-GRC-1, and S-GRC-2 for details of the guardrail attachment.

2.37 Drainage Requirements

Stormwater drainage systems constructed to drain streets accepted into the City Street Index are eligible for acceptance by the City if designed and constructed in accordance with the City of White House Stormwater Ordinance.

Only those stormwater structures, appurtenances, and piping located within the City R-O-W of Street Index roads are eligible for acceptance by the City. As it relates to roadways, the objective of surface drainage is to remove storm water from the traveled roadway as rapidly as possible so that traffic may move safely and efficiently. This is accomplished through careful roadway engineering practices such as using proper cross slopes, longitudinal grades, and cross drainage structures.

In the case of private development design, the planning and design of the overall drainage system should be done simultaneously with the road or street layout and gradient planning and design. Where positive lot drainage is proposed, coordination of the road or street grades and the finished lot elevations must be achieved.

All public and private roadways within the City shall be constructed at least one (1) foot above the 100-year base flood elevation established by FEMA.

2.38 Drainage / Hydrology Calculations

Drainage design requirements are set forth in Title 18 and shall be the followed accordingly.

Drainage/Hydrology Calculations are required as part of the Construction Plan submittal per the requirements set forth in Chapter 2 of these specifications. These calculations are *required to be endorsed by a TN registered professional engineer.*

The maximum allowable headwater to depth ratio shall be 1.5

Calculations should include the following as a minimum for submittal:

- Drainage area calculations include area in acres, runoff coefficients, a description of runoff calculation methods used, including rainfall intensity, and runoff (Q) used in calculations.
- Culvert cross sections clearly showing invert and outlet elevations, culvert lengths, roadway elevation and lengths.
- Energy Dissipation Design calculations (HY8 dissipater analysis reports will be accepted)
- Computer analysis report output. Preferred computer programs are as follows: HY8 (FHWA Culvert Analysis), Hydro-flow Hydrographs, Hydro-flow Storm Sewers, HEC-RAS for bridges and large culverts.
- Force effects (including earth pressure, dead load, and vehicular dynamic loading) on buried drainage structures *if requested by the Engineer.*

- Summary of high water elevations *if open channel flow is present*

2.39 Plans

Complete construction plans and specifications together with all appropriate design calculations are to be submitted and approved prior to the commencement of construction. Plans are to be provided in digital format on computer disc as well as on 24" x 36" sheets. Plans are to be on state plane coordinates in accordance with the City of White House's submission standard and to contain the following information:

1. Plan
2. Profile
3. Horizontal curve data
4. Vertical curve data
5. Grades
6. Stations of all PI's, PC's, PT's and intersections
7. Existing and proposed grades at half station
8. Typical cross section
9. Drainage Structures
10. Utilities - all known or proposed (gas, phone, cable, electric, sewer and water)
11. Signing Plan
12. Pavement Marking Plan
13. Length of Proposed Roadways rounded to 0.01 Mile

2.40 Record Drawings

Record drawings on computer disc are to be provided before final approval will be issued. Record drawings will consist of 3 sets of drawings and digital copies in PDF, DWG, and Shapefile formats.

2.41 Dedication

Roadways designed and constructed in accordance with these standards and approved by the Public Services Director and Public Services Director in accordance with the Street Acceptance Policy may be dedicated to the City of White House for maintenance. This is accomplished through the submittal and acceptance of a recorded deed for the R-O-W.

2.42 Constructions Zones

Within the City Easements/ROW's,

1) Structural Zones: Any area that will or may receive an additional loading of weight or energy. To include all roads, road easements, detention or retention ponds.

2) Non-Structural Zones: Landscaped storm drain easements.

2.43 Inspection

All elements of roadway and storm drain system construction, in both Structural and Non-Structural Zones must be inspected and approved by the Public Services Department as a prerequisite for acceptance by the City of White House. This will include:

1. Sub grade Surface
2. Storm Drain System and all related structures
3. Detention/Retention Ponds
4. Embankments
5. Utilities within the structural zone
6. Utilities in Landscaped zones
7. Sub grade for roads
8. Finished grade of road easements/ROW
9. Sub base
10. Base Course
11. Asphalt Paving

It is the contractor's responsibility to insure the Public Services Department is notified upon completion of each phase of construction and has the opportunity to make their inspections before proceeding to the next phase.

It should be understood that the inspections conducted by the Public Services Department are for the protection of the City of White House only. They are not intended to certify the contractor's satisfactory discharge of his contractual obligation to the owner, nor do they relieve the project engineer from any of his responsibilities with regard to inspection and contract administration.

2.44 General Instructions to Contractors

The following procedures for implementation of the City's inspections and final approval shall be followed. It is recommended that these instructions be included in the contract documents for the construction contract.

2.44.1 Applicability: As a prerequisite to City approval and acceptance of new streets, all phases of construction must be inspected and approved by the Public Service's Department.

2.44.2 Specifications: All construction and materials shall comply with the latest edition of the City of White House Standard Specifications for Roadway Construction unless specifically noted otherwise herein. These requirements and City specifications shall supersede the Public Services Department specifications in the event of a discrepancy.

2.44.3 Testing: The contractor is responsible for providing all geotechnical and materials testing and the accompanying documentation at no cost to the City. All testing is to be performed by a licensed certified agency and signed off on by the engineer. All testing is to be identified on forms as to the exact location (SD No.'s, Street name, Sta. No.'s, and elevation in regards to finished grade.) The City will be responsible for providing its own quality assurance testing. Unless otherwise stated herein, the proctor densities required under these procedures are standard proctor densities.

2.44.4 Notification: After receiving approval of street, storm drainage and sediment and erosion control plans, the contractor or engineer must contact the Public Services Department with a start date for construction at least 48 hours in advance. Upon completion of site clearing and grubbing and erosion control installation a mandatory site meeting will be held. Meeting is to be arranged by the contactor or project engineer. Meeting shall be attended by project engineer, contractor, developer, geotechnical engineer, Director of Public Services, and any utilities that will or may

encroach on/into a Structural Zone. (Attendee must be a responsible representative, meeting should be timely planned and the City notified at least 48 hours in advance.)

2.44.5 Erosion Control: Before starting any grading work, install sediment and erosion control measures per the approved plans to protect any downstream water bodies. The contractor is responsible for implementation and weekly or bi-weekly monitoring of the sediment and erosion control plan in accordance with the City of White House MS4 and TDEC Regulations, insuring inspection logs are available on site at all times, and for insuring that silt and sediment do not leave the site.

2.44.6 Inspections: Requests for any inspection must be arranged with the Public Services Department 24 hours in advance.

2.44.7 Other Regulations: The developer and contractor are also responsible for compliance with all applicable regulations administered by other agencies such as:

- TDEC
- Corps of Engineers
- TDOT
- City Planning and Codes

The Public Services Department may withhold approval at any stage of construction, including final approval, for failure to comply with these regulations.

2.45 Required Geotechnical Testing and City Inspections

Mandatory Initial Sub grade Surface Inspection: After clearing and rough grading of streets but prior to placement of any storm drain or fill for road way embankments, a mandatory sub grade surface inspection is required.

The developer, contractor, project engineer, geotechnical engineer, any utilities that may be working within a structural zone and the Public Services Department should be present. This inspection shall be set up by the contractor or the project engineer.

A rubber-tired backhoe or motor grader are needed for this inspection in order to confirm that all stumps, roots and unacceptable soils have been removed. A proof-roll may be conducted during this inspection at the discretion of the Public Services Department or geotechnical engineer. Underdrain requirements may also be identified at this point. All deficiencies identified during this inspection must be corrected by the contractor before the next inspection is requested. The consulting engineer or geotechnical engineer as well as the Public Services Department and contractor should be represented. This inspection shall be set up by the contractor or the consulting engineer.

2.45.1 Trenching and Backfilling: Storm drain trench bedding and backfill must be a TDOT approved material, be visually inspected, and signed off on by the geotechnical inspector and a copy of the inspection must be sent to the City.

The contractor shall notify the Public Services Department when backfilling of storm drainage or utility excavations within a Structural Zone is to take place. Backfill in these excavations shall be compacted at the proper moisture content in lifts **not exceeding 6 inches.** The contractor shall

provide geotechnical testing and documentation, at no cost to the City, confirming that all backfill has been compacted to at least 95% of maximum proctor density.

2.45.2 Trenches in the Structural Zone: Such trenches are to have density testing ~~beginning at the pipe haunches, on both sides,~~ every ~~1~~2200 ft. or any portion of that, testing to be performed ***after final elevation of the subgrade is in place.*** ~~every 1 ft. of fill every 100 ft. until sub-grade elevation is met.~~

2.45.3 Trenches in a Non-Structural Zone: Such trenches are to have a density testing beginning at pipe haunches both sides every 200 ft., or any portion of that, testing to be performed ***after final elevation of the subgrade is in place.*** ~~every 2 ft. of fill every 200 ft. until sub-grade elevation is achieved.~~

Density Requirement in a Non-Structural Zone to be 95% of maximum proctor density within the pipe zone and 85% from top of pipe zone to finished grade.
The Public Services Director is to be copied on all testing. If not properly notified, or if the test results are unsatisfactory, the Public Services Department may require excavation and re-compaction of the backfill. No proof-roll of the sub grade will be scheduled until the backfill compaction has been documented.

2.45.4 Erosion Control: Install sediment and erosion control measures in accordance with the approved Stormwater Pollution Prevention Plan.

2.45.5 Storm Drain Boxes/Basins:

1) Boxes inside a Structural Zone - fill around boxes to have 1 density test ~~for every 2 ft.~~ of fill placed. Density test must meet 95% of maximum proctor density.

2) Boxes inside a Non-Structural Zone - fill around boxes to have 1 density test ~~for every 3 ft.~~ of fill placed. Density test must meet 85% of maximum proctor density. Public Services Director is to be copied on all testing.

2.45.6 Embankments: All stumps and large roots must be removed from the roadbed prior to placement of fill for embankments regardless of fill height. All roadway embankment and embankment fill must be approved by and signed off on by the geotechnical engineer. Roadway embankments fill to be placed and compacted in lifts not exceeding 8".

The contractor is responsible for providing geotechnical testing and documentation that the embankment material has been compacted to **95% of maximum proctor density**.

Density testing of embankment fills to be performed ~~every 1ft. of fill~~ **every 250 ft. alternating lanes with a minimum of 2 tests per road~~, per 1ft. of fill~~.** The Public Services Department is to be copied on all testing.

No proof roll of the sub grade will be scheduled until the compaction has been documented.

2.45.7 Curb and Gutter Proof-Roll: Curb and gutter must be placed on compacted and approved sub grade or base material. Prior to scheduling a curb and gutter proof-roll the Public Service's department office must be in receipt of all density testing data required to be completed at this stage

of construction. The geotechnical inspector, contractor, project engineer and Public Services Director, or his/her designee, shall be present for this proof-roll.

- **NOTE:** Upon completion of a passing curb and gutter proof-roll, absolutely no excavation or trenching is to be done in a Structural Zone (Roadway or Roadway Easement) without the approval of the Public Service's department office.

No base course material or curbs should be placed prior to written approval of the sub grade from the Public Service's department office.

- **NOTE:** Any completed and approved sub grade left exposed for over two weeks or damaged by inclement weather must be re-inspected and approved by the Public Service's department. This may include another proof roll if necessary in the judgment of the Public Service's department.

Any excavation within a tested and City approved sub grade shall be treated as new excavation and complete density testing and proof-rolling requirements must be met.

2.45.8 Catch Basins: The location and orientation of the catch basins relative to the curb and gutter, as well as the roadway width, should be confirmed at this time. Catch basins improperly placed must be relocated and/or reconstructed. All catch basins must have a temporary drain by which standing water can be drained from the surface of the sub grade and base during construction. These drains must be properly plugged before the final inspection is requested.

2.46 Signs

Traffic control signs and name signs on new streets are to be installed by the developer in accordance with an approved signing plan as a prerequisite for acceptance by City.

2.47 Final Approval

Final approval and acceptance shall comply with the City Street Acceptance Policy. The Planning Commission shall review and provide recommendation to the Board of Mayor and Aldermen, after which the Board of Mayor and Aldermen must formally approve public acceptance before a maintenance bond is allowed to be submitted.

2.47.1 Final Inspection: After the paving is completed and all utility, storm drainage and associated work is complete, a final inspection can be scheduled. The following items should all be completed before a final inspection is requested:

- Permanent grass on road shoulders; cut and fill slopes and easements
- Street name signs (City Standard or an approved alternate)
- Traffic control signs (per TN MUTCD)
- Pavement marking (Thermoplastic unless otherwise directed by the Public Services Department)
- As-built Drawings

2.47.2 Documentation: As a prerequisite to conducting the final inspection, the following must be provided:

- Digital submission of as-built plans

- 24"x36" hard copy of as-built plans
- Recorded R-O-W deeds and/or final subdivision plat showing recorded R-O-W for roads and drainage system
- One-year warranty bond for road and drainage systems
- Documentation of asphalt verification testing

2.47.3 Punch List: A written punch list of deficiencies found during the final inspection will be provided. All items should be completed before requesting a re-inspection.

Failure to comply with any of the above listed requirements could render the streets and storm drainage systems ineligible for acceptance by City.

2.48 Encroachment Permits

An encroachment permit, approved by the Public Service's department, is required for all construction, undertaken by parties other than the Public Service's department or its authorized contractor, within or affecting the R-O-W of any City maintained road. This requirement applies, but is not be limited, to:

- Driveway connections involving a curb cut or pipe installation
- Curb cuts
- Utility taps
- Utility crossing
- Storm drainage installation
- Storm drainage discharge
- Subdivision entrance signs or gateways

The permittee is required to indemnify the City for any liability incurred or damages sustained as a result of the encroachment.

The permittee is responsible for:

- Notifying the Public Service's department when construction begins on an encroachment
- Ensuring that a copy of the encroachment permit is on the construction site
- Ensuring that the construction and the restoration of the roadway have been approved by the Public Service's department office
- All construction

The encroachment permit application form may be obtained from the Public Service's department.

First Reading:	January 17, 2019	PASSED
Second Reading:	April 18, 2019	PASSED

Michael Arnold, Mayor

ATTEST:

Derek Watson, City Recorder