

**ORDINANCE 2000-7  
DEVELOPMENT REGULATIONS  
CITY OF DAHLONEGA, GEORGIA**

AN ORDINANCE AMENDING IN THEIR ENTIRETY THE CITY OF DAHLONEGA SUBDIVISION ORDINANCE (ORDINANCE 84-3) AND THE CITY OF DAHLONEGA DEVELOPMENT ORDINANCE (92-4) AND TO THE EXTENT CONFLICTING, THE CITY OF DAHLONEGA ZONING ORDINANCE (91-9); FOR THE PURPOSE OF ESTABLISHING RULES AND REGULATIONS GOVERNING THE DEVELOPMENT OF LAND WITHIN THE INCORPORATED CITY OF DAHLONEGA, GEORGIA; DEFINING STANDARDS FOR STREET, UTILITIES AND DRAINAGE IMPROVEMENTS; PROVIDING FOR THE METHOD OF ADMINISTRATION AND AMENDMENT; PRESCRIBING PENALTIES FOR THE VIOLATION OF ITS PROVISIONS; AND FOR OTHER PURPOSES.

WHEREAS, the City of Dahlonega is desirous of enacting new development regulations to incorporate changes and amendments enacted since the adoption of the 1984 Subdivision Ordinance and 1992 Development Ordinance to yield a new document in its entirety to reflect said changes; and

WHEREAS, the City of Dahlonega is desirous of amending to the extent conflicting its zoning ordinance, Ordinance 91-9, so that the newly enacted Development Regulations supercedes and govern all conflicts with Ordinance 91-4 as amended;

WHEREAS, the City of Dahlonega Planning and Zoning Commission on October 31<sup>st</sup>, 2000, following a duly advertised public hearing, reviewed and recommended to the Mayor and the City Council of Dahlonega the adoption of the text of new Development Regulations.

WHEREAS, the Mayor and the City Council of the City of Dahlonega, on December 4<sup>th</sup>, 2000, held a duly advertised public hearing on those proposed amendments; and

WHEREAS, the Mayor and City Council of the City of Dahlonega find that the above specified amendments further the purposes of promoting the health, safety, morals, convenience, order, prosperity, and general welfare of the present and future residents of the City of Dahlonega;

NOW, THEREFORE BE IT RESOLVED by the Mayor and City Council of Dahlonega, that it has hereby approved and adopts the new document entitled "The Development Regulations of the City of Dahlonega, Georgia".

BE IT FURTHER RESOLVED that, effective the 4<sup>th</sup> day of December, 2000, the 1984 City of Dahlonega Subdivision Ordinance (Ordinance 843) and the 1992 City of Dahlonega Development Ordinance (Ordinance 92-4) be, and are hereby amended and superceded by the Development Regulations of the City of Dahlonega, Georgia, "and that the City of Dahlonega Zoning Ordinance (Ordinance 91-9 as amended) is hereby superceded to the extent conflicting with "The Development Regulations of the City of Dahlonega."

ADOPTED this 4<sup>th</sup> day of December, 2000.

Thomas C. Davis, Mayor  
Bill Scott, Council Member  
Billie D. Stancil, Council Member

Gary McCullough, Council Member  
Loy Jones, Council Member  
Janet Jarrard, City Clerk

**CITY OF DAHLONEGA, GEORGIA  
COMPREHENSIVE DEVELOPMENT REGULATIONS**

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**THE COMPREHENSIVE DEVELOPMENT ORDINANCE  
OF THE  
CITY OF DAHLONEGA, GEORGIA**

**ARTICLE I  
AUTHORITY, TITLE, PURPOSE AND INTENT**

AN ORDINANCE ESTABLISHING RULES AND REGULATIONS GOVERNING THE SUBDIVISION AND DEVELOPMENT OF LAND WITHIN THE INCORPORATED CITY OF DAHLONEGA, GEORGIA; DEFINING STANDARDS FOR STREET, UTILITIES, AND DRAINAGE IMPROVEMENTS; PROVIDING FOR THE METHOD OF ADMINISTRATION AND AMENDMENT; PRESCRIBING PENALTIES FOR THE VIOLATION OF ITS PROVISIONS; AND FOR OTHER PURPOSES.

Section 1.1 Authority

This Ordinance is adopted under the authority of the Constitution of the State of Georgia and laws enacted pursuant thereto.

Section 1.2 Short Title

This Ordinance shall be known and may be cited as "The Comprehensive Development Ordinance of the City of Dahlonega, Georgia."

Section 1.3 Purpose

These regulations are intended to serve the following purposes:

- (a) To protect and promote the health, safety and general welfare;
- (b) To provide a system for the subdividing of lands and the accurate recording of land titles;
- (c) To encourage economically sound and orderly land development in accordance with the Comprehensive Plan and other policies and objectives of the City;
- (d) To assure the provision of needed open spaces and public facility sites in new land subdivisions through the dedication or reservation of land for public purposes; and
- (e) To assure equitable review and approval of all land subdivisions by providing uniform procedures and standards for the subdivider.

Section 1.4 Intent and Application

It is the intent of this Ordinance that it will apply to and provide guidance for the subdivision of land and development of land within the incorporated limits of the City of Dahlonega, Georgia. Any land development activity must comply with this Ordinance.

## ARTICLE II DEFINITIONS

### Section 2.1 Use of Words and Interpretation

- (a) For the purposes of this Ordinance, the following shall apply to the use of all words:
- (1) Words used in the present tense shall include the future tense,
  - (2) Words used in the singular number include the plural and words in the plural number include the singular,
  - (3) Words in masculine gender shall include the feminine and words in feminine gender shall include the masculine,
  - (4) The term "shall" is mandatory and not discretionary,
  - (5) The word "may" is permissive,
  - (6) Use of the word "and" is inclusive and requires that all of the component phrases so connected must be present or fulfilled for sufficiency,
  - (7) Use of the word "or" is not exclusive and requires that at least one of the component phrases so connected must be present or fulfilled for sufficiency. The word "or" may allow more than one component phrase to be present or fulfilled, as in the term, "and/or".
- (b) In this Ordinance the following shall control the interpretation of words and phrases:
- (1) Words and phrases defined in this Article shall be interpreted as defined herein without regard to other meanings in common or ordinary use, unless the context of the word indicates otherwise.
  - (2) Words or phrases not defined herein shall be interpreted as defined in the Zoning Ordinance of Dahlonaga, Georgia, as applicable to the use of the word or phrase within the context of this Ordinance.
  - (3) Words or phrases not defined herein or in any other applicable code, regulations or ordinance of the City of Dahlonaga, Georgia shall be construed to have the meaning customarily assigned to them.

### Section 2.2 Definitions of Words and Phrases

**Alley or Service Drive** - A minor, permanent, public service-way which is used primarily for vehicular service to the back or the side for properties otherwise abutting a street.

**Arterial** - An arterial street as defined and/or designated in the Zoning Ordinance or Comprehensive Plan of the City.

**Block** - A piece or parcel of land entirely surrounded by public street, other than alleys, or other major physical barriers.

**Board of Zoning Appeals** - The body established by these regulations appointed by the Governing Body which has jurisdiction to take action on appeals, variances, and other determinations as herein established

**City** - The City of Dahlonaga, Georgia, a municipal corporation.

**City Council** - The legally constituted and elected governing body of the City of Dahlonaga, Georgia.

**Clearing** - The removal of trees, other vegetation and/or above ground improvements including, but not limited to, buildings and structures, walls, fences, steps, walks, curbs, gutters, concrete slabs, pavements (including bases for pavements) and surfacing.

**Concept Plan** - A drawing which shows the overall concept of a proposed development, and which may include lots and streets in a subdivision or the general location of buildings and improvements for a multi-family or non-residential project, and which may be drawn to approximate dimensions in a freehand style.

**Cul-de-sac** - A minor local street having one end open to traffic and being permanently terminated by a vehicular turnaround.

**Developer** - Any person, individual, firm, partnership, association, corporation, estate, trust, or any other group or combination acting as a unit who directs the undertaking or proposes to undertake development activities as herein defined, whether the development involves the subdivision of the land for sale to individual users, the construction of buildings or other improvements on a single land ownership or both.

**Development** - 1. (noun) A specific subdivision or project which is a single entity or intended to be constructed as an interrelated whole, whether simultaneously or in phases. 2. (verb) All activities associated with the conversion of land or the expansion or replacement of an existing use to any new use intended for human operation, occupancy, or habitation other than for agricultural purposes. Such activities include land disturbance and the construction of improvements such as, but not limited to, streets, driveways, parking areas, sidewalks, buildings, structures, utilities, or storm drainage facilities.

**Development Plans** - The detailed and professional plans showing the layout and design, site work and construction activities proposed for a project (other than architectural/engineering buildings plans); including, but not limited to, Site Plans, Grading Plans, Erosion and Sediment Control Plans, Tree Protection Plans, Landscape Plans, Street Plans and Profiles, Water Supply Plans, Sanitary and Storm Sewer Plans and Profiles, Other Site Improvement Plans and Other Appropriate Sections, Details, Notes, Schedules, Legends and Diagrams.

**Drainage Improvements** - Those facilities and structures intended to control and direct the passage of storm waters and other surface water flows from and across property; including but not limited to, modified natural drainageways, modified creeks, modified streams, channels, swales, ditches, flumes, culverts, cross drains and other piping, catch basins, area drains, drop inlets, junction boxes, headwalls, flared end sections, detention ponds and basins, rip rap, drainageway lining systems, and energy dissipation devices.

**Drainage Manual** - The City of Dahlonega Drainage Manual as contained in Appendix A.

**Driveway** - A vehicular access way in private ownership, other than a private street, which provides access to primarily only one property, or no more than two single-family detached residences.

**Easement** - Recorded authorization for a specified purpose by a property owner for the use of any designated part of the real property by another entity.

**Erosion Control Regulations** - The City of Dahlonega, Georgia, Soil Erosion and Sediment Control Ordinance.

**Expressway** - A high capacity public street from which access to abutting property is prohibited and as defined and/or designated in the Zoning Ordinance or Comprehensive Plan of the City.

**Final Plat** - A finished drawing of a subdivision showing completely and accurately all legal and boundary information and certifications required by these Regulations and conforming to the Georgia Plat Act.

**Georgia DOT** - The Department of Transportation of the State of Georgia.

**Grading** - The movement, removal, or addition of soil, earth, sand, silt, or rock on a site by use of mechanical equipment.

**Grubbing** - The removal of stumps, roots, and abandoned underground facilities including, but not limited to, utilities, structures, walls, footings, foundations, wells, septic tanks, storage tanks, and pipe.

**Health Department** - The Health Department of Lumpkin County, Georgia.

**Lot** - A portion of a subdivision, or any other parcel of land, intended as a unit for transfer of ownership or for development or both. In determining the area and dimensions of a lot, no part of the public right-of-way may be included.

**Lot, Corner** - A lot abutting upon two or more streets at their intersection.

**Lot, Double Frontage** - A lot, other than a corner lot, abutting upon two or more streets.

**Mean Sea Level** - The average height of the sea for all stages of the tide. For purposes of these Regulations, the term is synonymous with National Geodetic Vertical Datum.

**Owner** - A person having a majority fee simple interest in real property, or a majority interest through any other form of ownership.

**Pedestrian Way** - A right-of-way within a block dedicated to public use, intended primarily for pedestrians and from which motor propelled vehicles are excluded.

**Person** - An individual, firm, partnership, corporation, joint venture, association, social club, fraternal organization, estate, trust, business trust, receiver, syndicate, or other group or combination acting singly or collectively for a common purpose, and the duly authorized agents thereof.

**Planning and Zoning Commission** - The City of Dahlonega Planning and Zoning Commission as established in the City of Dahlonega Zoning Ordinance.

**Plat** - A map or drawing indicating the subdivision, re-subdivision, or recombination of land.

**Preliminary Plat** - A drawing which shows the perimeter boundary, topography, lot layout arrangement, street layout, and other features of a proposed subdivision, as specified in these regulations.

**Project** - A principal building or structure, or a group of buildings or structures, planned as an interdependent unit together with all accessory uses of structure, utilities, drainage, access, and circulation facilities, whether built in whole or in phases. Examples include, but are not limited to, a principal building on a lot, a residential subdivision, a multi-family development, an industrial plant, an institutional building, a shopping center or an office complex.

**Public Works Department** - The Department of Public Works of the City of Dahlonega, Georgia.

**Road** - Refer to "Street, Public".

**Sketch Plan** - Refer to "Concept Plan".

**Street, Public** - A dedicated and accepted public right-of-way which affords the principal means of access to abutting properties.

**Street, Local Nonresidential** - A street intended primarily to provide local access to adjacent existing or planned commercial or industrial development and not for through traffic.

**Street, Local Residential** - A street intended primarily to provide local access to adjacent existing or planned residential development and not for through traffic.

**Street, Major Collector** - A street that collects traffic from minor streets or other collector streets and channels it to arterial streets. Collector streets provide land access and traffic circulation within residential neighborhoods, commercial, and industrial areas.

**Street, Minor Collector** - A through street intended primarily to connect subdivisions or other areas to Major Collector Streets or other thoroughfares, or functioning as a central route within a subdivision channeling traffic from the local streets to a Major Collector, another Minor Collector, or other thoroughfares.

**Street, Marginal Access** - A local street which is generally parallel to and adjacent to a major thoroughfare and which provides access to adjacent properties and protection from through traffic.

**Street, Substandard** - A street which does not comply to at least the standards for the designated street classifications as contained in these Regulations.

**Subdivider** - Any person dividing or proposing to divide land so as to constitute a subdivision as herein defined.

**Subdivision** - 1. (verb) Any division or re-division of a lot, tract or parcel, regardless of its existing or future use, into two or more lots, tracts or parcels. The term "subdivision" shall mean the act or process of dividing property. 2. (noun) Where appropriate to the context, the term "subdivision" also may be used in reference to the aggregate of all lots held in common ownership at the time of division.

**Zoning Ordinance** - The City of Dahlonega, Georgia, Zoning Ordinance.

**ARTICLE III**  
**APPLICATION AND GENERAL PROVISIONS**

Section 3.1 Zoning Ordinance

Whenever there is a discrepancy between minimum standards or dimensions required under this Ordinance and those contained in the Zoning Ordinance, building codes, or other ordinances or regulations, the most restrictive shall apply.

Section 3.2 Application

Any subdivision activity and land development activity must first comply with these Regulations.

Section 3.3 Dedication of Public Lands and Facilities

No land dedicated as a public street or other public purpose shall be opened or accepted as a public street or for any other purpose, and no subdivision of land shall be made, nor subdivision plat, nor part thereof, shall be recorded before obtaining final approval from the City Council. Said final approval shall be entered in writing on the Final Plat by the Mayor. As soon as practical after final approval is granted and recording fees are paid to the City by the subdivider, the Mayor shall cause the Final Plat to be recorded by the Clerk to Superior Court of Lumpkin County.

Section 3.4 Transfer of Land Ownership

No person shall transfer title or attempt to record title to any land in the City of Dahlonega, and no building permit may be issued on said land, unless:

- (a) Said land is shown in its entirety and present boundaries on a Final Plat as approved (under these or any previous applicable regulations) and duly recorded with the Clerk to Superior Court of Lumpkin County; or,
- (b) Said land is shown in its entirety and present boundaries on a plat recorded with the Clerk to Superior Court of Lumpkin County pursuant to the regulations governing Subdivision Exemptions contained herein; or,
- (c) Said land is an aggregation of properties for land assembly purposes, and no building permit will be requested prior to the compliance with these regulations and the Zoning Ordinance.

No person shall transfer title to any property by reference to, exhibit of, or any other use of any map or plat illustrating the subdivision of land without a Final Plat of said land showing said property first having been duly approved under these Regulations or any previously applicable regulations and recorded with the Clerk of Superior Court of Lumpkin County.

Section 3.5 Subdivision Exemptions

For the purpose of these Regulations the types of activities contained in this Section shall be considered subdivisions but exempt from the procedures and required public improvements portions of these Regulations, except as noted:

- (a) Combinations - The combination or recombination of two or more previously platted lots of record, where the total number of lots is not increased and the resultant lots or parcels are in compliance with the Zoning Ordinance.
- (b) Minor Subdivisions - The division of land into two or fewer lots, provided;
  - (1) Each lot complies with all requirements of the Zoning Ordinance and is limited to single-family detached residential use.
  - (2) Each proposed lot fronts on an existing public street having a right-of-way not less than the City minimum for the street category given to the existing public street.
  - (3) Each proposed lot complies with requirements of the Health Department.

- (4) Each lot thus created shall not be re-subdivided pursuant to the provisions of this subparagraph. Such re-subdivisions shall be accomplished only through the subdivision procedures contained in these Regulations.
- (c) Estate Subdivisions - The division of land in any single family detached residential zoning district into lots having a minimum lot area of five acres provided:
  - (1) Each proposed lot fronts on an existing public street having a right-of-way not less than the City minimum for the street category given to the existing public street.
  - (2) Each proposed lot shall provide at least 100 feet of frontage upon the existing public street and shall meet or exceed all other minimum requirements of the applicable single family detached residential zoning district.
  - (3) Each proposed lot complies with requirements of the Health Department.
  - (4) No lot thus created may be re-subdivided to less than five acres as an exemption to these Regulations.

For the purpose of these Regulations the types of activities contained in this Section shall be considered subdivisions but exempt from the procedures and required public improvements portions of these Regulations, provided the property owner notifies the City in writing of such division and provides a copy of a plat of the land subdivision prepared and sealed by a Land Surveyor currently registered in Georgia. Such notification is to be submitted to the City Planner.

### Section 3.6 Suitability of the Land

Land subject to flooding, improper drainage or erosion, and any land deemed to be unsuitable for development due to steep slopes, unsuitable soils, subsurface conditions or other undesirable characteristics shall not be subjected to development for any use that may retain such conditions or increase danger to health, safety, life, or property, unless steps are taken to eliminate or abate these conditions. Land within a proposed subdivision which is unsuitable for development shall be incorporated into the buildable lots as excess lot area.

### Section 3.7 Conformance to the Comprehensive Plan

All proposed subdivisions shall conform to the City of Dahlonega Comprehensive Plan at the time of submission of the Preliminary Plat to the Planning and Zoning Commission. Where features of the Comprehensive Plan, such as parks, streets, and utility systems, are located in whole or in part in a proposed subdivision, or when these features have not been anticipated by the Comprehensive Plan, but are considered essential by the Planning and Zoning Commission and/or Mayor and Council, land for such features shall be dedicated to the City.

The Planning and Zoning Commission shall disapprove subdivisions when such planned features, as specified by the Comprehensive Plan, are not incorporated therein.

### Section 3.8 Survey Monuments

All property corners shall be monumented with a steel - concrete reinforcing bar or steel pipe at least one-half inch in diameter and 18 inches long. Standard brass disk survey monuments or concrete Georgia Department of Transportation right-of-way markers are also acceptable property corner monuments. In areas to be maintained with grass mowing equipment, bar or pipe monuments are to be installed at or within two inches of ground level. In paved areas, bar or pipe monuments are to be installed flush with the pavement surface. In natural areas, bar or pipe monuments are to be installed so as to extend one to four inches above ground level.

On subdivisions containing floodplains, not less than one permanent vertical control monument per ten acres of floodplain area shall be established and identified on the Final Plat. Each permanent vertical control monument shall be referenced to mean sea level and be a standard brass disk type survey monument or concrete Georgia Department of Transportation right-of-way marker. When right-of-way

markers are used, they shall be buried vertically such that three to six inches of the marker extends above ground level.

All property corner and vertical control monuments shall be installed before the Final Plat is considered for approval by the City.

### Section 3.9 Access

When land is subdivided into larger parcels than ordinary building lots, such lots shall be arranged and designed so as to allow for the construction of future streets and to provide access to those areas not presently served by streets. No subdivision shall be designed so as to completely eliminate street access to adjoining parcels of land. Every development shall be designed to facilitate access to adjoining properties which are developed or anticipated to be developed in a manner substantially similar to the subject property. Inter-parcel access shall be shown on the Final Plat as required by and subject to the approval of the City.

Any lot required to provide minimum frontage by the zoning district in which the lot is located shall provide vehicular access directly from a public street along the frontage or along any other property line which abuts a public street.

Private streets as may be approved under the provisions of the Zoning Ordinance or Development Regulations shall be constructed to the roadway standards of the City.

### Section 3.10 Required Public Improvements

Every developer of lands within the jurisdiction of this Ordinance shall provide the public improvements included in this Ordinance, in accordance with these Development Regulations and other pertinent ordinances, codes, and regulations of the City of Dahlonega, Georgia. These public improvements together with associated rights-of-way, easements, and other lands shall be provided at no cost to the City and shall be dedicated or otherwise transferred, as required, to the public in perpetuity and without covenant or reservation.

### Section 3.11 Plan Review and Approval

Any developer of land within incorporated Dahlonega, Georgia, shall first submit to the City such plans, plats, or construction drawings as may be required by these Regulations and receive approval of those documents by the City prior to the initiation of development activities. Approval of plans, plats, or construction drawings by the City shall not imply nor transfer acceptance of responsibility for the application of the principles of engineering, surveying, architecture, landscape architecture, or any other profession, from the professional corporation or individual under whose hand or supervision the plans, plats, or construction drawings were prepared and sealed.

### Section 3.12 Other Permits

Nothing in these Regulations shall impose any obligation on the City to obtain or assist in obtaining permits, approvals, and/or clearances from other local, state, or Federal agencies having jurisdiction over elements of a project. It is solely the developer's responsibility to obtain all such required permits, approvals, and/or clearances. The developer shall furnish the City with copies of all such permits, approvals, and/or clearances before authorization to proceed with development is requested.

### Section 3.13 Standard Specifications

The City will maintain on file for consultation and distribution a series of standard specifications for construction of utilities and drainage facilities for the development of land in accordance with these Development Regulations.

The standard specifications describe minimum acceptable standards for utility and drainage construction of land development activities authorized under this Ordinance, but shall not supercede more restrictive,

prudent design requirements or good engineering practice as applied to specific situations on a case-by-case basis. The standard specifications are included in this Ordinance as Appendix B and are subject to the modifications and appeal provisions of XII and XIII.

Section 3.14 Standard Drawings

The City will maintain on file for consultation and distribution a series of standard drawings illustrating details of construction and design of streets, utilities, drainage facilities, site improvements, and other elements related to the development of land in accordance with these Development Regulations.

The standard drawings illustrate minimum acceptable standards for land development activities authorized under this Ordinance, but shall not supersede more restrictive, prudent design requirements or good engineering practice as applied to specific situations on a case-by-case basis.

The standard drawings are included in this Ordinance as Appendix C and are subject to the modification and appeal provisions of Articles XII and XIII.

**ARTICLE IV  
STREET STANDARDS**

Section 4.1 Right-of-Way and Pavement Widths

Minimum widths for construction (new streets or widening sections) are specified in Table 4-A.

<u>Street Category</u>	<b>TABLE 4-A</b> <u>Minimum Right-of-way</u>	<u>Minimum Roadway (1)</u>
<b>Arterial</b>		
Primary	100 feet	66 feet
Secondary	80 feet	52 feet
<b>Collector</b>		
Primary	80 feet	52 feet
Secondary	60 feet	42 feet
<b>Local</b>		
Non Residential	60 feet	36 feet
Non Residential Cul-de-sac	60 foot radius	50 foot radius
Residential	50 feet	24 feet
Residential Cul-de-sac	50 foot radius	40 foot radius

(1) Roadway width dimensions are back of curb to back of curb.

Section 4.2 Street Design

**Access**

A maximum number of 200 residential units shall be allowed per street outlet to a public street. Reserve strips controlling access to public streets shall not be permitted.

**Street Jogs**

Street jogs with centerline offsets of less than 125 feet shall not be permitted.

**Street Gradients**

(a). The minimum street gradient shall be one percent without special approval from the City

Manager. A minimum street gradient of one half percent to one percent may be approved by the City Manager, based on adequate engineering designs provided by the subdivider's engineer, where at least one percent cannot reasonably be achieved due to topographical limitations imposed by the land.

(b). The maximum street gradient for primary arterial streets shall be eight (8) percent. The maximum street gradient for secondary arterial, primary and secondary collector and nonresidential local streets shall be ten percent. The maximum street gradient for residential local streets shall be 16 percent. Grades between 12 percent and 16 percent shall not exceed a length of 150 feet measured as the tangent length between points of vertical curvature.

(c). The maximum gradient on any cul-de-sac shall be six percent.

**Vertical Street Alignment**

All changes in street profile grades having an algebraic difference greater than one percent shall be connected by a parabolic curve having a minimum length (L) equal to the product of the algebraic difference between the grades in percent (A) and the design constant (K) assigned to the street according to its category (i.e.,  $L = A * K$ ).

Constant (K) values are shown in the following Table 4-B for both desirable and minimum acceptable conditions. In all cases, the desirable value shall be used, unless it cannot be achieved due to topographical conditions beyond the subdivider's control. In such conditions, the City Manager may approve a lesser value to the extent required by the unique situation, but in no event less than the minimum value specified in Table 4-B.

**TABLE 4-B**

<u>Street Category</u>	<u>Crest Curves</u>		<u>Sag Curves</u>	
	<u>Minimum</u>	<u>Desirable</u>	<u>Minimum</u>	<u>Desirable</u>
Arterial				
Primary	110	160	90	110
Secondary	90	120	70	90
Collector				
Primary	60	80	60	70
Secondary	60	80	60	70
Local				
Non Residential	30	30	40	40
Non Residential Cul-de-sac	20	30	30	30
Residential	20	20	30	30
Residential Cul-de-sac	20	20	30	30

**Horizontal Street Alignment**

All new streets shall conform with the horizontal centerline curvature and super elevation criteria specified in Table 4-C.

**TABLE 4-C**

<u>Street Category</u>	<u>Minimum Centerline Radius (Ft)</u>	<u>Maximum Superelevation (ft/ft)</u>
Arterial		
Primary	1,146	0.06
Secondary	955	0.06
Collector		
Primary	600	0.00
Secondary	415	0.00
Local		
Non Residential	275	0.00
Non Residential Cul-de-sac	165	0.00
Residential	165	0.00
Residential Cul-de-sac	165	0.00

Super elevation runoff shall be provided on each end of horizontal curves to rotate pavement section from normal crown section to full super elevation section and to rotate pavement section from full super elevation section to normal crown section in accordance with design standards of the Georgia Department of Transportation.

Tangents between reverse horizontal curves shall not be less than those specified in Table 4-D.

**TABLE 4-D**

<u>Street Category</u>	<u>Minimum Tangent Length</u>
Arterial	
Primary	200 feet
Secondary	150 feet
Collector	
Primary	120 feet
Secondary	120 feet
Local	
Non Residential	100 feet
Non Residential Cul-de-sac	75 feet
Residential	75 feet
Residential Cul-de-sac	50 feet

#### Street Intersections

##### *Intersection Angle*

Intersecting streets shall meet at approximately a right angles and shall not be at an angle of less than 80 degrees unless approved by the City Manager.

##### *Intersection Vertical Approaches*

For all but local streets, street intersections, including approaches, shall have a maximum vertical grade of two percent. For local streets, street intersections, including approaches, shall have a maximum vertical grade of five percent. The minimum approach length (distance from extended outer edge of the nearest through lane of the intersecting street to the point of vertical curvature in the approaching street) shall be provided in accordance with Table 4-E.

**TABLE 4-E**

<u>Street Category</u>	<u>Minimum Approach Length</u>
<b>Approaching</b>	
Arterial	
Primary	100 feet
Secondary	100 feet
Collector	
Primary	75 feet
Secondary	50 feet
Local	
Non Residential	25 feet
Non Residential Cul-de-sac	25 feet
Residential	25 feet*
Residential Cul-de-sac	25 feet*

\* For intersections of local residential streets, the minimum approach length is zero unless the approaching street grade is five percent or more, in which case the indicated minimums apply.

*Intersection Radii*

Intersection radii for streets, measured at the back of the curb, and for rights-of-way shall be as shown in the following Table 4-F. For intersecting streets of different classifications, the larger radii shall be provided. In all cases, sufficient right-of-way shall be provided to maintain at least ten feet from the back of curb. For intersecting rights-of-way, lines may be joined by either an arc having the minimum radius shown in Table 4-F or by a chord connecting the end points of an arc having the minimum radius shown in Table 4-F. Larger radii may be required for streets intersecting at angles less than 90 degrees.

**TABLE 4-F**

<u>Street Category</u>	<u>Minimum Back of Curb Radius (Ft)</u>	<u>Minimum Right-of-way Radius (Ft)</u>
<b>Arterial</b>		
Primary	40	23
Secondary	35	21
<b>Collector</b>		
Primary	30	21
Secondary	30	11
<b>Local</b>		
Non Residential	30	18
Non Residential Cul-de-sac	25	14
Residential	25	14
Residential Cul-de-sac	25	14

**Islands**

In general use of raised traffic islands is discouraged in favor of painted islands supplemented with traffic buttons or other devices manufactured for traffic control. Where requested by the City Manager, traffic islands shall conform to the design guidance of the latest edition of “A Policy on Geometric Design of Highways and Streets”, published by the American Association of Highway and Transportation Officials. Improvements on islands within rights-of-way shall be limited to traffic control devices.

## Turning Lanes

Turning lanes shall be required by the City to meet projected traffic demand and/or safe operations. When provided, turning lanes shall meet the following criteria:

- (a) Provide not less than 150 feet of storage length for arterial roadways. Provide not less than 100 feet of storage length for collector roadways.
- (b) Provide taper lengths of not less than 50 feet.
- (c) Longer storage and taper lengths may be required when traffic projections indicate they are justified.

## Cul-de-sac Streets

Cul-de-sac streets shall be designed so that the maximum desirable length is 800 feet, but no longer than 1,200 feet, including circular turn around, unless excepted by the Planning and Zoning Commission.

## **ARTICLE V LOT AND BLOCK STANDARDS**

### Section 5.1 Lots

In general, lots should be designed such that they are no more than four times as deep as they are wide at the building set back line. For lots which include 1) particular or unusual difficulties to meet minimum setback limits, 2) unusual building sites due to easement configuration, 3) possible floodplain encroachment, 4) storm water detention facilities, 5) zoning imposed buffers, and/or 6) unusual or severe topographic features, the City shall require a final plat notation requiring an approved Site Plan prior to issuance of a building permit. All lots shall conform to the requirements of the City of Dahlonega Zoning Ordinance. Minimum lot sizes, widths, and setbacks are specified in the City of Dahlonega Zoning Ordinance.

### Section 5.2 Side Lot Lines

In so far as practical, side lot lines shall be at right angles to straight street lines or radial to curved street lines. Each lot must front for at least fifty (50) feet on a dedicated public street unless the lot upon which the building permit is requested is an approved lot in an approved Planned Unit Development.

### Section 5.3 Corner Lots

Corner lots shall have extra width to permit prescribed set-back limits from all streets on which the lot has frontage.

### Section 5.4 Double Frontage Lots

Double frontage lots other than corner lots shall be required for residential subdivisions along arterial or primary collector streets where internal access can be provided. When approved by the Planning and Zoning Commission, double frontage lots can be used to overcome specific disadvantages of topography, orientation and/or property size. Otherwise, double frontage lots other than corner lots shall be prohibited.

To properly separate residential subdivisions employing double frontage lots from traffic arteries, the Planning and Zoning Commission will require a planted buffer of ten foot minimum width along the lot line abutting the traffic artery. The easement for the buffer will be required to deny right of access to the lot on which it is located.

### Section 5.5 Panhandle or Flag Lots

Panhandle or Flag lots, of required width and area, may be allowed where terrain makes standard design or frontage impossible or impractical. Where such lots are allowed, the street frontage of each panhandle access shall not be less than 20 feet wide, and the panhandle access shall not be more than 200 feet long. Not more than two (2) such panhandle access points shall abut each other, and if so combined the width of each panhandle may be reduced to not less than fifteen (15) feet. All such access points or combinations thereof shall be separated from each other by the frontage of a standard lot required under the applicable provisions of these Regulations.

### Section 5.6 Blocks

The lengths, widths, and shapes of blocks shall be determined with regard to:

- (a). Provision of adequate building sites suitable to the special needs of the type of use contemplated.
- (b). Applicable zoning requirements as to lot size and dimensions.
- (c). Needs for convenient access, circulation, control and safety of vehicular and pedestrian traffic.
- (d). Limitations and opportunities of topography.

The Planning and Zoning Commission may, when existing or proposed pedestrian/bicycle circulation patterns or public gathering places so justify, require pedestrian/bicycle ways or access easements through blocks.

## **ARTICLE VI PLAT SPECIFICATIONS**

### Section 6.1 Preliminary Plat Specifications

The Preliminary Plat for a subdivision shall be clearly and legibly drawn at a scale of not less than 100 feet to one inch. The sheet size shall not exceed 48 inches by 36 inches, provided, however, a scale of 200 feet to one inch may be used to avoid sheets in excess of 48 inches by 36 inches. The minimum sheet size shall be 8½ inches by 11 inches. The City Manager may approve other scales and sheet sizes as deemed appropriate.

The Preliminary Plat shall contain the following:

- (a) Proposed name of the subdivision.
- (b) Names, addresses and telephone numbers of the property owner of record and the developer or subdivider.
- (c) Name, address and telephone number each professional firm associated with a Preliminary Plat.
- (d) Date of survey, north point and graphic scale.
- (e) Subdivision location including land lot(s) and land district(s), area in acres, internal and abutting zoning, proposed number of lots with minimum lot size, and proposed phasing, if any.
- (f) A location sketch or vicinity map positioning the subdivision in relation to the surrounding area with regard to recognized permanent landmarks. The location sketch scale shall be not greater than 2,000 feet to the inch.
- (g) Boundary lines of the overall property perimeter showing bearings in degrees, minutes and seconds and distances in feet and hundredths of a foot along all lines and the bearing and distances to an existing street intersection or other recognized permanent landmark. The source of boundary information shall be shown.
- (h) Topography with mean sea level contours at intervals no greater than five feet. The source of topographic information shall be shown.
- (i) Natural features such as lakes, ponds, streams, creeks, State waters, wetlands, 100 year flood plains and other significant features. The source of flood plain information shall be shown.
- (j) Cultural features such as rights-of-way, easements, pavements (including widths), bridges, culverts and storm drains, utility lines, appurtenances and structures, City and County jurisdictional limits,

- land lot and district lines, zoning districts and limits and other significant features.
- (k) Proposed layout including lot lines with preliminary dimensions, lot numbers, block letters, street rights-of-way with names and widths, easements, public use facilities, facilities exclusively for subdivision uses, and all relevant conditions of zoning.
  - (l) Location of all existing or previous landfills.
  - (m) Proposed method of sewage disposal.
  - (n) Preliminary Plat Certifications as specified in Section 7.5.

#### Section 6.2 Preliminary Plat Supplemental Information

In addition to the Preliminary Plat, the following information shall be provided to the Planning Commission with each Preliminary Plat submittal:

- (a). A written summary of the proposed subdivision giving information as to the overall development plan including, as appropriate, the types and square footage's of structures, number of housing units, types of land uses, anticipated traffic generation, and other pertinent information so that the effects of the subdivision can be fully considered by the Planning and Zoning Commission.
- (b). Description of the anticipated utility systems required to serve the proposed subdivision including projected average and peak demands or flows for potable water, fire protection, sewerage, and electrical power.
- (c). Description of proposed stormwater management practices for the subdivision including the ownership and proper maintenance provisions of all stormwater detention facilities within the subdivision.
- (d). Such additional information as may be reasonably required to obtain an adequate understanding of the subdivision.

#### Section 6.3 Subdivision Development Plans

Subdivision development plans shall conform to the approved Preliminary Plat and may constitute only that portion of the Preliminary Plat which the developer or subdivider proposes to construct at one time as a single unit or phase, provided that such portion conforms to these regulations.

Subdivision Development Plans are to consist of not less than the following:

- (a). Erosion/Sediment Control Plan prepared in accordance with the City's Soil Erosion and Sediment Control Ordinance.
- (b). Grading and Drainage Plans prepared in accordance with the City's Development Regulations.
- (c). Street Improvement Plans prepared in accordance with the City's Development Regulations.
- (d). Utility Plans prepared in accordance with the City's Development Regulations.
- (e). Other plans as requested by the City.

Encroachments:

Where construction is proposed on adjacent property, an encroachment agreement or easement shall be submitted to the City.

#### Section 6.4 Final Plat Specifications

The Final Plat shall be clearly and legibly drawn in black ink on suitable permanent reproducible material. The scale of the Final Plat shall be 100 feet to one inch or larger. Sheet size shall not exceed 24 inches by 34 inches. The minimum sheet size shall be 8½ inches by 11 inches.

The Final Plat shall be based on a certified boundary survey delimiting the entirety of the property contained within the Final Plat, and tied to a point of reference with the same degree of accuracy as the boundary itself. The survey shall have an accuracy of no less than 1 in 10,000, and shall meet all requirements of Georgia Law regarding the recording of maps and plats.

The Final Plat shall substantially conform to the approved Preliminary Plat and it may constitute only a portion of the approved Preliminary Plat which the subdivider proposes to record at any one time, provided that such portion conforms to the requirements of these regulations, and said portion is not inconsistent with the health, safety, or welfare of the public. Any substantial deviation from the approved Preliminary Plat shall require that a revised Preliminary Plat be submitted to and approved by the Planning and Zoning Commission.

The Final Plat shall contain the following:

- (a) Name of the subdivision and unit or phase number, if any.
- (b) Names, addresses and telephone numbers of the property owner of record and the developer or subdivider.
- (c) Name, address and telephone number each professional firm associated with the portion of the subdivision depicted on the Final Plat.
- (d) Date of plat and survey, north point and graphic scale.
- (e) Subdivision location including land lot(s) and land district(s), area in acres, internal and abutting zoning, and number of lots.
- (f) A location sketch or vicinity map positioning the subdivision in relation to the surrounding area with regard to recognized permanent landmarks. The location sketch scale shall be not greater than 2,000 feet to the inch.
- (g) Boundary lines of the subdivision property perimeter showing bearings in degrees, minutes and seconds and distances in feet and hundredths of a foot along all lines and the bearing and distances to an existing street intersection or other recognized permanent landmark. The boundary information shall be tied and related to the State Plane Coordinates System, 1983 North American Datum, Georgia, West zone.
- (h) Municipal or county jurisdictional lines tied to the lines of the subdivision by distance and angles when such lines traverse or adjoin the subdivision; land lot or land district lines traversing or adjoining the subdivision shall also be indicated.
- (i) Locations, widths and names of all streets within and immediately adjoining the plat and all other public or utilities easements or rights-of-way.
- (j) Street centerlines showing angles of deflection and standard curve data including radii, chord lengths and bearings, lengths of arcs and tangents, and points of curvature and tangency.
- (k) Lot lines with complete dimensions to the nearest one-hundredth of a foot and bearings to the nearest second, and radii, arc and chord lengths, and chord bearings of rounded corners.
- (l) Building setback lines with dimensions. When lots are located on a curve or when side lot lines are at angles other than ninety degrees, the lot width at the building line shall be shown.
- (m) Lots numbered in numerical order and blocks lettered alphabetically.
- (n) Location, material and size of all drainage pipes, location and type of all drainage system appurtenances such as catchbasins, headwalls and inlets, location and extent of detention ponds with 100 year event level noted, the location, material and size of all City water mains, the location of all fire hydrants, and the location, width and purpose of any easements, including slope easements.
- (o) Location of any areas to be reserved, donated, or dedicated to public use with notes stating their purpose and limitations. Location of any areas to be reserved by private deed covenant for common use of all property owners, or dedicated to a homeowner's association.
- (p) A statement of private covenants, if any, and if they are brief enough to be put directly on the Final Plat; otherwise, if covenants are separately recorded, a statement as follows:

*“This plat is subject to the covenants set forth in the separate document(s) attached hereto dated \_\_\_\_\_, which hereby become a part of this plat, and which were recorded on \_\_\_\_\_.”*

- (q) Accurate location, material and description of property corner or line monuments or markers. All monuments and markers shall be in place prior to approval of the Final Plat.
- (r) Extent of the 100-year floodplain within the subdivision. When floodplain is present, a chart giving the areas within and outside of the floodplain for each lot containing any portion of the floodplain shall be on the Final Plat. The origin of the floodplain data shall be indicated.
- (s) Individual lots which are deemed by the City Manager as requiring site plans shall be designated in a readily identifiable manner.
- (t) Certificates and statements specified in these Regulations.

Section 6.5 Plat Certifications

The Preliminary Plat shall contain the following statements;

(a). Preliminary Plat Certification to read as follows:

*I hereby submit this Preliminary Plat as authorized agent/owner of all property shown thereon, and certify that all contiguous property under my ownership or control is included within the boundaries of this Preliminary Plat, as required by the Subdivision Regulations.*

Signature of Authorized Agent/Owner Date

(b). Preliminary Plat Approval Statement to read as follows:

*This Preliminary Plat has been reviewed and approved for general compliance with the Zoning Ordinance, Development Regulations and Subdivision Regulations of the City of Dahlonega, Georgia.*

Chairman, Planning and Zoning Commission Date

The Final Plat shall contain the following statements;

(a). Surveyor's Certification to read as follows:

It is hereby certified that this plat is true and correct as to the property lines and all improvements shown thereon, and was prepared from an actual survey of the property made by me or under my supervision; that all monuments and markers shown thereon actually exist, and their location, size, type and material are correctly shown. The field data upon which this plat is based has a closure precision of one foot in feet and an angular error of per angle point, and was adjusted using rule. This plat has been calculated for closure and is found to be accurate within one foot in feet, and contains a total of acres. The equipment used to obtain the linear and angular measurements herein was .

Georgia Land Surveyor \_\_\_\_\_ Date: \_\_\_\_\_

(b). Owners Acknowledgement and Declaration to read as follows:

(STATE OF GEORGIA)

(LUMPKIN COUNTY)

The owner of the land shown on this plat and whose name is subscribed thereto, and in person or through a duly authorized agent, acknowledges that this plat was made from an actual survey, and dedicates by this Declaration to the use of the public forever all streets, street rights-of-way, sanitary sewers and appurtenances, sanitary sewer easements, potable water mains and appurtenances, potable water easements, storm drains and appurtenances within street rights-of-way, and other public facilities and appurtenances thereon shown for the purposes therein expressed.

Owner Date

(c). Health Department Approval to read as follows (subdivisions with septic systems only):

The lots shown hereon have been reviewed by the Lumpkin County Health County Department and with the exception of lots are approved for development. Each lot is to be reviewed by the Health Department and approved for septic system installation prior to the issuance of a building permit.

Health Department Official \_\_\_\_\_ Date \_\_\_\_\_

(d). Final Plat Approval to read as follows:

This subdivision has been reviewed by the Planning Commission and the City and found to be in compliance with Zoning Ordinance, Development Regulations and Subdivision Regulations. The Mayor and City Council hereby approve this Final Plat, subject to the provisions and requirements of the City's regulations.

Mayor \_\_\_\_\_ Date \_\_\_\_\_

City Engineer \_\_\_\_\_ Date \_\_\_\_\_

(e). The Final Plat shall contain a tabulation of the areas of street rights-of-way, sanitary sewer easements, potable water easements, and other public facilities to be dedicated to the City.

**ARTICLE VII  
STREET IMPROVEMENT STANDARDS**

Section 7.1 Street Improvements

Streets, whether abutting or internal, existing or new, shall be constructed or improved under those circumstances and to the standards as established in these Regulations. Roadway improvements shall be in accordance with the street classification system defined in these Regulations. Specific street classification designations shall be as shown in adopted transportation plans of the City or as established by the Planning and Zoning Commission.

Section 7.2 Minimum Right-of-Way and Pavement Widths

The minimum widths for rights-of-way and pavements shall be as specified in these Regulations and shown on standard drawings.

On any existing street having a right-of-way less than the minimum which abuts a property being developed, one-half of the required width of right-of-way, measured to the centerline of the existing right-of-way, shall be dedicated at no cost to the City along the entire property boundary abutting the existing street.

Additional street right-of-way width may be required to be dedicated at intersections or other locations fronting the property where turning lanes, storage lanes, medians, islands, or realignments are required for traffic safety and minimum right-of-way standards would be inadequate to accommodate these improvements.

Section 7.3 Street Widening

When property fronting on an existing City street is to be developed and when the property is to be accessed from the existing City street, roadway improvements (pavement, curb and gutter and drainage) are required along the existing road across the entire property frontage. Required improvements shall not be less than provided in these Regulations for the designated street classification.

Road widening, curb, gutter, and drainage shall be provided from the centerline of the existing roadway along the side of the road upon which the property abuts. In lieu of installation of curbs and gutters

and/or related improvements, the developer must have presented to and received approval by the City for a Street Improvements and Storm Water Drainage Plan for the development and its affected environs. Said plan must provide for adequate storm water drainage and will further address, as a minimum, street grading, paving, curbs and gutters, and or other innovative provisions for said drainage. This plan must conform to the applicable standards and specification established by the City and be prepared, signed, and sealed by a Georgia registered professional civil engineer.

The developer shall be responsible for the relocation and/or modifications of public and/or private utilities as necessitated by the required street improvements.

#### Section 7.4 New Streets

All public streets proposed to be constructed in a subdivision or other development shall be designed and constructed at least to the standards contained in these Regulations in accordance with the appropriate street classification of said streets.

#### Section 7.5 Substandard Streets

In the event that a development has access to a substandard street and if that substandard street provides the primary means of access to the development, the substandard street, except as indicated below, shall be fully upgraded along the entire property frontage and continuing to the nearest standard paved road along the route of primary access.

In the event that a development has access to a substandard street and if that substandard street is other than the primary means of access to the development, the substandard street, except as indicated below, shall be fully upgraded only along the entire property frontage and shall be paved on the opposite side of the road from the development, 12 feet from the street centerline.

The upgrading of substandard streets used for access will not be required if any of the following conditions are met:

- (a) The development consists of a single one or two family residence on an existing recorded lot within the City;
- (b) Total traffic on the substandard street is less than 2000 vehicles per day including projected traffic volume from the development; or
- (c) The development is a small business with ingress/egress of less than 100 vehicles per day.

#### Section 7.6 Acceleration/Deceleration Lanes

Except as indicated, acceleration and deceleration lanes shall be provided for new street and driveway connections to existing streets. The lanes will not be required if any of the following conditions are met:

- (a) The driveway is for a one or two family residence;
- (b) Total traffic on the existing roadway is less than 2000 vehicles per day (count of existing traffic must have been made within one year of the development plan submittal date);
- (c) The driveway is for a small business with ingress/egress of less than 100 vehicles per day; or
- (d) Construction cost of the lanes exceeds 25 percent of the estimated development cost.

#### Section 7.7 Improvements Along State and Federal Highways

For any development which abuts a State or Federal highway, improvements to the highway and the location and design of any street or driveway providing access from the highway shall comply with the standards and requirements of the Georgia Department of Transportation. A copy of the approved Georgia DOT permit shall be provided to the City prior to issuance of building permits.

#### Section 7.8 Specifications

Unless otherwise specifically set forth herein, all of the materials, methods of construction, and workmanship for street construction shall conform to the latest edition of the Georgia Department of Transportation Standard Specifications for Road and Bridge Construction including all amendments.

Section 7.9 Subgrade Preparation

- (a) Clear and grub entire street right-of-way before commencing street earthwork construction. For specific technical requirements reference is made to Georgia DOT Specifications Section 201- Clearing and Grubbing Right-of-Way. Combustible material generated from clearing and grubbing operations may be burned only when authorized and permitted by the Lumpkin County Fire Chief.
- (b) Conduct street earthwork construction in accordance with Georgia DOT Specification Sections 205 - Roadway Excavation and 208 - Embankments. For purposes of these Regulations, the maximum density of soil material shall be determined by ASTM D 698 (Standard Proctor) test procedures.
- (c) Complete utility and drainage earthwork before starting street subgrade construction.
- (d) Perform subgrade construction in accordance with Georgia DOT Specification section 209 - Subgrade Construction.
- (e) The developer shall provide quality control testing during earthwork and subgrade construction as necessary to assure the entire earthwork, including all fill layers and subgrades, meet the minimum requirements of these Regulations. The minimum quality control testing to be provided consists of the following:
  - (1) Moisture - density relationship curve for each type soil encountered.
  - (2) For cut areas, one in-place density test (ASTM D 1556 or other recognized method).
  - (3) For fill areas, one in-place density test (ASTM D1556 or other recognized method) per 1000 cubic yards or fraction thereof of fill placed.
- (f) Earthwork which falls below specified minimum quality control limits shall be removed, reconstructed, and retested by the developer until compliance with specified requirements is achieved.
- (g) After completing street earthwork operations and before beginning street base construction, the developer shall file a copy of the quality control test results demonstrating compliance with these requirements with the City. At any time during the construction process, representative(s) of the City may request to review and the developer shall provide quality control test results.

Section 7.10 Minimum Street Sections and Design Speeds

- (a) The minimum street sections are defined in the Subdivision Regulations and in Appendix C, Standard Details, of these Regulations. Specific Details and required design speeds for the standard street classifications are as follows:

<u>Street Classifications</u>		<u>Design Speed Detail in MPH</u>
(1) Major Thoroughfares With Medians	R010	50
(2) Collector "A" Streets (Industrial/Commercial)	R020	45
(3) Collector "B" Streets	R030	40
(4) Local (Minor) Streets	R040	30
(5) Alleys	R060	20
(6) Cul-de-Sacs	R080	NA

- (b) Construct street and alley bases in accordance with Georgia DOT Specification Section 300 - Specifications Applying to All Base and Subbase Courses. The following Georgia DOT Specification Sections shall apply to base materials indicated on the Standard Detail Typical Street Sections:

- (1) Graded Aggregate Base - Section 310 - Graded Aggregate Construction.

- (c) Construct surface and binder asphaltic paving courses, including prime, in accordance with Georgia DOT Specification Section 400 - Hot Mix Asphaltic Concrete Construction.
- (d) When street earthwork and paving are complete, the developer shall grass and stabilize all disturbed areas including roadway shoulders which are not covered by paving or other improvements. It shall be the developer's responsibility to maintain grassed areas by watering, fertilizing, weeding, mowing, trimming, regrading, and replanting as required to establish a smooth, acceptable stand of grass free of eroded or bare areas. Grassed areas will be considered acceptable when a viable stand of grass covers at least 90 percent of the total area with no bare spots exceeding one square foot and the ground surface is fully stabilized against erosion. Grassing operations shall meet the technical requirements of Georgia DOT Specification Section 700 - Grassing for Planting Zone 1A.
- (e) The developer shall provide quality control testing during base and pavement construction as necessary to assure the entire pavement structure meets the minimum requirements of these Regulations. The minimum quality control testing to be provided consists of the following:
  - (1) Moisture-density relationship curve for each base material used on project.
  - (2) For soil cement base, conduct mix design to determine Portland cement content (percent of dry weight of the soil) to achieve a minimum compressive strength of 300 psi at seven days when testing in accordance with ASTM D 1632 and D 1633.
  - (3) One in-place density test (ASTM D 1556 or other method acceptable to the City) per 1200 square yards or fraction thereof of base. (4.9 (e) (2) and (3).
  - (4) One thickness measurement normal to base surface per 1200 square yards or fraction thereof of base.
  - (5) For base course, one surface tolerance measurement using a 15 foot straight edge per 250 square yards or fraction thereof of base.
  - (6) One asphalt extraction (ASTM D 2172) and aggregate gradation analysis (ASTM C 136) per 2400 square yards or fraction thereof of surface course and per 2400 square yards or fraction thereof of binder course (if any). Obtain samples for extraction and gradation tests in accordance with ASTM D 979.
  - (7) One density and compacted thickness measurement per 1200 square yards or fraction thereof of each course placed. Density determined to be made in accordance with ASTM D 1188. Remove not less than 3 inch diameter nor larger than 12 inch square test specimens. Repair test specimen holes with full depth application of fresh hot asphaltic plant mix.
  - (8) For asphalt extraction, one surface tolerance measurement using 15 foot straight edge per 250 square yards or fraction thereof of surface course.
- (f) Base and/or paving construction which falls below specified minimum quality control limits shall be removed, reconstructed, and re-tested until compliance with specified requirements is achieved.
- (g) After completing base and paving construction, the developer shall file a copy of the quality control test results demonstrating compliance with these Regulations with the City. At any time during the construction process, representative(s) of the City may request to review and the developer shall provide quality control test results.
- (h) In the event the developer desires to utilize base or paving materials or systems not included in these Regulations, the developer shall provide an engineering study prepared by a Georgia registered professional civil engineer comparing the proposed material or system to the appropriate system which is included in these Regulations. The engineering study will include a pavement structural design based on the AASHTO "Guide for Design of Pavement Structures" and suggested specifications for the materials and construction of the proposed system. The City will treat the developer's request through the appeals process described elsewhere in these Regulations.

### Section 7.11 Curb and Gutter

- (a) All new streets or street widening sections shall be provided with curb and gutter, except as provided herein. All gutters shall drain smoothly with no areas of ponding. In lieu of installation of curbs and gutters and/or related improvements, the developer must have presented to and received approval by the City for a Street Improvements and Storm Water Drainage Plan for the development and its affected environs. Said plan must provide for adequate storm water drainage, and will further address, as a minimum, street grading, paving, and curbs and gutters, and or other innovative provisions for said drainage. This plan must conform to the applicable standards and specification established by the City and be prepared, signed, and sealed by a Georgia registered professional civil engineer.
- (b) Concrete used for curb and gutter construction shall have a minimum 3000 psi compressive strength at 28 days (ASTM C 39); a 2 inch to 4 inch slump (ASTM C 143) and, 3 to 6 percent air content (ASTM C 231 or C 173) and shall comply with ASTM C 94.
- (c) In residential developments, the developer may use either a standard curb and gutter section or a roll back curb and gutter section. In other developments, the developer shall use a standard curb and gutter section. Both sections are shown in Appendix C, Standard Details.
- (d) Construct curb and gutter true to line, grade and cross section on properly prepared subgrade. Apply Georgia DOT Type 2 membrane curing compound.
- (e) Protect completed curb and gutter work from damage until dedication to the City. As soon as the curb and gutter will not be damaged, backfill, compact, stabilize and grass adjacent ground to achieve design line and grade. Acceptably repair or replace broken or defective curbs and gutters.

### Section 7.12 Sidewalks

Sidewalks shall be provided for all developments within a mile from an existing or proposed school, park, or community center. Sidewalks shall be provided along public streets for all multi-family, commercial, and industrial developments, and in such other locations as deemed necessary by the City for safe pedestrian movement.

### Section 7.13 Traffic Control Devices

Traffic control devices consisting of street name signs, traffic control signs, traffic markings, and traffic signals shall be provided by the developer as appropriate to serve each development. All traffic control devices and installation thereof shall conform to the Manual on Uniform Traffic Control Devices, ANSI D6.1e.

For residential developments, minimum traffic control devices shall consist of street name signs on at each street intersection, stop or yield signs at each intersection, one speed limit sign per block, school or pedestrian crossing signs where appropriate, and limited pavement marking such as crosswalk lines for school or pedestrian crossings.

Minimum traffic control devices for non-residential developments shall include those devices for residential developments and lane and centerline markings, stop lines, and parking space markings. Additionally, appropriate other signs and signals shall be provided by the developer.

### Section 7.14 Street Lighting

The developer shall provide a street lighting standard at each street intersection and at an intervals not exceeding 400 feet.

### Section 7.15 Preparation of Street Improvement Plans

Street improvement plans for all new streets, street widenings, and existing street upgrades shall be prepared by a Georgia registered professional civil engineer. At least three (3) copies of the plans shall be submitted to the City for review and comment. Within thirty (30) days of submittal of the plans, the

City will either approve the plans or disapprove the plans and provide written comments on items requiring changes and/or additional information. When not approved, the cycle of plan submittal and review will be repeated until the plans can be approved by the City.

Information to be shown on the plans shall consist of not less than the following:

- (a) Profiles of existing ground levels along street centerlines and each right-of-way. Field determined elevations shall be indicated at intervals not exceeding 100 feet. Where cross sections are provided at least every 100 feet, only centerline elevations need be shown on the profile.
- (b) Existing facilities and features within and adjacent to rights-of-way which affect or could be affected by street improvement construction. Items include, but are not limited to, streets, rights-of-way, buildings, parking lots, driveways, fences, and tree lines.
- (c) All drainage ways, lakes, streams, creeks, channels, wetlands, and drainage facilities.
- (d) All existing utilities and appurtenances within and adjacent to rights-of-way which affect or could be affected by street improvement construction. The utility type, size, depth, material and location in relation to street improvements must be indicated.
- (e) Existing and proposed property and easement lines, land lot, and land district lines intersecting street rights-of-way.
- (f) Limits of new construction.
- (g) New road improvements, including but not limited to, curbs and gutters, sidewalks, pavements, driveways, wheel chair ramps, traffic control devices, and street lights (if any).
- (h) Profiles of each pavement edge or line of curb and gutter with new finished grade elevations at intervals not exceeding 100 feet.
- (i) Horizontal and vertical street geometry including street centerline angles of deflection, radii, degree of curvature, design speed, tangent lengths, arc lengths, bearings street grades, and lengths of vertical curves. Stations for all points of curve, points of tangency, points of intersection, both horizontal and vertical, must be shown.
- (j) Benchmarks for vertical control.
- (k) Name of the development, names, addresses, and telephone numbers of developer and developer's engineer, engineer's seal, north arrow, scale, and date.

Plans shall be prepared in conformance with the following:

- (a) Where specific design guidance is not given, in these regulations or other regulations, rules, ordinances, of the City, the AASHTO publication "A Policy on Geometric Design of Highways and Streets", latest edition, shall be followed.
- (b) All elevations shall be based on and tied to U.S. Coast and Geodetic Survey mean sea level datum.
- (c) Plan drawings shall be at a scale of at least 1 inch equals 50 feet. In developed or congested areas, a scale of 1 inch equals 20 feet or less shall be utilized.
- (d) For profile drawings, the horizontal scale shall be the same as that used for associated plan drawings. The vertical scale shall be at least 1 inch equals 10 feet. A 1 inch equals 5 feet vertical scale is often necessary to properly depict grade changes in flat areas.
- (e) The desired drawing size is 24 inches by 36 inches. In no case shall drawings be larger than 30 inches by 42 inches nor smaller than 11 inches by 17 inches.

**ARTICLE VIII  
WATER AND SEWER SYSTEMS**

Section 8.1 Approval Procedure

The following process applies to the approval for the installation of water mains, water systems, sewer mains, sewer systems, and appurtenances in residential and commercial developments to be operated and maintained by the City of Dahlonega. The process includes the following steps:

- (a) Application and Preliminary Approval;
- (b) Construction and Inspection; and
- (c) Final Acceptance.

Section 8.2 Application and Preliminary Approval

- (a) The Developer must submit to the City three (3) copies of the preliminary plans showing the location and general plan for water and/or sewer systems. If the subdivision is to be constructed in phases, the Developer should also include a general layout of the entire subdivision as well as the more detailed layout of the specific phase(s) to be approved at the time.
- (b) The City will evaluate the site for water service as well as the potential need for looping easements by conducting flow and pressure tests, and/or computer modeling in the area of the proposed development.
- (c) The Developer or a representative of the Developer must bring a formal request for water and/or sewer service to the City. The City will take action to commit to serve a specific number of lots in the subdivision as presented, modify the request, or reject the request entirely. The City will also determine the City's participation in water and sewer system construction, as appropriate.
- (d) If the City commits to serve the proposed development, the Developer must submit to the City a minimum of three (3) sets of plans prior to submission for design and construction approval by the Georgia Environmental Protection Division. The water and sewer system improvements being submitted to the City must be in accord with the most current Design Criteria Standards adopted by the City Council.
- (e) If the plans submitted to the City for review are approved, two (2) copies of the plans will be retained by the City and the remaining copies will be returned to the Developer.
- (f) If changes are required, a checklist will be returned to the Developer.
- (g) After the changes have been made, the Developer must submit three (3) copies of the revised construction plans to the City for review.
- (h) After review and approval by the City, two (2) copies of the plans stamped "Approved for Design Concept" will be retained by the City and the remaining copies returned to the Developer.
- (i) The City shall bill the Developer for all research and engineering time on the application and approval process.
- (j) The plans shall be submitted by the Developer to the Georgia Environmental Protection Division (EPD) for review and approval prior to construction. Should any changes be made to the plans resulting from the EPD review and approval process, the Developer shall provide to the City one (1) set of plans as approved by EPD for construction.

Section 8.3 Construction and Inspection

- (a) A representative of the Developer, the installation contractor, and the City shall attend a pre-construction conference at the City at least two (2) working days prior to the start of any construction. The purpose of this conference will be to define roles and responsibilities for the correct execution of the proposed water and/or sewer line installations.
- (b) All water and/or sewer line installations shall be inspected during construction. This can be accomplished in one of two ways, and the method shall be agreed upon at the pre-construction conference by the Developer and the City:

- (1) Option A - The design professional engineer shall provide inspection and submit to the City a set of as-built drawings at the completion of all work. The engineer shall certify that all work was installed in accordance with the approved plans and specifications or as modified by change orders which must also be reviewed and accepted by the City. Responsibility for retention of this service is the Developer's. The Developer shall submit as-built drawing and engineering certification to the City before final acceptance of the water and/or sewer lines by the City.
- (2) Option B – City personnel shall inspect and certify that all work was installed in accordance with the Construction Standards of the City and design provided by the Developer. The City shall receive a set of as-built drawings, as prepared by the design engineer, at the completion of all work. Payment for the inspection services provided by the City will be billed by the City to the Developer within seven (7) days of final inspection.
- (c) The contractor shall notify the City 24 hours in advance of starting construction.
- (d) The contractor shall perform all required water and/or sewer line tests. The construction inspector shall be present during testing and keep detailed records for the City.
- (e) The contractor shall prepare the water lines for bacteriologic testing. It is the sole responsibility of the City to secure the samples and have them tested in an EPD approved water laboratory. The Developer will be notified of the results within four (4) working days. Successful bacteriological testing must be completed prior to the acceptance by the City.
- (f) The Developer must have an executed Change Order in hand before making any field changes that do not conform to the water and/or sewer line plans approved by EPD.

#### Section 8.4 Final Approval

- (a) The Developer shall submit to the City three (3) copies of the as-built drawings stamped by a registered civil engineer. If the Developer's design engineer inspected the job, the engineer certification must be submitted at this time as well.
- (b) The City Manager will make final acceptance for ownership of the water and/or sewer line installations. The Developer shall submit to the City a copy of the final subdivision plat for certification, with respect to easements dedicated to the City.

#### Section 8.5 Design Criteria

##### **GENERAL**

- (a) A horizontal separation of at least 10 feet must be maintained between the water main and any existing or proposed parallel sewer. When water mains cross sewers, a minimum vertical separation of 18 inches must be provided between the two pipes (measured edge to edge), and the water main must cross over the sewer line. At crossings, one full length of water pipe must be located so that both joints are as far from the sewer as possible.
- (b) The minimum cover over water and sewer lines shall be three (3) feet.
- (c) All elevation data shall be referenced to mean sea level (MSL).
- (d) A project location map shall be provided on the drawings.
- (e) The drawings shall bear the following notes:
  - (1) The City of Dahlongega shall be notified 24 hours prior to any water or sewer line construction or repair. Call City Hall at (706) 864-6133.
  - (2) All water main and sanitary sewer materials and workmanship shall be in accordance with the City of Dahlongega Design Criteria.
  - (3) The Contractor shall be responsible for maintaining a marked-up set of design drawings showing "as-built" conditions. These "record drawings" shall be made available to the designer and/or the City Inspector upon request. The mark-ups shall be at the site at all times and shall be utilized to develop final record drawings.
- (f) The following note shall appear on the final plat and/or as-built drawing:

*Owners Dedication Certificate*

*City of Dahlonega*

*Lumpkin County, Georgia*

*The owner of the land shown on this plat and whose name*

*Is subscribed thereto, and in person or through a duly*

*Authorized agent, acknowledges that this plat was made from an actual survey and*

*Dedicated to the City of Dahlonega forever, all water mains, sanitary sewers, easements,*

*And associated appurtenances thereon shown.*

*Owner* \_\_\_\_\_

*Date* \_\_\_\_\_

- (g) Contractors and subcontractors are required to possess a business license to work within the applicable jurisdiction. Proof of said license and all other applicable permits (County Erosion Control, DOT, etc.) shall be on the job site.

**WATER LINES INSTALLED WITHIN SUBDIVISIONS**

- (a) Water lines shall have a minimum diameter of 6 inches. The lines must be large enough to meet the residential demand of the proposed subdivision and fire flow requirements combined. Acceptable fire flow is a minimum of 500 gpm at 20 psi. The residential demand is determined as follows:

<u>Total Units Served</u>	<u>GPM Per Unit</u>
0-5	6
6-10	4
11-20	3
21-100	2.5
101-200	2.0
201 +	1.5

(b) Looping and Easements

- (1) The overall distribution plan adhered to by the City utilized extensive looping of water lines. This looping provides adequate fire flow protection while eliminating dead ends and stagnated water.
- (2) It is the City's policy to require 20 foot wide utility easements between lots in new subdivisions where a loop cannot be installed to connect to another subdivision or main line in the future. The design engineer should determine the location of possible future development around the proposed subdivision, consider the ease of construction of a loop to the future development, and discuss these with the City. All easements must be shown on the plans and on the final recorded plat as 20 foot utility easements dedicated to the City of Dahlonega.
- (3) The Developer must lay the water line along the entire length of each required easement to the adjoining property with a dead-end gate valve at the end.
- (4) Water lines are to be installed only on dedicated rights-of-way and centered within the easement. In general, easements dedicated to the City will be entered by City personnel for maintenance purposes only. Non-permanent structures such as fences, shrubs, and trees shall be allowed within the water line easement.

- (c) Subdivision water lines shall have a minimum cover of 3 feet to the top of the pipe.

(d) Pipe and Fittings

- (1) All water main piping shall be a minimum of 8 inches and shall be ductile iron pipe (DIP) and shall conform to AWWA C 151 with a minimum pressure class 350 or thickness class 52 unless otherwise specified or shown on the drawings. Pipe and fittings shall be cement lined in accordance with AWWA C 104.
  - (2) Fittings shall be mechanical joint compact ductile iron and conform to AWWA C 153 with rated working pressure of 350 PSI or AWWA C 110 with rated working pressure of 250 PSI.
- (e) A ¾ inch service tap and corporation stop for chlorination shall be indicated on the plans within 3 to 5 feet from the beginning point of the water line installation.
- (f) All services crossing streets inside the subdivision shall be installed inside 1 ½ inch or 2 inch Class 160 PVC conduit. Conduit shall extend to a minimum of 5 feet on each side of the curb/pavement.
- (g) Developer shall be responsible for contacting the power company and determining where the transformers will be positioned so as to avoid conflict with meter set and fire hydrant locations.

**WATER LINES INSTALLED OUTSIDE OF SUBDIVISION SITE**

- (a) All piping and fittings shall conform to the design criteria for water lines installed within subdivisions as a minimum. More stringent criteria may be required at the City's discretion.
- (b) Water lines shall be located within 5 feet of the right-of-way limits with a minimum cover of 36 inches on county roads, state routes, and federal highways. All bores shall have steel casing with PVC carrier pipe, with the casing length equal to the width of the pavement plus 10 feet on each side.
- (c) If any portion of a project is within a Georgia DOT right-of-way, then a DOT permit application will be required. The Developer must prepare a complete application package and provide it to the City for submittal to the Georgia DOT.
- (d) Crossings of large streams wider than 15 feet shall require TR Flex D.I. pipe as manufactured by U.S. Pipe or approved equal.

**FIRE HYDRANTS**

- (a) Fire hydrants are to be spaced a maximum distance of 750 feet apart inside a proposed subdivision and a maximum of 1,000 feet outside the subdivision, measured from hydrant to hydrant along the roadway.
- (b) Hydrants are to be set within a foot of the right-of-way limits on any street or road and are to be set on property lines where possible.
- (c) Fire hydrants shall be required at the end of all dead-end lines such as those installed in cul-de-sacs.
- (d) Each fire hydrant shall have a 6 inch gate valve bolted directly to a hydrant tee.
- (e) No fire hydrants shall be placed on water mains which are smaller than 8 inches in diameter unless the main is "looped" or the Developer can show the farthest hydrant can maintain a flow of 500 gpm at 20 psi.
- (f) In commercial and industrial areas, fire hydrants shall be placed such that the maximum hose lay (as a truck travels) shall be no greater than 300 feet, unless the Fire Department requires closer spacing for specific reasons.
- (g) As a minimum, fire hydrants shall be placed such that the maximum hose lay (as a truck travels) shall be no greater than 500 feet in single family residential areas and 350 feet in multi-family residential housing complexes. Note: The Fire Chief should be contacted to determine if stricter requirements are in order for specific project types.
- (h) Fire hydrants shall be three way hydrants with a 4 ½ inch valve opening. They shall be Clow F2545 M.J.
- (i) Gate valves shall be installed on all hydrant leads.

- (j) Valve location markers shall be installed for all valves (except hydrant lead valves). The markers shall be four feet long concrete posts with brass discs cast into one side. The marker posts shall extend from ½ to 18 inches above finished grade.

## **VALVES**

### **(a) Gate Valves**

- (1) Gate valves size 3 inches and larger shall be resilient seat wedge type and shall conform with the specifications of the American Water Works Association, Designation C509 with a wall thickness that meets or exceeds AWWA C 153, latest edition rated for 200 psi minimum working pressure. Gate valves shall be equipped with “O” ring stem seals above and below stem thrust collar. Gate valves for use on mechanical joint ductile iron pipe and slip joint ductile iron pipe shall have manufacturer’s standardized mechanical joint ends. Gate valve body and bonnet shall be ductile or cast iron and shall be fusion bonded, interior and exterior, with epoxy coating which conforms to AWWA C 550, latest edition.
- (2) Water mains in which the valves are installed shall be tested as specified and the valve must remain water tight under this pressure in each direction.
- (3) Valves shall open counter clockwise, be designed for vertical installation, be the non-rising stem type, and shall have 2 inch square operating nut.
- (4) Valves shall be equipped with valve boxes. Provide extension stem where required to bring the operating nut to within 12 inches of ground surface. Extension connection shall be with wrench nut coupling; no set screw allowed.
- (5) All gate valves shall be manufactured by Mueller, M & H Valve, American-Darling, U.S. Pipe, Clow, or approved equal.

### **(b) Butterfly Valves**

- (1) Butterfly valves shall be resilient seated, short body design and shall conform to AWWA C 504 latest edition. Valves shall be Class 250 (250 psi bi-directional shut-off rating, 500 psi body hydrostatic shell test, fusion bonded epoxy coated interior and exterior, and maximum line velocity of 16 feet per second). Valves shall be Mueller, M & H Valve, Clow, Dezurik, or Pratt. Certified test results shall be furnished with each valve.
- (c) Every tee shall have two valves away from the source, and every cross shall have three valves away from the source.
- (d) An inline valve shall be installed every 1,000 feet of water line within a subdivision, and every 1,000 feet outside of subdivision.
- (e) All connections to existing water mains shall be made with tapping sleeves and tapping valves. All back-taps should be shown on the drawings and labeled as such.
- (f) Tapping valves shall be Mueller Model H-687 or H-667, M & H Style 3751-NRS or 751, or American Darling No. 864 or 565. Sleeves shall be Mueller Model H-615, M & H Style 1174-01, or American Darling mechanical joint, Tyler Model 5-149-D1, or U.S. Pipe T-9 M.J.
- (g) All stub-out valves and dead-end valves shall be shown to have a mechanical joint cap on the plans.

## **SERVICES**

- (a) Meters and backflow preventers shall be installed by the City. The City will make all service connections and collect fees for each meter set.
- (b) Water service lines on the City side of the meter shall be copper tubing with brass fittings conforming to ASTM B88, Type K and ANSI B 16.26 respectively.

## **BACKFLOW PREVENTION**

- (a) Backflow prevention devices shall be required on all housing and on all commercial, industrial, and institutional establishments' water service lines.
- (b) As a minimum, commercial, industrial, and institutional establishments and multi-family housing shall install and maintain double check valve assemblies in a separate vault immediately downstream from the City's meter.
- (c) Establishments determined to present a high hazard backflow potential shall be required to install and maintain reduced pressure zone (RPZ) backflow preventers.
- (d) Double detector check valves shall be installed on all fire sprinkler mains. Valves shall be housed in a vault as close to the City main as is possible. A double check valve and a detector check valve in combination may be provided in lieu of the double detector check.

#### **SEWER LINES INSTALLED INSIDE AND OUTSIDE SUBDIVISIONS**

- (a) A 30' 0" permanent, recorded easement shall be required on all 8 inch diameter and larger sanitary sewers. The sewer shall be on the centerline of the easement. No permanent buildings or structures shall be built within easements.
- (b) Minimum slope for 8 inch and larger gravity sanitary sewer pipe shall be 0.50%, the maximum slope shall be 15.0%.
- (c) Gravity sanitary sewer pipe material shall be vitrified clay, ductile iron pipe or SDR 26 PVC unless depth of cover is 20 feet or greater, less than 4 feet, or the sewer is to be laid in fill area. In these cases, the pipe shall be ductile iron, Class 51.
- (d) Bedding for sanitary sewers shall meet the following: Embedment materials shall be angular graded crushed stone, ¼ inch to ¾ inch in size with no more than 5 % passing a No. 8 standard sieve in accordance with Class I materials as defined in ASTM D2321 Section 5.1.1.

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- (e) Sanitary sewer force mains shall be ductile iron pipe, Class 50 minimum.
- (f) Service lateral pipe material shall be vitrified clay or SDR 26 PVC sewer pipe. If PVC sewer service is used, the connection to the VC sewer main shall be made with an appropriate bell donut and clay wye. The bell donut shall be equivalent to those manufactured by Fernco, Inc.
- (g) Cleanouts shall be placed on all building service laterals at the point at which City maintenance terminates. This point shall be the curb line, the property line, the right-of-way line, or the easement line as applicable. Cleanouts shall be 6 inch and have a brass cap.
- (h) Manhole frames and covers shall be Vulcan V-1480-1, U.S. Foundry 362, or equivalent. If equivalent rings and covers are proposed, they shall be approved by the City prior to installation.
- (i) At the point of connection in manholes the invert of building service lines shall be placed, as a minimum, at the crown of the City sewer.
- (j) The minimum diameter of gravity sanitary sewer pipe shall be 8 inches with the exception of sewer service line which may be a minimum of 4 inches.
- (k) Manholes shall be placed at all changes in direction and grade of sanitary sewers. Manholes shall be spaced such that the distance between manholes does not exceed 350 feet.
- (l) Outside drop connections shall be constructed at manholes on all influent sewers where the invert elevation is greater than 2 feet over the invert elevation of the effluent sewer.
- (m) Sewage pumping stations will not be permitted unless the Developer can demonstrate extreme hardship would result if the station were denied. Pumping stations will be discouraged and therefore, only permitted on a case by case basis.
- (n) All sewage pumping stations shall have an auxiliary power source. Additionally, they shall be provided with a remote telemetry system compatible with the City's existing system.
- (o) Plans and profiles showing all utility and pipeline crossings as well as existing and proposed grades shall be provided for all sanitary sewers. Building services are excepted.
- (p) Sewer maintenance access shall be maintained on all sanitary sewer easements. Maintenance access is defined as grades, soil compaction and slopes which allow a sewer jet truck (weighing approximately 50,000 pounds) to navigate easily. Maximum slope shall not exceed 20%.

## **WASTEWATER PRETREATMENT**

- (a) Sand traps and oil separators with sample station manholes shall be installed in all sanitary sewer service lines from service stations, garages, and similar operations. Domestic sewage shall not pass through sand traps or oil separators.
- (b) Grease traps and sample station manholes shall be installed in process waste lines of all sanitary service sewers for commercial, industrial, and institutional establishments with food preparation areas.
- (c) If dumpster pad drains are to be tied onto the sanitary sewer, a grease trap and sample station manhole shall be placed between the pad and the City sewer. Domestic wastewater shall be excluded from the trap. Food process waste streams may utilize the same trap if sized appropriately.
- (d) Rainwater shall be prevented from entering the sanitary sewer at all dumpster pad locations. Method must be detailed on drawings.

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- (e) Grease trap and oil separator details shall appear on the project drawings and shall be approved prior to installation.
- (f) Oil separators shall be sized to handle two (2) times the expected flow rate.
- (g) Grease traps shall be sized as necessary with the minimum allowable size being 1,000 gallons. If a dumpster pad is tied into the grease trap the minimum size is 1,500 gallons.
- (h) Sample station manholes may be required on all commercial, industrial, and institutional sanitary service sewers.

## **PLANS FOR PROPOSED SUBDIVISION WATER AND SEWER SYSTEM**

- (a) Design engineer/Developer is to submit drawings on 24" x 36" paper stamped by a professional engineer registered in Georgia. Water and sewer line details included in Appendix C are part of the plans and specifications. Only special details not included in Appendix C should be shown on the drawings. Drainage design details, erosion control, and other plans required by the City should not be submitted with the water and sewer line plans.
- (b) Scale is to be 1" = 100'
- (c) Site plans shall include:
  - (1) Streets and street names with lot layout and district;
  - (2) Location of storm drains, drainage easements, and any retention ponds;
  - (3) Location map and topography of subdivision;
  - (4) Water line layout with all gate valves, air release valves, fittings, tapping sleeves, hydrants, chlorination taps, and sampling station including materials and size labels for each;
  - (5) Any rock outcroppings;
  - (6) All easements with labels;
  - (7) City road and DOT right-of-ways;
  - (8) Existing water lines, hydrants, and valves in surrounding area including materials and size labels for each;
  - (9) Service laterals;
  - (10) Water line legend with symbols;
  - (11) Details of special water line installations such as stream crossings, elevated lines on piers, bridges, etc.;
  - (12) All pad mounted electrical transformers; and
  - (13) Project name with specific phase(s) to be reviewed for approval clearly marked red on the plans.
- (d) All proposed water lines and appurtenances shall have a line weight equivalent to a #3 pen. All other lines shall have a line weight equivalent to a #1 or #2 pen.

(e) If the subdivision consists of multiple phases or units, two copies of the overall subdivision plan shall be submitted with the phase(s) or unit(s) being requested for approval. Scales of the overall plans may vary.

## **AS-BUILT DRAWINGS**

- (a) As-builts must be submitted before a project can receive final approval by the City.
- (b) Copies must be clear, clean, and legible.
- (c) Drawings shall include a site plan of the water and sewer lines and appurtenances as they were installed with any shop drawings needed for clarification or as requested by the City.
- (d) As-built drawings must be on mylar, 24" x 36" in size, and stamped by a Professional Engineer registered in the State of Georgia.

## **ARTICLE IX GRADING AND DRAINAGE**

### Section 9.1 Site Grading

Site grading shall be done in accordance with the finished grades shown on the approved development drawings. Site grades shall direct surface drainage away from buildings without causing adverse impact on adjacent properties.

The maximum slopes for soil cut or fill shall be two feet of horizontal run for each foot of vertical rise or fall except for stable rock slopes. If actual soils encountered require a flatter slope for stability, the lesser slope shall be used.

Soil erosion and sediment control measures shall be provided as required in the Soil Erosion and Sediment Control Ordinance.

### Section 9.2 Drainage

Provisions for storm water drainage and detention designs are given in the City of Dahlonega Drainage Manual which is incorporated in these Regulations as Appendix A.

### Section 9.3 Specifications for Drainage Construction

Specifications for drainage construction are included herein as Appendix B, Specifications for Utility and Drainage Construction.

### Section 9.4 Preparation of Grading and Drainage Plans

Grading and drainage plans for all developments except individual one and/or two family dwelling units, shall be prepared by a Georgia registered professional engineer or landscape architect. At least three copies of the plans and detention study shall be submitted to the City for review and comment. Within thirty days of submittal of the plans, the City will either approve the plans or make comment on items requiring changes and/or additional information. When not approved, the cycle of plan submittal and review will be repeated until the plans can be approved by the City.

Information to be shown on the plans shall consist of not less than the following:

- (a) Topographic map of the existing conditions for the development showing existing facilities and features which affect or could be affected by grading and drainage improvements. Utilize a contour interval of not greater than two feet with spot elevations as necessary to define existing ground surfaces.
- (b) All drainageways, lakes, streams, creeks, swales, ditches, channels, wetlands, and drainage facilities.
- (c) All existing utilities and appurtenances which affect or could be affected by grading and drainage improvements. The utility type, size and location in relation to grading and drainage improvements should be indicated.

- (d) Existing and proposed property and easement lines and land lot and land district lines intersecting or bounding grading and drainage improvements.
- (e) Finished grades depicted by finished contours and/or spot elevations as necessary to define finished grade surfaces.
- (f) New drainage improvements including, but not limited to, pipes, culverts, catch basins, area drains, drop inlets, junction boxes, headwalls, berms, dikes and detention basins with outlet works. The drainage areas tributary to each drainage structure, design flow, and time of concentration shall be indicated.
- (g) Profiles of storm drains showing existing and finished ground surfaces, pipes, drainage structures with top and flow line elevations, distances from centerline to centerline of drainage structures, pipe and ditch grades, crossing utilities, and limits of special construction.
- (h) Benchmarks for vertical control.
- (i) Name of the development, names, addresses and telephone numbers of developer and developer's design professional, design professional's seal, north arrow, scale, and date.

Plans shall be prepared in conformance with the following:

- (a) All elevations shall be based on and tied to U.S. Coast and Geodetic Survey mean sea level datum.
- (b) Plan drawings shall be at a scale of at least 1 inch equals 100 feet. In developed or congested areas, a scale of 1 inch equals 20 feet or less shall be utilized.
- (c) For profile drawings, the horizontal scale shall be the same as that used for the associated plan drawings. The vertical scale shall be at the least 1 inch equals 10 feet. A 1 inch equals 5 feet vertical scale is often necessary to properly depict drainage conditions.
- (d) The desired drawing size is 24 inches by 36 inches. In no case shall drawings be larger than 30 inches by 42 inches nor smaller than 11 inches by 17 inches.
- (e) Drainage construction may be shown on street or utilities improvements plans provided the resulting drawings are clear, legible and plainly show all necessary information.

## **ARTICLE X FEES**

Fees for subdivision plat review, development plan review, copies of these Regulations, appeals, waivers, re-inspections, and other items are on file with the City Clerk and may be altered or amended from time-to-time by the City Council to help defray the costs of the administration of these Regulations. Subdivision plat and development plan review fees shall be paid at the time plats and plans are submitted for review

## **ARTICLE XI ADMINISTRATION, ENFORCEMENT, APPEAL, AND VIOLATIONS**

### Section 11.1 Administration and Enforcement

These Regulations shall be administered, interpreted, and enforced by the City Manager or the City Manager's designated representative.

In any case in which activities are undertaken in violation of these Regulations, not in compliance with the provisions of a permit issued by the City, or without authorization of a permit which would otherwise be required, the City Manager is hereby authorized to order that all unauthorized or improper work be stopped, direct correction of deficiencies, or take any other legal or administrative action appropriate to the severity of the violation and degree of threat to the public's health, safety and welfare.

It shall be the duty and responsibility of the City Manager to maintain an accurate and up-to-date compilation of these Regulations, including Appendices, and all amendments, and to publish said compilation and make it available to the public for a fee set by the City Council.

### Section 11.2 Appeal and Waiver of the Regulations

It is the intention of this Ordinance that all questions arising in connection with the interpretation and enforcement of these Regulations first be presented to the City Manager and that such questions shall be presented to the Board of Zoning Appeals only on appeal from the decision of the City Manager.

Requests of waivers of the requirements of these Regulations shall be submitted in a form as prescribed by the City Manager along with such fee as shall be established by the City Council. The City Manager shall coordinate the review of each waiver request by all other affected City departments and shall summarize such comments and/or recommendations as may be received to the Board of Zoning Appeals for final action in their normal course of business.

### Section 11.3 Violation and Penalty

Any person, firm or corporation violating any provision of this Ordinance shall be guilty of a misdemeanor and, upon conviction, shall be fined, as determined by the Criminal Court of the City of Dahlonega, for each offense. Each day such violations continues shall constitute a separate offense. Nothing herein contained shall prevent the City from taking such other lawful action as is necessary to prevent or remedy any violation.

## **ARTICLE XII APPEALS PROCEDURE**

### Section 12.1 Appeals, Hearings, and Notice

Appeals to the Board of Appeals may be initiated by any person aggrieved or by any officer, department, board, or bureau of the City. Such appeal shall be taken within a reasonable time, as provided by the rules of the Board by filing with the officer from whom the appeal is taken and with the Board's notice of said appeal specifying the grounds thereof. The City Manager shall forthwith transmit to the Board all papers constituting the record from which the action appealed was taken .

An appeal stays all legal proceeding in furtherance of the action appealed, unless the officer from whom the appeal is taken certifies to the Board, after the notice of appeal shall have been filed with the officer, that by reason of facts stated in the certificate a stay would, in the officer's opinion, cause imminent peril to life and property. In such case, proceedings shall not be stayed otherwise than by a restraining order which may be granted by the Board or by a court of record on application, on notices to the officer from whom the appeal is taken, and on due cause shown.

The Board shall fix a reasonable time for the hearing of the appeal or other matter referred to it, and give public notice thereof, as well as due notice to the parties of interest, and decide the same within a reasonable time. At the hearing any party may appear in person, by agent, or by attorney.

### Section 12.2 Powers and Duties

The Board of Zoning Appeals shall have the following powers and duties:

- To hear and decide appeals where it is alleged there is error in any order, requirement, decision, or determination made by the City Manager in the enforcement of this Ordinance.
- To authorize, upon appeal, in specific cases a variance from the terms of this Ordinance as will not be contrary to the public interest, where a literal enforcement of the provisions of the Ordinance will in an individual case, result in unnecessary hardship, so that the spirit of the Ordinance shall be observed, public safety and welfare secured, and substantial justice done. Such variance may be granted in such individual case of unnecessary hardship upon a finding by the Board of Zoning Appeals that:
  - (a) there are extraordinary and exceptional conditions pertaining to the particular piece of property in question because of its size, shape, or topography;
  - (b) the application of the Ordinance to this particular piece of property would create an unnecessary hardship;

- (c) such conditions are peculiar to the particular piece of property involved; and
  - (d) relief, if granted, would not cause substantial detriment to the public good or impair the purpose and intent of this Ordinance, provided, however, that no variance may be granted for a use of land or building or structure that is prohibited in a given district by the Zoning Ordinance.
- To decide on other matters where a decision of the Board of Zoning Appeals may be specifically required by the provisions of this Ordinance. In exercising these powers, the Board of Zoning Appeals may reverse or affirm, wholly or in part, or may modify the order, requirements, decision, or determination, and to that end shall have all the powers of the officer from whom the appeal is taken and may issue or direct the issuance of a permit. The Board, in the execution of the duties for which appointed, may subpoena witnesses and in case of contempt may certify such fact to the Superior Court.

### Section 12.3 Certiorari from Decisions

Any person aggrieved by any decision of the Board of Zoning of Appeals shall have the right of certiorari to the Superior Court within thirty (30) days after the decision of the Board is rendered.

## **ARTICLE XIII AMENDMENTS**

### Section 13.1 Authority

This Ordinance may be amended from time-to-time by the City Council as herein specified, but no amendment shall become effective unless it has been submitted to the Planning and Zoning Commission at a public hearing for review and recommendation. The Planning and Zoning Commission shall have 30 days from the date of the hearing to submit its recommendation to the City Council. If the Planning and Zoning Commission fails to submit a report within the 30 day period, it shall be deemed to have approved the proposed amendment.

### Section 13.2 Requirements for Change

When the public necessity, general welfare, or good development practices justify such action, and after the required review and report by the Planning and Zoning Commission, the City Council may undertake the necessary steps to amend these Regulations.

### Section 13.3 Procedure for Amendments

Request to amend these Regulations shall be processed in accordance with the following requirements:

- (a) Initiation of amendments: A proposed amendment to these Regulations may be initiated by the City Council, Board of Zoning Appeals, the Planning and Zoning Commission, the City Manager, or by application filed with the City Manager by a developer or citizen.
- (b) Application Procedure. Each request for amendment of these Regulations shall be submitted in a form as prescribed by the City Manager along with such fee as shall be established by the City Council. Applications for amendments must be submitted in proper form at least 25 days prior to a Planning and Zoning Commission hearing in order to be heard at that hearing.

**ARTICLE XIV**  
**LEGAL STATUS PROVISIONS**

Section 14.1 Conflict With Other Regulations

Whenever the regulations of this Ordinance require or impose more restrictive standards than are required in or under any other statutes, the requirements of this Ordinance shall govern. Whenever the provisions of any other statute require more restrictive standards than are required by this Ordinance, the provisions of such statute shall govern.

Section 14.2 Severability

Should any section, subsection, sentence, clause, phrase, or provision of this Ordinance be declared invalid or unconstitutional by any court of competent jurisdiction, such declaration shall not affect the validity of the Ordinance as a whole or any part thereof which is not specifically declared to be invalid or unconstitutional.

Section 14.3 Effective Date

These Regulations shall be in full force and effective on \_\_\_\_\_, 2000, following adoption by the City Council and shall apply to any subdivision or development for which the first submittal of a Preliminary Plat or development plan are received after the effective date of these Regulations.

**APPENDIX A**  
**DRAINAGE MANUAL**

## **INTRODUCTION**

As the use and character of land changes due to the growth of Dahlongega, it is important to recognize the adverse effects those changes can have on natural and man-made systems. Applying reasonable solutions project by project is much easier and more cost effective than ignoring negative impacts until they become monumental problems.

Drainage affords an excellent example of this point. Up until the early 1970's, urban growth was accomplished without consideration that storm water runoff and soil erosion were dramatically increased by development. The result of this approach was often heavy siltation and flooding. Even though modern detention and erosion control regulations have eased the problems, many cities still suffer drainage woes stemming from years of poor storm water management.

The purpose of this Manual is to establish criteria for dealing with drainage for all projects within the City of Dahlongega. Set forth herein are policies, methods and techniques to be used in developing drainage improvements on a consistent basis throughout the City.

It must be recognized that this manual is not intended to be a complete reference on drainage nor is it expected to cover every situation which may arise. The manual is to serve as a guide to engineers versed in drainage analysis and design. Unique circumstances requiring special or alternative design methods should be brought to the attention of the City early in project life so that agreement on problem approach can be reached without impacting project progress.

Manual users are encouraged to comment on its contents so that it may be made as useful and applicable as possible.

## **CHAPTER 1 DESIGN POLICY**

### Hydrology

For drainage areas containing 50 acres or less, designs are to be based on the Rational Method. Designs for areas containing more than 50 acres are to be based on a method approved by the City Engineer for the specific basin. Normally, the Soil Conservation Service method or the U.S.G.S. Flood Frequency Relation Method may be used.

Within the City of Dahlongega the Burkli-Ziegler formula and the Talbot formula are not considered appropriate.

### Culverts and Piped Systems

1. Culverts are to be designed for a 50 year frequency flood event. The area inundated by the design event is to be contained in a drainage easement.
2. Piped storm drainage systems are to be designed for a 25 year frequency storm event in non-residential areas and for a 10 year frequency storm event in residential areas. Catch basins are to be spaced so that the maximum gutter spread is six feet or less for the design storm event.
3. The minimum pipe size to be used as a culvert or in a piped system is 15 inch diameter.

4. Under City streets, all pipe used for culverts and storm drainage systems is to be reinforced concrete. Corrugated plastic pipe may also be used for culverts and storm drainage systems not under City streets. Pipe class for reinforced concrete is to be determined for actual conditions anticipated for each specific application but not less than class III. The designer may select round pipe conforming to ASTM C76, arch pipe conforming to ASTM C506 or elliptical pipe conforming to ASTM C507.
5. For concrete culvert and pipe systems, a roughness coefficient (Manning's n) of 0.012 is to be used. For corrugated plastic culvert and pipe systems a roughness coefficient (Manning's n) of 0.020 is to be used.
6. The minimum velocity in a pipe flowing full is to be 2.0 feet per second. The maximum velocity in a pipe flowing full is to be 12.0 feet per second. The exit velocity of culvert and pipe systems is to be controlled and modified to prevent channel erosion or scour.
7. The absolute minimum clearance between the bottom of the paving base or subbase and the exterior crown of the storm drain pipe or culvert is to be 1.0 foot. A clearance of 2.0 feet is considered more desirable and should be achieved if possible.

### Detention Facilities

1. Detention facilities are required for any project when the runoff is increased by more than 1.0 cubic foot per second for a 10 year frequency storm event.
2. The peak release rate of storm water from a project is not to be increased from the predeveloped state for all intensities up to and including the 100 year event. Specific storm events to be examined include the 2, 5, 10, 25, 50 and 100 year return frequency.
3. Detention facilities located on paved areas used for parking or vehicular access are discouraged. The depth of water in a detention facility located on paved areas also used for vehicular purposes is limited to six inches. The depth of water in a detention facility located on paved areas also used for parking is limited to two inches.

## **CHAPTER 2 DATA COLLECTION**

### Drainage Basin Size

The size of drainage basin(s) for a project is to be determined from:

1. Field survey using conventional topographic techniques,
2. Aerial topographic maps of the project,
3. Other maps acceptable to the City.

### Land Use

In drainage basins having limits beyond the boundaries of a project, land use outside the project will be considered as either 1) the existing development or 2) natural undeveloped as appropriate.

### Soil Conditions

The soil conditions for a project are to be determined from:

1. Field survey of project site soils.
2. Soil Survey of Lumpkin County, Georgia  
U. S. Department of Agriculture  
Soil Conservation Service

### Existing Storm Drains

Careful field investigation is required to locate existing storm drains which drain into or are located within a project. Data on pipe or culvert material, size, slope, entrance and exit conditions should be recorded. Any construction record information on existing storm drains will be made available at City Hall through the Public Works Department. This data must be field verified as the City cannot assure correctness or accuracy of record information.

## **CHAPTER 3 RATIONAL METHOD**

### Rational Method Formula

The rational method provides a means to relate rainfall to storm water runoff. The formula, expressed below, gives peak runoff in cubic feet per second from a drainage basin.

$$Q = CIA$$

- Q = the peak runoff in cubic feet per second.  
C = a coefficient representing the ratio of runoff to rainfall.  
I = the average rainfall intensity in inches per hour for a duration equal to the time of concentration (Tc).  
  
A = the drainage area in acres.

### Runoff Coefficient

The selection of a runoff coefficient (C) is judgmental. To choose a realistic value, the engineer must consider soil type and moisture content, topography, land use and imperviousness of the drainage area. Table 3-1 presents typical values which are characteristic of the Dahlonega area.

### Time of Concentration

The time of concentration (Tc) is the time in minutes required for runoff to flow from the most hydraulically remote point in the drainage area to the point under investigation. It is taken as the sum of the inlet time and the travel time. Inlet time is the time storm water is flowing overland to the nearest pipe, channel or natural waterway. Figure 3-2, taken from the U.S.D.A., is to be used to establish overland flow velocities for calculating inlet time.

TABLE 3-1  
RUNOFF COEFFICIENTS FOR VARIOUS LAND-USES

<u>Slope</u>	<u>Land-Use</u>	<u>Sandy Soils</u>		<u>Clay Soils</u>	
		<u>Min.</u>	<u>Max.</u>	<u>Min.</u>	<u>Max.</u>
Flat (0-2%)	Woodlands	0.10	0.15	0.15	0.20
	*Pasture, grass & farmland	0.15	0.20	0.20	0.25
	Rooftops and pavement	0.95		0.95	
	Single family residential:				
	1/2 acre lots & larger	0.30	0.35	0.35	0.45
	Smaller lots	0.35	0.45	0.40	0.50
	Multi-family residential:				
	Duplexes	0.35	0.45	0.40	0.50
	Apartments, townhouses, and condominiums	0.45	0.60	0.50	0.70
	Commercial and Industrial	0.50	0.95	0.50	0.95
Rolling (2-7%)	Woodlands	0.15	0.20	0.20	0.25
	*Pasture, grass & farmland	0.20	0.25	0.25	0.30
	Rooftops and pavement	0.95		0.95	
	Single family residential:				
	1/2 acre lots & larger	0.35	0.50	0.40	0.55
	Smaller lots	0.40	0.55	0.45	0.60
	Multi-family residential:				
	Duplexes	0.40	0.55	0.45	0.60
	Apartments, townhouses, and condominiums	0.50	0.70	0.60	0.80
	Commercial and Industrial	0.50	0.95	0.60	0.95
Steep (7%+)	Woodlands	0.20	0.25	0.25	0.30
	*Pasture, grass & farmland	0.25	0.35	0.30	0.40
	Rooftops and pavement	0.95		0.95	
	Single family residential:				
	1/2 acre lots & larger	0.40	0.55	0.50	0.65
	Smaller lots	0.45	0.60	0.55	0.70
	Multi-family residential:				
	Duplexes	0.45	0.60	0.55	0.70
	Apartments, townhouses, and condominiums	0.60	0.75	0.65	0.85
	Commercial and Industrial	0.60	0.95	0.65	0.95

\* Coefficients assume good ground cover.

Travel time is the time storm water is flowing a pipe, channel or natural waterway. Velocities determined from the Manning Equation are to be used for calculating travel times.

The minimum time of concentration which can be used for any drainage basin is to be five (5) minutes.

### Rainfall Intensity

Intensities (I) to be used in the Rational Formula are to be selected from Figure 3-1 for the appropriate time of concentration. This family of intensity-frequency-duration curves was developed from Weather Bureau Technical Paper No. 25.

### Drainage Area

The drainage area (A) in acres should be determined from field verified topographic maps and/or surveys of the drainage basin.

FIGURE 3-1

ATLANTA, GEORGIA  
1903-1951

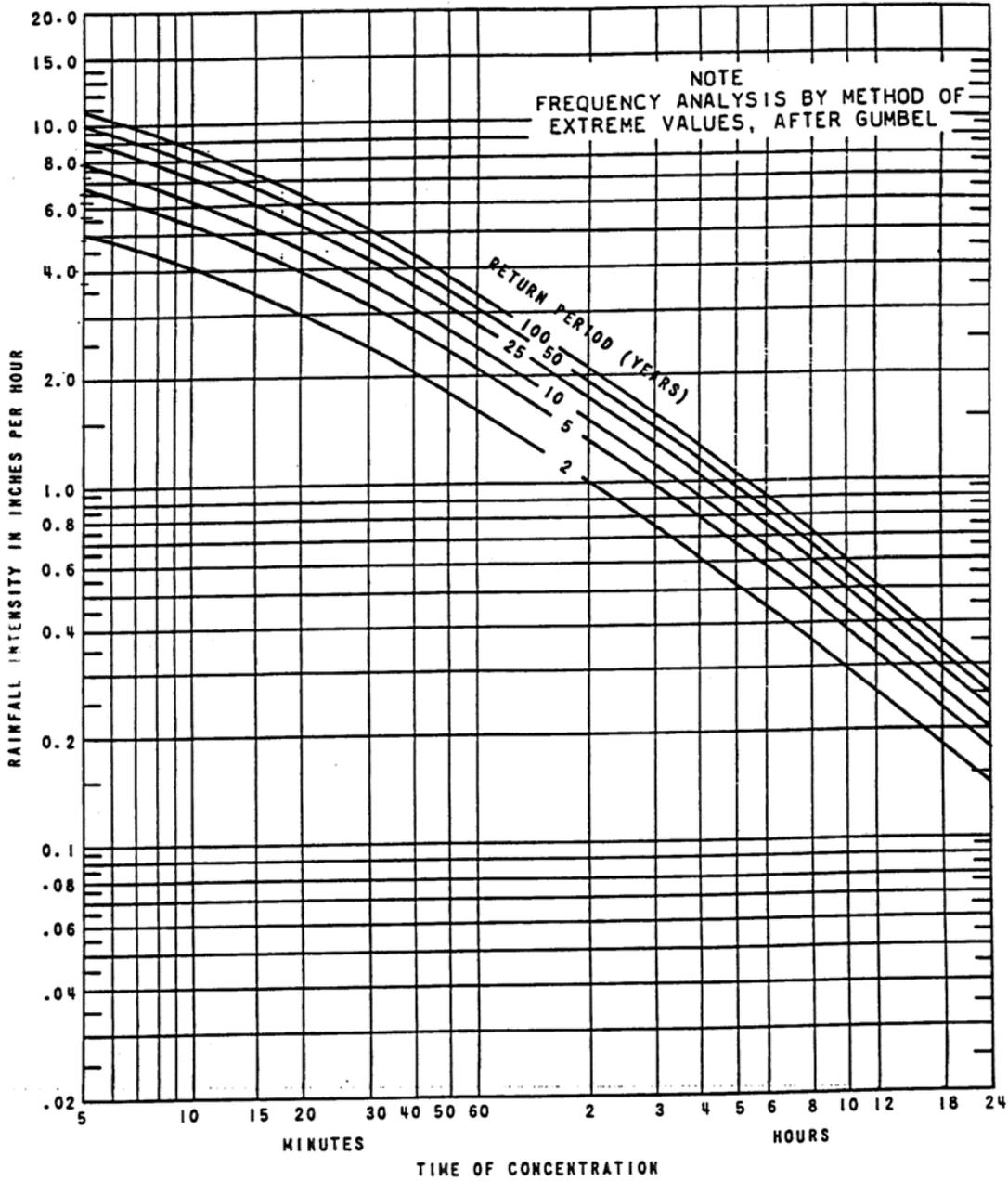
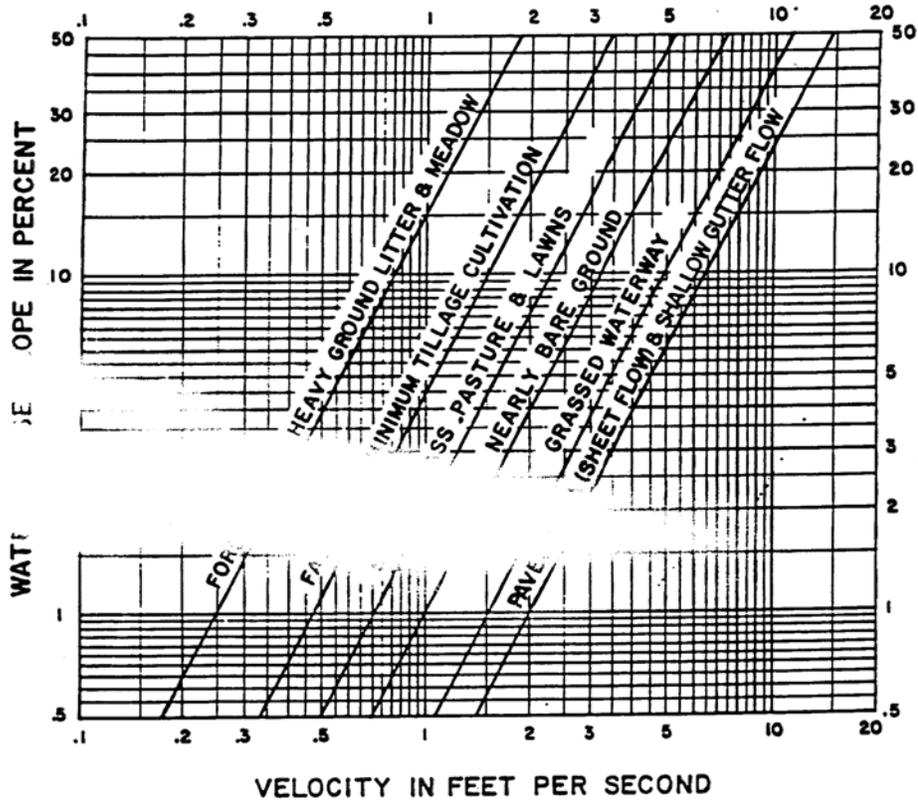


FIGURE 3-2

AVERAGE VELOCITIES FOR ESTIMATING  
OVERLAND FLOW TIME



URBAN HYDROLOGY FOR SMALL WATERSHEDS  
TECHNICAL RELEASE NO. 55  
SOIL CONSERVATION SERVICE  
U.S. DEPARTMENT OF AGRICULTURE  
JANUARY 1975

### Example 1

Compute the peak runoff rate expected from a 50 year frequency storm event at a cross drain entrance in a proposal single family subdivision utilizing the Rational Formula.

#### Information from Data Collection Activities

Drainage Area	=	54 acres
Average Slope of Drainage Area	=	3%
Length of Overland Flow	=	560' at 6% slope
Ground Cover	=	Minimum Tillage
Length of Drainage Ditch	=	200' at 1% slope
Predominant Soil Type	=	Loamy Sand
Exist Land Use		
Woodland		15 acres
Farmland and Pasture		7 acres
Single Family Residential (3/4 acre lots)		11 acres
Single Family Residential (1/3 acre lots)		17 acres
Commercial		4 acres

#### Composite "C" Value

<u>Land Use</u>	<u>Area - A</u>	<u>C*</u>	<u>CXA</u>
Woodland	5	0.20	1.00
Farmland & Pasture	7	0.25	1.75
SFR (3/4 acre lots)	11	0.50	5.50
SFR (1/3 acre lots)	17	0.55	9.35
Commercial	<u>4</u>	0.75	<u>3.00</u>
	54 acres		22.60

$$\text{Composite C} = \frac{\text{CXA}}{\text{A}} = \frac{22.60}{54} = 0.42$$

\* Based on Table 3-1 and site investigation.

#### Time of Concentration

$$\text{Time of Concentration (Tc)} = \text{Inlet Time} + \text{Travel Time}$$

$$\text{Inlet Time} = \frac{\text{Length of Travel}}{\text{Average Velocity}} = \frac{560 \text{ ft.}}{1.2 \text{ fps}} = 467 \text{ sec.}$$

$$\text{Travel Time} = \frac{\text{Length Drainage Ditch}}{\text{Average Velocity}} = \frac{1300 \text{ ft.}}{3 \text{ fps}} = 400 \text{ sec.}$$

$$T_c = 467 + 400 = 867 \text{ sec.} = 14.5 \text{ min.}$$

### Rainfall Intensity

$$I_{50} = 8.0 \text{ in/hr} \quad \text{From Figure 3-1}$$

### Peak Run-off

$$\begin{aligned} Q &= CIA \\ &= 0.42 \times 8.0 \times 54 \\ &= 181.4 \text{ cubic feet per second} \end{aligned}$$

## **CHAPTER 4**

### **DETENTION FACILITIES**

### Design Methods

Small Drainage Areas (3 acres or less):

To determine detention requirements for small drainage areas of 3 acres or less, the "bowstring" method may be used. By this method, storage required is equal to the maximum difference between the total inflow (based on post development conditions) less the total outflow (based on natural undevelopment conditions). Example No. 2 at the end of this chapter illustrates the "bowstring" method. The designer may also use the reservoir routing method.

Drainage Areas Over 3 Acres:

For drainage areas over 3 acres in size, the reservoir routing method is to be used to establish detention requirements. The basic technique of this method calls for repetitive solution to the continuity equation. The formula of the equation utilized is:

$$I_1 + I_2 + \frac{2S_1}{t} - O_1 = \frac{2S_2}{t} + O_2$$

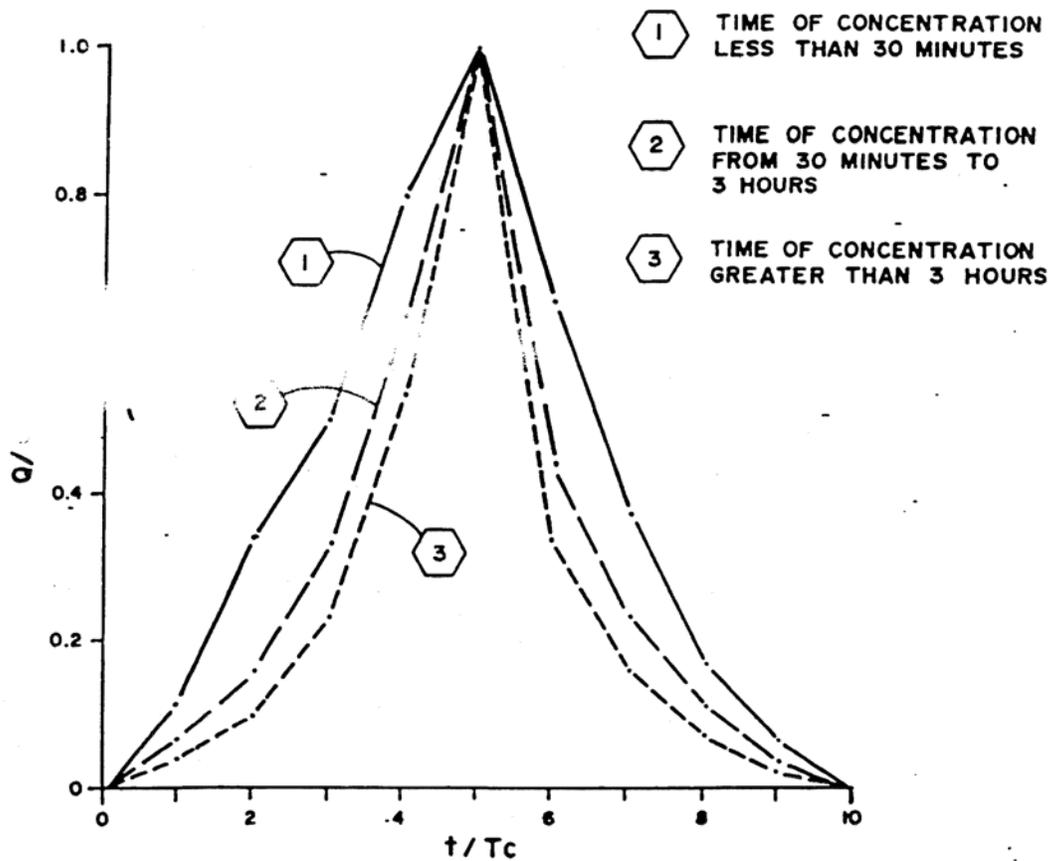
Where

- t = a selected time interval
- I<sub>1</sub> = inflow at the start of the time interval
- O<sub>1</sub> = outflow at the start of the time interval
- S<sub>1</sub> = storage at the start of the time interval

- $I_2$  = inflow at the end of the time interval
- $O_2$  = outflow at the end of the time interval
- $S_2$  = storage at the end of the time interval

The inflow hydrograph for the reservoir routing metered is to be developed from the appropriate unit hydrograph on Figure 4-1. The reservoir routing method is illustrated by Example No. 3 at the end of this chapter.

**FIGURE 4-1**  
**DIMENSIONLESS HYDROGRAPHS FOR**  
**DETENTION FACILITY DESIGN**  
**RESERVOIR ROUTING METHOD**



$t/T_c$	1	2	3	4	5	6	7	8	9	10
1	0.12	0.34	0.50	0.80	1.00	0.66	0.37	0.17	0.06	0.00
2	0.07	0.16	0.33	0.64	1.00	0.44	0.23	0.11	0.03	0.00
3	0.04	0.10	0.23	0.53	1.00	0.34	0.16	0.07	0.02	0.00

## Design Storms

In determining detention design, the engineer must evaluate the 2, 5, 10, 25, 50 and 100 year return frequency storm events. Under all events analyzed, the peak natural undeveloped runoff is not to be exceeded. In determining the peak natural undeveloped runoff, a runoff coefficient (c) not exceeding 0.3 must be used unless a higher coefficient can be demonstrated by fact. All such higher values must have the written concurrence of the City Manager or his/her designated representative..

## Emergency Overflow

Detention facilities should be suitable for storing excessive post development runoff for all storm events through the 100 year frequency. Because, however, the 100 year event can be exceeded and because outlet works can become partially or totally blocked, the design engineer must provide an emergency overflow for all detention facilities. The emergency overflow should direct flows to minimize property damage and avoid risk to people.

## Freeboard

Detention facilities for sites of 2 acres or less should have a freeboard of not less than six inches. For sites exceeding 2 acres, the freeboard should be not less than one foot. Freeboard is defined as the vertical distance between the maximum water surface elevation anticipated in design and the top of retaining banks or structures provided to prevent overtopping because of unforeseen conditions.

### **Example 2**

Design the detention facility required to serve a 12,000 square foot neighborhood shopping center located on a square 1.4 acre site. For purposes of this example consider only a 5 year frequency storm. The existing site is a wooded lot.

## Allowable Release Rate

$$\begin{aligned} \text{Time of concentration (Tc)} &= 11 \text{ minutes} \\ \text{Intensity (I)} &= 6.5 \text{ in/hr.} \quad (\text{From Figure 3-1}) \\ \text{C factor} &= 0.20 \quad (\text{From Table 3-1}) \\ \text{Allowable Release Rate} &= \text{CIA} \\ &= 0.20 \times 6.5 \times 1.4 \\ &= 1.82 \text{ cfs} \end{aligned}$$

## Inflow

Determine post development "C" factor.

<u>Use</u>	<u>Area</u>	<u>C</u>	<u>CXA</u>
Roof or Paving	0.64	0.95	0.61
Grassed Lawn	0.33	0.30	0.10
Undisturbed Natural	<u>0.43</u>	0.20	<u>0.09</u>
	1.43 acres		0.08

$$\text{Composite C} = \frac{\text{CXA}}{\text{Area}} = \frac{0.80}{1.43} = 0.57$$

A 1.40

$$\text{Inflow} = C \times A \times I_t \times 60_t$$

$\underline{t}$ min	$\underline{60_t}$ sec	$I_t$ in/hr	$\underline{CXA}$	$\underline{\text{Inflow}}$ C.F.
0	0	0	0.82	0
5	300	8.5	0.82	2091
10	600	6.5	0.82	3198
15	900	5.4	0.82	3985
20	1200	4.8	0.82	4723
30	1800	3.9	0.82	5756
40	2400	3.2	0.82	6298
50	3000	2.8	0.82	6888
60	3600	2.5	0.82	7380

### Outflow

$$\text{Outflow} = \text{Allowable Release Rate} \times 60_t$$

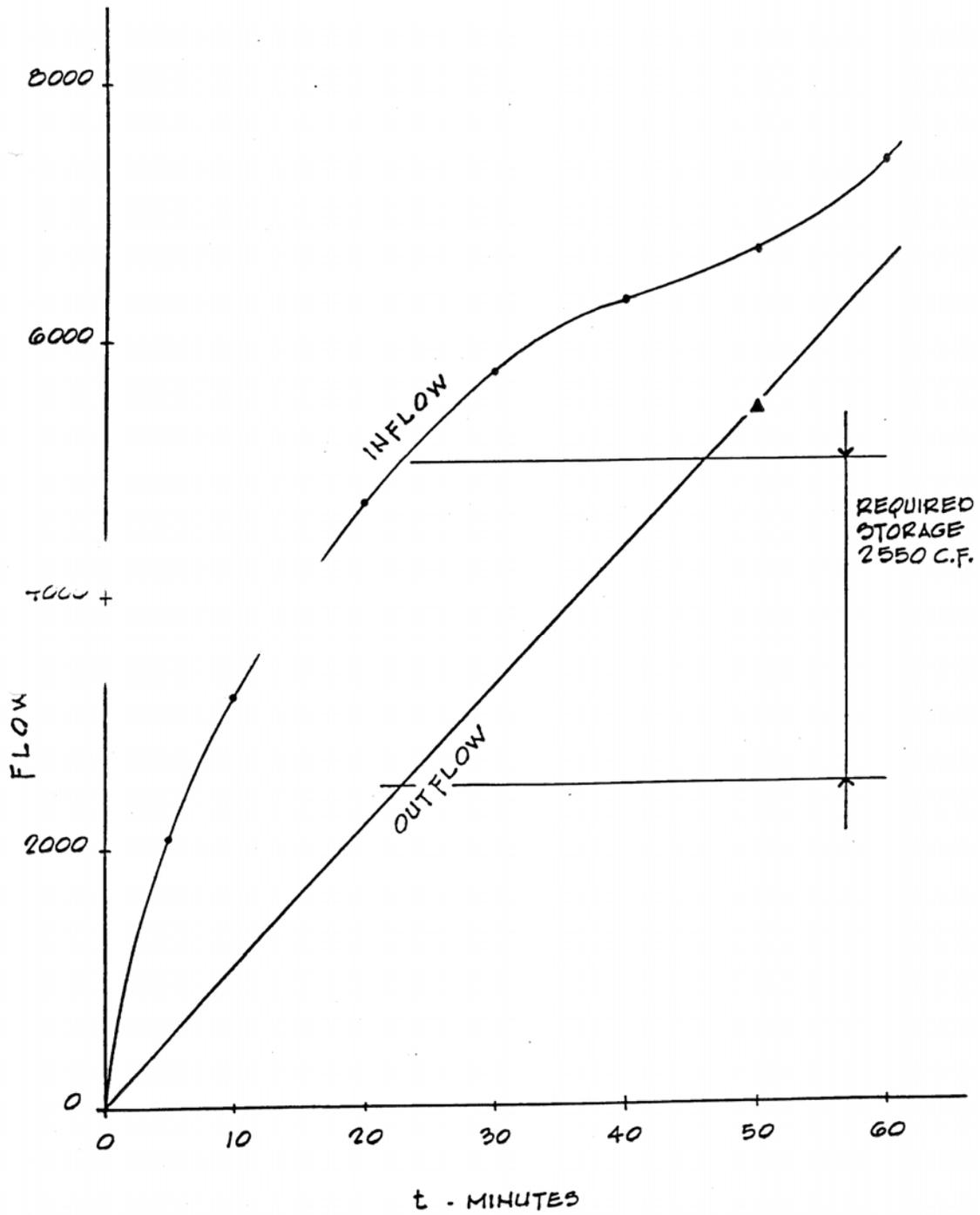
$\underline{t}$ min	$\underline{60_t}$ sec	$\underline{ARR}$ C.F.S.	$\underline{\text{Outflow}}$ C.F.S.
0	0	1.82	0
50	3000	1.82	5460

Plot inflow and outflow on graph. Maximum difference between two plots represents required storage.

Assume maximum storage depth of 3.0 feet.

$$\frac{\text{Required Storage}}{\text{Depth}} = \text{Surface Area at mid depth}$$

$$\frac{2400}{3} = 800 \text{ SF}$$



Select 20' x 40' x 3.0' deep pond with 3:1 side slopes for maintenance. Allow 1.0' freeboard except an emergency spillway, where 0.5' freeboard is to be used.

Outlet Device Design

Select "V" notch weir box. (Design engineer may choose any outlet device which properly regulates discharge from detention facility)

$$H_{max} = 3.0 \text{ ft}, Q_{max} = 1.82 \text{ cfs}$$

$$Q = 2.5 \tan \frac{\theta}{2} H^{5/2}$$

$$1.82 = 2.5 \tan \frac{\theta}{2} 3^{5/2}$$

$$\frac{1.82}{2.5} = \tan \frac{\theta}{2} 15.59$$

$$\frac{0.728}{15.59} = \tan \frac{\theta}{2}$$

$$0.04669 = \tan \frac{\theta}{2}$$

$$2.7^\circ = \frac{\theta}{2}$$

$$\theta = 5.4^\circ$$

Use 5° "V" notch weir.

### Example 3

Design the detention facility required to serve a 102 unit motel located on a 7.9 acre site. For purposes of this example consider only a 50 year frequency storm. The existing site consist of 2.7 acres of wooded area and the remainder is pasture.

#### Allowable Release Rate

$$\begin{aligned} \text{Time of concentration} &= 20 \text{ minutes} \\ \text{Intensity (I}_{50}) &= 6.7 \text{ in/hr (From Figure 3-1)} \\ \text{C factor} &= \end{aligned}$$

<u>Use</u>	<u>Area</u>	<u>C</u>	<u>CXA</u>
Woodland	2.7	0.20	0.54
Pasture	<u>5.2</u>	0.25	<u>1.30</u>
	7.9		1.84

$$C = \frac{CXA}{A} = \frac{1.84}{7.9} = 0.23$$

$$\begin{aligned}
 \text{Allowable Release Rate} &= CIA \\
 &= 0.23 \times 6.7 \times 7.9 \\
 &= 12.17 \text{ cfs}
 \end{aligned}$$

### Inflow

Determine time of concentration and peak flow for developed condition.

$$\begin{aligned}
 \text{Time of concentration} &= 10 \text{ minutes} \\
 \text{Intensity (I}_{50}\text{)} &= 9.2 \text{ in/hr (From Figure 3-1)} \\
 \text{C factor} &=
 \end{aligned}$$

<u>Use</u>	<u>Area</u>	<u>C</u>	<u>CXA</u>
Building & Paving	2.2	0.95	2.09
Lawn	3.1	0.25	0.78
Natural	<u>2.6</u>	0.15	<u>0.39</u>
	7.9 acres		3.26

$$C = \frac{CXA}{A} = \frac{3.26}{7.9} = 0.41$$

$$\begin{aligned}
 \text{Peak Runoff} &= Q = CIA \\
 &= 0.41 \times 9.2 \times 7.9 \\
 &= 29.80 \text{ cfs}
 \end{aligned}$$

Using unit hydrograph 1 on Figure 4-1, develop inflow hydrograph.

<u>t/Tc</u>	<u>t</u> <u>minutes</u>	<u>Q/Q peak</u>	<u>Q</u> <u>CFS</u>
0	0	0	0
1	10	0.12	4
2	20	0.34	10
3	30	0.50	15
4	40	0.80	24
5	50	1.00	30
6	60	0.66	20
7	70	0.37	11
8	80	0.17	5
9	90	0.06	2
10	100	0.00	0

### Storage Approximation

Determine approximate storage volume required by the "bowstring" method or by:

$$\text{Storage} = (Q_{\text{dev.}} - Q_{\text{undev.}}) \times 300 T_c$$

$$= (29.8 - 12.2) \times 300 \times 10$$

$$= 52,800 \text{ c.f.}$$

Assume 3 foot depth

$$\text{Pond area} = 52,800/3$$

$$= 17,600 \text{ S.F.}$$

Because this is approximate, select 150' x 150' pond (at mid depth) with 3 on 1 side slopes. (Note: At this point, designer may select any type or shape storage facility).

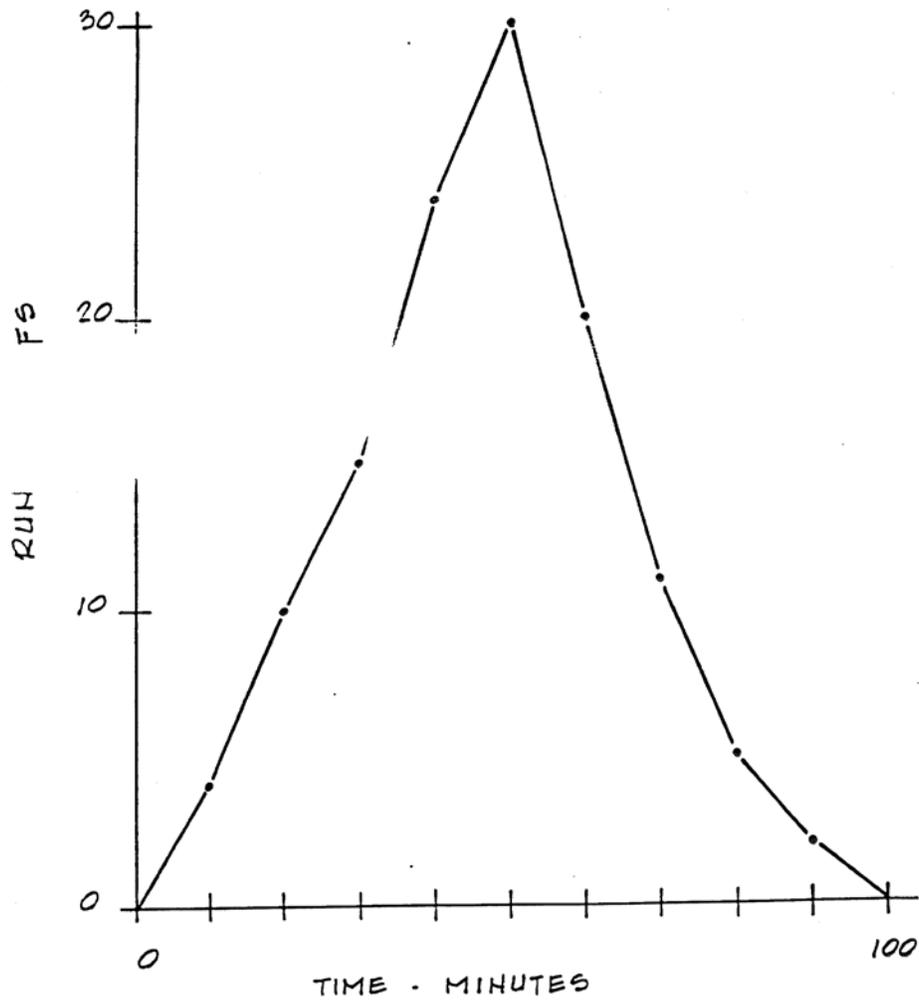
Stage Storage Curve:

Based on storage facility, prepare a stage - storage curve.

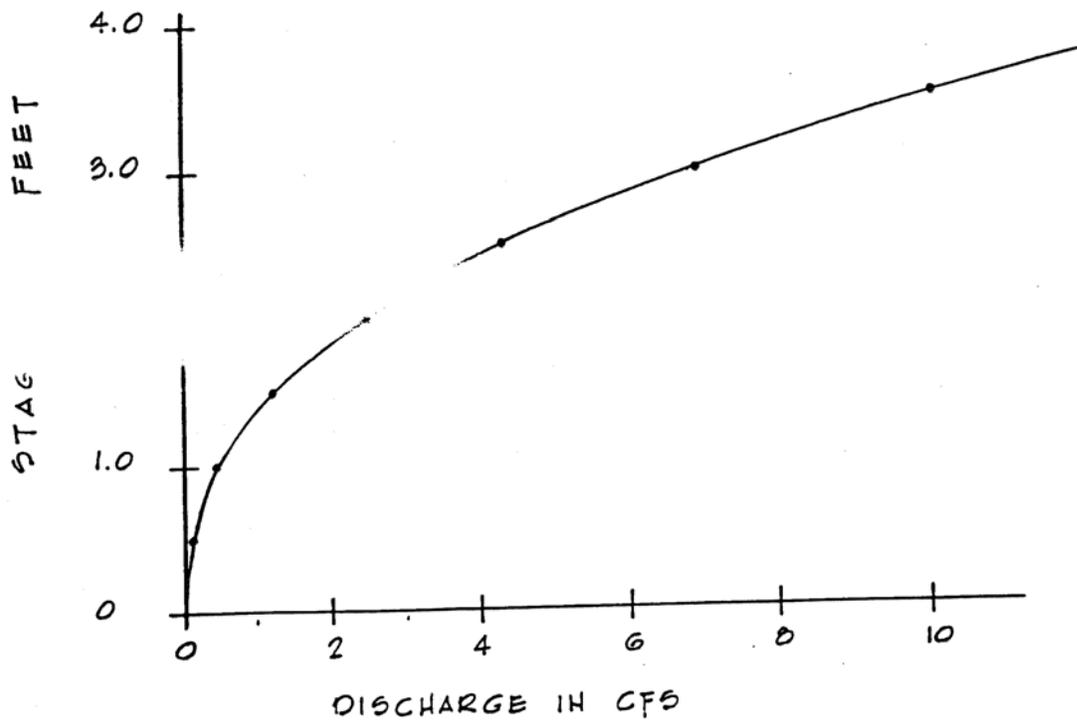
Stage - Discharge Curve:

Select trial discharge control structure. For this example, a 20° "V" notch weir box is chosen.

<u>Depth</u> <u>Ft</u>	<u>Outflow</u> <u>Cfs</u>
0.0	0.00
0.5	0.07
1.0	0.44
1.5	1.21
2.0	2.49
2.5	4.35
3.0	6.87
3.5	10.10
4.0	14.10



Insert Discharge in cfs chart



<u>Stage ft</u>	<u>Area sf</u>	<u>Volume cf</u>	<u>Storage cf</u>
0	0	0	0
0.5	20,736	5,184	5,184
1.0	21,609	10,586	15,770
1.5	22,500	11,027	26,797
2.0	23,409	11,477	38,274
2.5	24,336	11,936	50,210
3.0	25,281	12,404	62,614
3.5	26,244	12,881	75,495

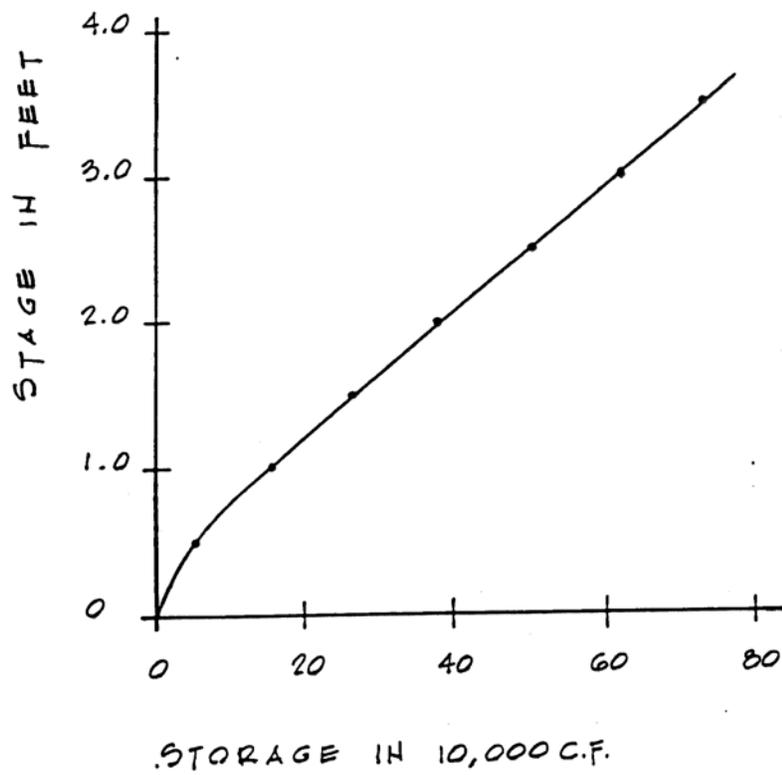
### Routing Curve

Prepare a routing curve from stage discharge and stage-storage curves. Use a routing period equal to half of the time of concentration.

$$\text{Routing Period (t)} = T_c/2 = 10/2 = 5 \text{ min.} = 300 \text{ sec.}$$

<u>Stage ft</u>	<u>Storage cf</u>	<u>2S/t cfs</u>	<u>0 cfs</u>	<u>2S/t + 0 cfs</u>
0.0	0	0	0	0
0.5	5,184	34.6	0.1	34.7
1.0	15,770	105.1	0.4	105.5
1.5	26,797	178.6	1.2	179.8
2.0	38,274	255.2	2.5	257.7
2.5	50,210	334.7	4.4	339.1
3.0	62,614	417.4	6.9	424.3
3.5	75,495	503.3	10.1	513.4

Insert Storage in 10,000 cfs chart



## Routing Calculations

$$I_1 + I_2 + (2S_1/t - 0_1) = 2S_2/t + 0_2$$

<u>t</u>	<u>I<sub>1</sub></u>	<u>I<sub>2</sub></u>	<u>2S<sub>1</sub>/t</u>	<u>0<sub>1</sub></u>	<u>2S<sub>2</sub>/t</u>	<u>0<sub>2</sub></u>	<u>2S<sub>2</sub>/t</u>
<u>min</u>	<u>cfs</u>	<u>cfs</u>	<u>cfs</u>	<u>cfs</u>	<u>cfs</u>	<u>cfs</u>	<u>cfs</u>
5	0	2	0	0	2	0	2
10	2	4	2	0	8	0	8
15	4	7	8	0	19	0	19
20	7	10	19	0	36	0.1	35.9
25	10	13	35.9	0.1	58.8	0.2	58.6
30	13	15	58.6	0.2	86.4	0.3	86.1
35	15	20	86.1	0.3	120.8	0.6	120.2
40	20	24	120.2	0.6	163.6	1.0	162.6
45	24	27	162.6	1.0	212.6	1.8	210.8
50	27	30	210.8	1.8	266.0	2.8	263.2
55	30	25	263.2	2.8	315.4	3.9	311.5
60	25	20	311.5	3.9	352.6	4.9	347.7
65	20	16	347.7	4.9	378.8	5.7	373.1
70	16	11	373.1	5.7	394.4	6.2	388.2
75	11	8	388.2	6.2	401.0	6.4	394.6
80	8	5	394.6	6.4	401.2	6.4	394.8
85	5	3	394.8	6.4	396.4	6.3	390.1
90	3	2	390.1	6.3	383.8	5.9	377.9
95	2	1	377.9	5.9	375.0	5.6	369.4
100	1	0	369.4	5.6	364.8	5.3	359.5

Maximum release rate is 6.4 cfs at 80 min which is less than allowable release rate of 12.17 cfs. The proposed design is therefore acceptable. (NOTE: At this point, engineer can 1) proceed to verify other frequency storm events or 2) refine design to get maximum release rate closer to allowable release rate.

## CHAPTER 5

### OPEN CHANNELS

#### Design

Improved open channels used as a part of a storm drainage system should be sized to accommodate flows for the storm events given in Chapter 1 of this manual. Flow velocities and depths should be determined from the Manning equation.

A channel system consist of its 1) cross section configuration, 2) horizontal alignment, 3) slope or grade and 4) surface materials. These components must be combined so that the resulting system prevents erosion. The actual selection of system components is left to the design engineer.

The minimum channel conditions the design engineer must achieve are 1) not less than an established grass lining and 2) a lined freeboard of at least 6 inches above the 10 year frequency storm flow.

#### Manning "n"

For channel calculations, select the appropriate roughness coefficient from the chart at the end of this chapter. The chart was taken from the Georgia Department of *Transportation Manual on Drainage Design for Highways*.

#### Allowable Velocities

The maximum permissible velocities in channels lined with uniform stands of various grass covers, are not to exceed the values given in Table E-2. This table is from the *Manual for Erosion and Sediment Control in Georgia*.

MANNING'S ROUGHNESS COEFFICIENTS "n"

Channel Description	"n" Range <u>Construction 1,</u>	
	Good	<u>Fair</u>
<b>CLOSED CONDUITS</b>		
a. Concrete Pipe	0.012	0.015
b. Corrugated Metal Pipe or Pipe-Arch		
(1) 2-2/3" x 1/2' Corrugation (Riveted)		
(a) Plain or coated	0.024	
(b) Paved invert		
Rowing full under pressure	0.021	0.018
Part full, depth 0.8 D	0.021	0.016
(2) 6" x 2" Corrugation (Field-Bolted)		
(a) Plain or coated	0.03	
c. Vitrified Clay Pipe	0.012	0.014
d. Cast Iron Pipe, Uncoated	0.013	
e. Steel Pipe	0.009	0.011
f. Brick	0.014	0.017
g. Monolithic Concrete		
(1) Wood forms, rough	0.015	0.017
(2) Wood forms, smooth	0.012	0.014
(3) Steel forms	0.012	0.013
h. Cemented Rubble Masonry Walls		
(1) Concrete floor and top	0.017	0.022
(2) Natural floor	0.019	0.025
<b>OPEN CHANNELS, LINED <u>3</u></b>		
<b>Straight Alignment <u>4</u></b>		
a. Concrete surfaces		
(1) Formed, no finish	0.013	0.017
(2) Trowel finish	0.012	0.014
(3) Float finish	0.013	0.015
(4) Gunite, good section	0.016	0.019
(5) Gunite, wavy section	0.018	0.022
b. Concrete bottom float-finished, sides of		
(1) Dressed stone in mortar	0.015	0.017
(2) Random stone in mortar	0.017	0.020

	(3) Cement rubble masonry	0.020	0.025
	(4) Dry rubble (riprap)	0.020	0.030
c.	Gravel bottom, sides of		
	(1) Formed Concrete	0.017	0.020
	(2) Random stone in mortar	0.020	0.023
	(3) Dry rubble (riprap)	0.023	0.033
d.	Brick	0.014	0.017
e.	Asphalt		
	(1) Smooth	0.013	
	(2) Rough	0.016	
f.	Concrete lined excavated rock		
	(1) Good section	0.017	0.020
	(2) Irregular section	0.022	0.027
g.	Flumes (steep slope) <u>5</u>		

#### OPEN CHANNELS — EXCAVATED 3

Straight alignment 4 Natural lining

#### Channel Description

a.	Earth, uniform section		
	(1) Clean, recently completed	0.016	0.018
	(2) Clean, after weathering	0.018	0.020
	(3) With short grass, few weeds	0.022	0.027
	(4) Gravel, uniform section, clean	0.022	0.027
b.	Earth, fairly uniform section		
	(1) No vegetation	0.022	0.025
	(2) Grass, some weeds	0.025	0.030
	(3) Dense weeds or aquatic plants in deep channels	0.030	0.035
	(4) Sides clean, gravel bottom	0.025	0.030
	(5) Sides clean, cobble bottom .	0.030	0.040
c.	Dragline excavated or dredged		
	(1) No vegetation	0.028	0.033
	(2) Light brush on banks	0.035	0.050
d.	Rock		
	(1) Based on design section		0.035
	(2) Based on actual mean section		
	(a) Smooth and uniform	0.035	0.040
	(b) Jagged and irregular	0.040	0.045
e.	Channels not maintained, weeds and brush uncut		
	(1) Dense weeds, high as flow depth	0.08	0.12

(2) Clean bottom, brush on sides	0.05	0.08
(3) Same, highest stage of flow	0.07	0.11
(4) Dense brush, high stage	0.010	0.014

HIGHWAY DITCHES AND SWALES WITH MAINTAINED VEGETATION

Depth of Flow Velocity in fps	n" Range	
	$\frac{0.1 - 0.7}{2' \text{ to } 6'}$	$\frac{0.7 - 1.5}{2' \text{ to } 6'}$

a. Bermuda. Kentucky bluegrass, buffalo

(1) Mowed to 2"	0.07	0.045	0.05	0.035
(2) Length 4" to 6"	0.09	0.05	0.06	0.04

b. Good stand any grass

(1) Length 12"	0.18	0.09	0.12	0.07
(2) Length 24"	0.30	0.15	0.20	0.10

c. Fair Stand any grass

(1) Length 12"	0.14	0.08	0.10	0.06
(2) Length 24"	0.25	0.13	0.17	0.09

STREET AND EXPRESSWAY GUTTERS

	Manning's n
a. Concrete gutter, troweled finish	0.012
b. Asphalt pavement	
(1) Smooth texture	0.013
(2) Rough texture	0.016
c. Concrete gutter with asphalt pavement	
(1) Smooth	0.013
(2) Rough	0.015
d. Concrete pavement	
	(1) Float finish 0.014
	(2) Broom finish 0.016

For gutter with small slope where sediment may accumulate, increase all above values of "N" by 0.002.

NATURAL STREAM CHANNELS 6

Channel Description	"n" Range	
a. Minor Streams <u>7</u> (Surface width at flood stage 100 ft.)		
(1) Fairly regular section		
(a) Some grass and weeds little or no brush	0.030	0.035
(b) Dense growth of weeds depth of flow materially greater than weed height	0.035	0.05
(c) Some weeds light brush on banks	0.035	0.05

(d) Some weeds heavy brush on banks	0.05	0.07
(e) Some weeds dense willows on banks	0.06	0.08
(f) For trees within channel with branches submerged at high stage, increase all above values by	0.01	0.02
(2) Irregular section with pools, slight channel meander		
(a) Channels (a) to (e) above increased all values about	0.01	0.02
(3) Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stage.		
(a) Bottom; gravel, cobbles and few boulders	0.04	0.05
(b) Bottom; cobbles with large boulders	0.05	0.07
b. Flood Plains (Adjacent to Natural Streams)		
(1) Pasture, no brush		
(a) Short grass	0.030	0.035
(b) High grass	0.03 5	0.05
(2) Cultivated areas		
(a) No crop	0.03	0.04
(b) Mature row crops	0.035	0.045
(c) Mature field crops	0.04	0.05
(3) Heavy weeds, scattered brush	0.05	0.07
(4) Light brush and trees		
(a) Winter	0.05	0.06
(b) Summer	0.06	0.08
(5) Medium to dense brush		
(a) Winter	0.07	0.11
(b) Summer	0.10	0.16
(6) Dense willows, summer, not bent over by current	0.15	0.20
(7) Cleared land with tree stumps 100-150 per acre		
(a) No sprouts	0.04	0.05
(b) With heavy growth of sprouts	0.06	0.08
(8) Heavy stand of timber, a few down trees, little undergrowth		
(a) Flood depth below branches	0.10	0.12
(b) Flood depth reaches branches ("n" increased with depth) <u>3</u>	0.12	0.16
c. Major Streams (Surface width at flood stage 100 ft.)		

Roughness coefficient is usually less than for minor streams of similar description on account of less effective resistance offered by irregular banks or vegetation on banks. Values of "n" may be somewhat reduced. Follow recommendation of note 6 if possible. The value of "n" for larger streams of most regular section, with no boulders or brush, may be in the range from

0.028 to 0.033.

## NOTES

1. For poor quality construction, use larger values of “n”.
2. Estimated by Federal Highway Administration (unless otherwise noted)
3. For important work and where accurate determination of water profiles is necessary, the designer is urged to consult the references cited and to select “n” by comparison of the specific conditions with the channels tested.
4. With channel of alignment other than straight, loss of head by resistance forces will be increased. A small increase in value of “n” may be made to allow for the additional loss of energy.
5. With steep slopes, depth of flow will generally be greater than computed by the usual methods for open channels due to air entrainment and additional resistance offered by air in contact with the high velocity flow. An approximate depth may be calculated by increasing “n” for the chute material involved by 20 to 30 percent.
6. For calculations of stage or discharge in natural stream channels, it is recommended that the designer consult the local District Office of the U.S. Geological Survey to obtain data regarding values of “n” applicable to streams of any specific region. Where the recommended procedure is not followed, the above values may be used as a guide.

The values of “n” tabulated have been derived by the Federal Highway Administration from data presented by C. E. Ramser and from other incomplete data. See Hydraulic Design Series No. 3 for additional references.

7. The tentative values of “n” cited are principally derived from measurements made on fairly short but straight reaches of natural streams. Where slopes calculated from flood elevations along a considerable length of channel, involving meanders and bends, are to be used in velocity calculations by the Manning formula, the value of “n” must be increased, to provide for the additional loss of energy caused by bends. All values stated above must be so increased. The increase may be in the range of perhaps 3 to 15 percent.

Cover	range' (percent)	Permissible velocity'	
		Erosion resistant soils (ft. per sec.)	Easily eroded soils (ft. per sec.)
Bermuda grass	05 5-10 over 10	8 7 6	6 5 4
Bahia Buffalo grass Kentucky bluegrass Smooth brome Blue grama Tall fescue	05 5-10 over 10	7 6 5	5 4 3
Grass mixtures Reed canary grass	0-5 5.10 <sup>2</sup>	5 4	4 3
Lespedeza sericea Weeping love grass Yellow bluestem Redtop Alfalfa Red fescue	0-5 <sup>3</sup>	3.5	2.5
Common lespedeza <sup>4</sup> Sudan grass~	0-5 <sup>4</sup>	3.5	2.5

<sup>1</sup>Use velocities exceeding 5 feet per second only where good covers and proper maintenance can be obtained.

<sup>2</sup>Do not use on slopes steeper than 10 percent except for vegetated side slopes in combination with a stone, concrete, or highly resistant vegetative center section.

<sup>3</sup>Do not use on slopes steeper than 5 percent except for vegetated side slopes in combination with a stone, concrete, or highly resistant vegetative center section.

<sup>4</sup>Annuals - use on mild slopes or as temporary protection until permanent covers are established.

<sup>5</sup>Use on slopes steeper than 5 percent is not recommended.

**Table E-2.** — Permissible velocities for channels lined with vegetation.

## CHAPTER 6

### CULVERTS

#### Design

The design of culverts in Dahlonega is to be based on Chapters 6 and 7 of the Georgia Department of Transportation *Manual on Drainage Design for Highways*.

#### Plan Data

Construction plans for culverts presented to the City for review should contain at least the following data for each culvert:

1. Drainage area.
2. Design Discharge and Flood Frequency.
3. Water surface elevation at Design Discharge.
4. Culvert size and slope.

## CHAPTER 7 STORM DRAINS

### Inlet Spacing

Catchbasins, drop inlets and similar structures for removing storm runoff from streets are to be spaced as necessary to keep gutter spread at or less than the maximum value identified in Chapter 1. The procedure and design aid charts contained in Chapter 10 of the Georgia Department of Transportation *Manual on Drainage Design for Highway* is an acceptable method for use in the City of Dahlonega.

### Piped Systems

Piped storm drain systems should be designed using the Manning equation.

## **CHAPTER 8**

### **SEDIMENT AND EROSION CONTROL**

The control of sedimentation and erosion is an important element in the construction process. Measures must be taken to assure that soil from construction and land clearing sites does not pollute waterways. To accomplish this goal, the City has adopted an ordinance entitled ***“The City of Dahlonega Soil Erosion and Sedimentation Control Ordinance”***. This ordinance and the ***Manual for Erosion and Sediment Control in Georgia*** by the State Soil & Water Conservation Committee of Georgia are incorporated as the design guides for developing erosion and sediment control plans in the City of Dahlonega.

**ORDINANCE 85-4**  
**SOIL EROSION AND SEDIMENTATION CONTROL ORDINANCE**  
**AMENDMENT 5**

NOW, THEREFORE, BE IT ORDAINED by the City Council of Dahlonega, and it is hereby ordained by the authority thereof that Ordinance 85-4 is hereby amended in its entirety so as to read as follows:

**SECTION I**

**TITLE**

This ordinance will be known as “City of Dahlonega Soil Erosion and Sedimentation Control Ordinance.

**SECTION II**  
**DEFINITIONS**

The following definitions shall apply in the interpretation and enforcement of this ordinance, unless otherwise specifically stated:

1. Best Management Practices (BMP’s): A collection of structural practices and vegetative measures which, when properly designed, installed and maintained, will provide effective erosion and sedimentation control for all rainfall events up to and including a 25-year, 24- hour rainfall event.
2. Board: The Board of Natural Resources.
3. Buffer: The area of land immediately adjacent to the banks of state waters in its natural state of vegetation, which facilitates the protection of water quality and aquatic habitat.
4. Commission: The State Soil & Water Conservation Commission.
5. Cut: A portion of land surface or area from which earth has been removed or will be removed by excavation; the depth below original ground surface to excavated surface. Also known as excavation.
6. Department: The Department of Natural Resources.
7. Director: The Director of the Environmental Protection Division of the Department of Natural Resources.
8. District: The Upper Chattahoochee River Soil and Water Conservation District.
9. Division: The Environmental Protection Division of the Department of Natural Resources.

10. Drainage Structure: A device composed of a virtually non-erodible material such as concrete, steel, plastic or other such material that conveys water from one place to another by intercepting the flow and carrying it to a release point for storm-water management, drainage control, or flood control purposes.

11. Erosion: The process by which land surface is worn away by the action of wind, water, ice or gravity.

12. Erosion and Sedimentation Control Plan: A plan for the control of soil erosion and sedimentation resulting from a land disturbing activity. Also known as the “plan”.

13. Ground Elevation: The original elevation of the ground surface prior to capping or filling.

14. Fill: A portion of land surface to which soil or other solid material has been added; the depth above the original ground.

15. Finished Grade: The final elevation and contour of the ground after cutting or filling and conforming to the proposed design.

16. Grading: Altering the shape of ground surfaces to a predetermined condition; this includes stripping, cutting, filling, stockpiling and shaping or any combination thereof and shall include the land in its cut or filled condition.

17. Issuing Authority: The governing authority of any county or municipality which has been certified by the Director of the Environmental Protection Division of the Department of Natural Resources as an Issuing Authority, pursuant to the Erosion and Sedimentation Act of 1975, as amended, or the Division in those instances where an application for a permit is submitted to the Division.

18. Land-Disturbing Activity: Any activity which may result in soil erosion from water or wind and the movement of sediments into state waters or onto lands within the state, including, but not limited to, clearing, dredging, grading, excavating, transporting, and filling of land but not including agricultural practices as described in Section III, Paragraph 5.

19. Metropolitan River Protection Act (MRPA): A state law referenced as O.C.G.A. 12-5-440 et. seq., which addresses environmental and developmental matters in certain metropolitan river corridors and their drainage basins.

20. Natural Ground Surface: The ground surface in its original state before any grading, excavation or filling.

21. Nephelometric Turbidity Units (NTU): Numerical units of measure based upon photometric analytical techniques for measuring the light scattered by finely divided particles of a substance in suspension. This technique is used to estimate the extent of turbidity in water in which colloiddally dispersed particles are present.

22. Permit: The authorization necessary to conduct a land-disturbing activity under the provisions of this ordinance.

23. Person: Any individual, partnership, firm, association, joint venture, public or private

corporation, trust, estate, commission, board, public or private institution, utility, cooperative, state agency, municipality or other political subdivision of this State, any interstate body or any other legal entity.

24. Project: The entire proposed development project regardless of the size of the area of land to be disturbed.

25. Roadway Drainage Structure: A device such as a bridge, culvert, or ditch, composed of a virtually non-erodible material such as concrete, steel, plastic, or other such material that conveys water under a roadway by intercepting the flow on one side of a traveled way consisting of one or more defined lanes, with or without shoulder areas, and carrying water to a release point on the other side.

26. Sediment: Solid material, both organic and inorganic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, ice, or gravity as a product of erosion.

27. Sedimentation: The process by which eroded material is transported and deposited by the action of water, wind, ice or gravity.

28. Soil and Water Conservation District Approved Plan: An erosion and sedimentation control plan approved in writing by the Upper Chattahoochee River Soil and Water Conservation District.

29. Stabilization: The process of establishing an enduring soil cover of vegetation by the installation of temporary or permanent structures for the purpose of reducing to a minimum the erosion process and the resultant transport of sediment by wind, water, ice or gravity.

30. State Waters: Any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wells, and other bodies of surface or subsurface water, natural or artificial, lying within or forming a part of the boundaries of the State which are not entirely confined and retained completely upon the property of a single individual, partnership, or corporation.

31. Structural Erosion and Sedimentation Control Practices: Practices for the stabilization of erodible or sediment producing areas by utilizing the mechanical properties of matter for the purpose of either changing the surface of the land or storing, regulating or disposing of runoff to prevent excessive sediment loss. Examples of structural erosion and sediment control practices are riprap, sediment basins, dikes, level spreaders, waterways or outlets, diversions, grade stabilization structures, sediment traps and land grading, etc. Such practices can be found in the publication Manual for Erosion and Sediment Control in Georgia.

32. Trout Streams: All streams or portions of streams within the watershed as designated by the Game and Fish Division of the Georgia Department of Natural Resources under the provisions of the Georgia Water Quality Control Act, O.C.G.A. 12-5-20 gL 52-q. , Streams designated as primary trout waters are defined as water supporting a self sustaining population of rainbow, brown or brook trout. Streams designated as secondary trout waters are those in which there is no evidence of natural trout reproduction, but are capable of supporting trout throughout the year. First order trout waters are streams into which no other streams flow except springs.

33. Vegetative Erosion and Sedimentation Control Measures: Measures for the

stabilization of erodible or sediment producing areas by covering the soil with:

- A. Permanent seeding, sprigging or planting, producing long-term vegetative cover; or
- B. Temporary seeding, producing short-term vegetative cover; or
- C. Sodding, covering areas with a turf of perennial sod-forming grass.

Such measures can be found in the publication Manual for Erosion and Sediment Control in Georgia.

34. Watercourse: Any natural or artificial watercourse, stream, river, creek, channel, ditch, canal, conduit, culvert, drain, waterway, gully, ravine, or wash in which water flows either continuously or intermittently and which has a definite channel, bed and banks, and including any area adjacent thereto subject to inundation by reason of overflow or floodwater.

35. Wetlands: Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

## **SECTION 111 EXEMPTIONS**

This ordinance shall apply to any land-disturbing activity undertaken by any person on any land except for the following:

- A.
  1. Surface mining, as the same is defined in O.C.G.A. 12-4-72, “Mineral Resources and Caves Act”;
  2. Granite quarrying and land clearing for such quarrying;
  3. Such minor land-disturbing activities as home gardens and individual home landscaping, repair, maintenance work, and other related activities which result in minor soil erosion;
  4. The construction of single-family residences, when such are constructed by or under contract with the owner for his or her own occupancy, or the construction of single family residences not a part of a platted subdivision, a planned community, or an association of other residential lots consisting of more than two lots and not otherwise exempted under this paragraph; provided, however, that construction of any such residence shall conform to the minimum requirements as set forth in Section IV of this ordinance. For single-family residence construction covered by the provisions of this paragraph, there shall be a buffer zone between the residence and any state waters classified as trout streams pursuant to Article 2 of Chapter 5 of the Georgia Water Quality Control Act. In any such buffer zone, no land-disturbing activity shall be constructed between the residence and the point where vegetation has been wrested by normal stream flow or wave action from the banks of the trout waters. For primary trout waters, the buffer zone shall be at least 50 horizontal feet, and no variance to a smaller buffer shall be granted. For secondary trout waters, the buffer zone shall be at least 50 horizontal feet, but the Director may grant variances to no less than 25 feet. Regardless of whether a trout stream is primary or secondary, for first order trout waters, which are streams into which no other streams flow except for springs, the buffer shall be at least 25 horizontal feet, and no variance to a smaller buffer shall be granted. The minimum requirements of Section IV of this ordinance and the buffer zones provided by this section shall be enforced by the issuing authority;
  5. Agricultural operations as defined in O.C.G.A. 1-3-3, “definitions”, to include raising, harvesting or storing of products of the field or orchard; feeding, breeding or managing livestock or poultry; producing or storing feed for use in the production of livestock, including but not limited to cattle, calves, swine, hogs, goats, sheep, and rabbits or for use in the production of poultry, including but not limited to chickens, hens and turkeys; producing plants, trees, fowl, or animals; the production of aqua culture, horticultural, dairy, livestock, poultry, eggs and apiarian products; farm buildings and farm ponds;

6. Forestry land management practices, including harvesting; provided, however, that when such exempt forestry practices cause or result in land-disturbing or other activities otherwise prohibited in a buffer, as established in paragraphs (15) and (16) of Section IV C. of this ordinance, no other land-disturbing activities, except for normal forest management practices, shall be allowed on the entire property upon which the forestry practices were conducted for a period of three years after completion of such forestry practices;

7. Any project carried out under the technical supervision of the Natural Resources Conservation Service of the United States Department of Agriculture;

8. Any project involving one and one-tenth acres or less; provided, however, that this exemption shall not apply to any land disturbing activity within~ 200 feet of the bank of any state waters, and for purposes of this paragraph, “State Waters” excludes channels and drainage ways which have water in them only during and immediately after rainfall events and intermittent streams which do not have water in them year round; provided, however, that any person responsible for a project which involves one and one-tenth acres or less, which involves land-disturbing activity, and which is within 200 feet of any such excluded channel or drainage way, must prevent sediment from moving beyond the boundaries of the property on which such project is located and provided, further, that nothing contained herein shall prevent the Issuing Authority from regulating any such project which is not specifically exempted by paragraphs 1, 2, 3, 4, **5, 6, 7, 9** or 10 of this section;

9. Construction or maintenance projects, or both, undertaken or financed in whole or in part, or both, by the Department of Transportation, the Georgia Highway Authority, or the State Toll way Authority; or any road construction or maintenance project, or both, undertaken by any county or municipality; provided, however, that such projects shall conform to the minimum requirements set forth in Section IV B. & C. of this ordinance; provided further that construction or maintenance projects of Department of Transportation or State Toll way Authority which disturb five or more contiguous acres of land shall be subject to provisions of Code Section 12-7-7.1; and;

10. Any land-disturbing activities conducted by any electric membership corporation or municipal electrical system or any public utility under the regulatory jurisdiction of the Public Service Commission, provided that any such land disturbing activity shall conform to the minimum requirements set forth in Section IVB. & C.

B. Where this section requires compliance with the minimum requirements set forth in Section IV B. & C. of this ordinance, Issuing Authorities shall enforce compliance with the minimum requirements as if a permit had been issued and violations shall be subject to the same penalties as violations by permit holders.

**SECTION IV**  
**MINIMUM REQUIREMENTS FOR**  
**EROSION AND SEDIMENTATION CONTROL**  
**USING BEST MANAGEMENT PRACTICES**

**A. GENERAL PROVISIONS**

Excessive soil erosion and resulting sedimentation can take place during land-disturbing activities. Therefore, plans for those land-disturbing activities which are not excluded by this ordinance shall contain provisions for application of soil erosion and sedimentation control measures and practices. The provisions shall be incorporated into the erosion and sedimentation control plans. Soil erosion and sedimentation control measures and practices shall conform to the minimum requirements of Section IV B. & C. of this ordinance. The application of measures and practices shall apply to all features of the site, including street and utility installations, drainage facilities and other temporary and permanent improvements. Measures shall be installed to prevent or control erosion and sedimentation pollution during all-stages of any land-disturbing activity.

**B. MINIMUM REQUIREMENT/BMP's**

1. Best management practices as set forth in Section IV B. & C. of this ordinance shall be required for all land-disturbing activities. Proper design, installation, and maintenance of best management practices shall constitute a complete defense to any action by the Director or to any other allegation of noncompliance with paragraph (2) of this subsection or any substantially similar terms contained in a permit for the discharge of stormwater issued pursuant to subsection (f) of Code Section 12-530, the "Georgia Water Quality Control Act". As used in this subsection the terms "proper design" and "properly designed" mean designed to control soil erosion and sedimentation for all rainfall events up to and including a 25-year, 24hour rainfall event.
2. A discharge of stormwater runoff from disturbed areas where best management practices have not been properly designed, installed, and maintained shall constitute a separate violation of any land-disturbing permit issued by a local Issuing Authority or by the Division or of any general permit for construction activities issued by the Division pursuant to subsection (f) of Code Section 12-5-30, the "Georgia Water Quality Control Act", for each day on which such discharge results in the turbidity of receiving waters being increased by more than 25 nephelometric turbidity units for waters supporting warm water fisheries or by more than ten nephelometric turbidity units for waters classified as trout waters. The turbidity of the receiving waters shall be measured in accordance with guidelines to be issued by the Director.
3. Failure to properly design, install, or maintain best management practices shall constitute a violation of any land-disturbing permit issued by a local Issuing Authority or by the Division or any general permit for construction activities issued by the Division pursuant to subsection (f) of Code Section 12-5-30, the "Georgia Water Quality Control Act", for each day on which such failure occurs.
4. The Director may require, in accordance with regulations adopted by the Board, reasonable and prudent monitoring of the turbidity level of receiving waters into which discharges from land disturbing activities occur.

**C. The rules and regulations, ordinances, or resolutions adopted pursuant to this chapter**

for the purpose of governing land-disturbing activities shall require, as a minimum, best management practices, including sound conservation and engineering practices to prevent and minimize erosion and resultant sedimentation, which are consistent with, and no less stringent than, those practices contained in the Manual for Erosion and Sediment Control in Georgia published by the Georgia Soil and Water Conservation Commission as of January 1 of the year in which the land-disturbing activity was permitted, as well as the following:

1. Stripping of vegetation, regrading and other development activities shall be conducted in a manner so as to minimize erosion;
2. Cut-fill operations must be kept to a minimum;
3. Development plans must conform to topography and soil type so as to create the lowest practical erosion potential;
4. Whenever feasible, natural vegetation shall be retained, protected and supplemented;
5. The disturbed area and the duration of exposure to erosive elements shall be kept to a practicable minimum;
6. Disturbed soil shall be stabilized as quickly as practicable;
7. Temporary vegetation or mulching shall be employed to protect exposed critical areas during development;
8. Permanent vegetation and structural erosion control practices shall be installed as soon as practicable.
9. To the extent necessary, sediment in run off water must be trapped by the use of debris basins, sediment basins, silt traps, or similar measures until the disturbed area is stabilized. As used in this paragraph, a disturbed area is stabilized when it is brought to a condition of continuous compliance with the requirements of O.C.G.A. 12-7-1 et. seq.;
10. Adequate provisions must be provided to minimize damage from surface water to the cut face of excavations or the sloping of fills;
11. Cuts and fills may not endanger adjoining property;
12. Fills may not encroach upon natural watercourses or constructed channels in a manner so as to adversely affect other property owners;
13. Grading equipment must cross flowing streams by means of bridges or culverts except when such methods are not feasible, provided, in any case, that such crossings are kept to a minimum;
14. Land-disturbing activity plans for erosion and sedimentation control shall include provisions for treatment or control of any source of sediments and adequate sedimentation control facilities to retain sediments on-site or preclude sedimentation of adjacent waters beyond the levels specified in Section IV B. 2. of this ordinance;
15. Except as provided in paragraph (16) of this subsection, there is established a 25 foot buffer

along the banks of all state waters, as measured horizontally from the point where vegetation has been wrested by normal stream flow or wave action, except where the Director determines to allow a variance that is at least as protective of natural resources and the environment, where otherwise allowed by the Director pursuant to O.C.G.A. 12-2-8, or where a drainage structure or a roadway drainage structure must be constructed, provided that adequate erosion control measures are incorporated in the project plans and specifications, and are implemented; provided, however, the buffers of at least 25 feet established pursuant to part 6 of Article 5, Chapter 5 of Title 12, the “Georgia Water Quality Control Act”, shall remain in force unless a variance is granted by the Director as provided in this paragraph. The following requirements shall apply to any such buffer: No land-disturbing activities shall be conducted within a buffer and a buffer shall remain in its natural, undisturbed state of vegetation until all land-disturbing activities on the construction site are completed. Once the final stabilization of the site is achieved, a buffer may be thinned or trimmed of vegetation as long as a protective vegetative cover remains to protect water quality and aquatic habitat and a natural canopy is left in sufficient quantity to keep shade on the stream bed; provided, however, that any person constructing a single family residence, when such residence is constructed by or under contract with the owner for his or her own occupancy, may thin or trim vegetation in a buffer at any time as long as protective vegetative cover remains to protect water quality and aquatic habitat and a natural canopy is left in sufficient quantity to keep shade on the stream bed; and

16. There is established a 50 foot buffer as measured horizontally from the point where vegetation has been wrested by normal stream flow or wave action, along the banks of any state waters classified as “trout streams” pursuant to Article 2 of Chapter 5 of Title 12, the “Georgia Water Quality Control Act”, except where a roadway drainage structure must be constructed ; provided, however, that small springs and streams classified as trout streams which discharge an average annual flow of 25 gallons per minute or less shall have a 25 foot buffer or they may be piped, at the discretion of the landowner, pursuant to the terms of a rule providing for a general variance promulgated by the Board, so long as any such pipe stops short of the downstream landowner’s property and the landowner complies with the buffer requirement for any adjacent trout streams. The Director may grant a variance from such buffer to allow land-disturbing activity, provided that adequate erosion control measures are incorporated in the project plans and specifications and are implemented. The following requirements shall apply to such buffer:

No land-disturbing activities shall be conducted within a buffer and a buffer shall remain in its natural, undisturbed, state of vegetation until all land-disturbing activities on the construction site are completed. Once the final stabilization of the site is achieved, a buffer may be thinned or trimmed of vegetation as long as a protective vegetative cover remains to protect water quality and aquatic habitat and a natural canopy is left in sufficient quantity to keep shade on the stream bed: provided, however, that any person constructing a single-family residence, when such residence is constructed by or under contract with the owner for his or her own occupancy, may thin or trim vegetation in a buffer at any time as long as protective vegetative cover remains to protect water quality and aquatic habitat and a natural canopy is left in sufficient quantity to keep shade on the stream bed; and

D. Nothing contained in this chapter shall prevent an Issuing Authority from adopting rules and regulations, ordinances, or resolutions which contain requirements that exceed the minimum requirements in Section IV B. & C. of this ordinance.

E. The fact that land-disturbing activity for which a permit has been issued results in injury to the property of another shall neither constitute proof of nor create a presumption of a violation of

the standards provided for in this ordinance or the terms of the permit.

## SECTION V

### APPLICATION PERMIT PROCESS

#### A. GENERAL:

The property owner, developer and designated planners and engineers shall review the general development plans and detailed plans of the Issuing Authority that affect the tract to be developed and the area surrounding it. They shall review the zoning ordinance, stormwater management ordinance, subdivision ordinance, flood damage prevention ordinance, this ordinance, and other ordinances which regulate the development of land within the jurisdictional boundaries of the Issuing Authority. However, the property owner is the only party who may obtain a permit.

#### B. APPLICATION REQUIREMENTS

1. No person shall conduct any land-disturbing activity within the jurisdictional boundaries of the City of Dahlonega without first obtaining a permit from the Building Inspection Department to perform such activity.

2. The application for a permit shall be submitted to the City of Dahlonega Building Inspection Department and must include the applicant's erosion and sedimentation control plan with supporting data, as necessary. Said plans shall include, as a minimum, the data specified in Section V C. of this ordinance. Soil erosion and sedimentation control plans shall conform to the provisions of Section IV B. & C. of this ordinance. Applications for a permit will not be accepted unless accompanied by three (3) copies of the applicant's soil erosion and sedimentation control plans.

3. A minimum fee in the amount of \$100.00 shall be charged for the project area up to 20 acres. An additional fee of \$5.00 per acre shall be charged for every acre above the first 20 acres.

4. Immediately upon receipt of an application and plan for a permit, the Issuing Authority shall refer the application and plan to the District for its review and approval or disapproval concerning the adequacy of the erosion and sedimentation control plan. The results of the District review shall be forwarded to the Issuing Authority. No permit will be issued unless the plan has been approved by the District, and any variances required by Section IV C. 15. & 16. and bonding, if required as per Section V B.5. (b), have been obtained. Such review will not be required if the Issuing Authority and the District have entered into an agreement which allows the Issuing Authority to conduct such review and approval of the plan without referring the application and plan to the District.

5. (a) If a permit applicant has had two or more violations of previous permits, this ordinance section, or the Erosion and Sedimentation Act, as amended, within three years prior to the date of filing of the application under consideration, the Issuing Authority may deny the permit application.

(b) The Issuing Authority may require the permit applicant to post a bond in the form of government security, cash, irrevocable letter of credit, or any combination thereof up to, but not exceeding, \$3,000.00 per acre or fraction thereof of the proposed land disturbing activity, prior to issuing the permit. If the applicant does not comply with this ordinance or with the conditions of the permit after issuance, the Issuing Authority may call the bond or any part thereof to be forfeited and may

use the proceeds to hire a contractor to stabilize the site of the land-disturbing activity and bring it into compliance. These provisions shall not apply unless there is in effect an ordinance or statute specifically providing for hearing and judicial review of any determination or order of the Issuing Authority with respect to alleged permit violations.

### C. PLAN REQUIREMENTS

1. Plans must be prepared to meet the minimum requirements as contained in Section IV B. & C. of this ordinance. Conformance with the minimum requirements may be attained through the use of design criteria in the current issue-of the Manual for Erosion and Sediment Control in Georgia, published by the State Soil and Water Conservation Commission as a guide; or through the use of more stringent, alternate design criteria which conform to sound conservation and engineering practices. The Manual for Erosion and Sediment Control in Georgia is hereby incorporated by reference into this ordinance. The plan for the land-disturbing activity shall consider the interrelationship of the soil types, geological and hydrological characteristics, topography, watershed, vegetation, proposed permanent structures including roadways, constructed waterways, sediment control and storm water management facilities, local ordinances and State laws.

#### 2. Data Required for Site Plan:

- (a) Narrative or notes, and other information: Notes or narrative to be located on the site plan in general notes or in erosion and sediment control notes.
- (b) Description of existing land use at project site and description of proposed project.
- (c) Name, address, and phone number of the property owner.
- (d) Name and phone number of 24hour local contact who is responsible for erosion and sedimentation controls.
- (e) Size of project, or phase under construction, in acres.
- (f) Activity schedule showing anticipated starting and completion dates for the project. Include the statement in bold letters, that “the installation of erosion and sedimentation control measures and practices shall occur prior to or concurrent with land-disturbing activities.”
- (g) Stormwater and sedimentation management systems-storage capacity, hydrologic study, and calculations, including off-site drainage areas.
- (h) Vegetative plan for all temporary and permanent vegetative measures, including species, planting dates, and seeding, fertilizer, lime, and mulching rates. The vegetative plan should show options for year-round seeding.
- (i) Detail drawings for all structural practices. Specifications may follow guidelines set forth in the Manual for Erosion and Sediment Control in Georgia.
- (j) Maintenance statement - “Erosion and sedimentation control measures will be maintained at all times. Additional erosion and sedimentation control measures

and practices will be installed if deemed necessary by onsite inspection.”

3. Maps, drawings, and supportive computations shall bear the signature/seal of a registered or certified professional in engineering, architecture, landscape architecture, land surveying, or erosion and sedimentation control. The certified plans shall contain:

- (a) Graphic scale and north point or arrow indicating magnetic north.
- (b) Vicinity maps showing location of project and existing streets.
- (c) Boundary line survey.
- (d) Delineation of disturbed areas within project boundary.
- (e) Existing and planned contours, with an interval in accordance with the following:

<b>Map Scale</b>	<b>Ground Slope</b>	<b>Contour Interval, ft.</b>
1 inch = 100 ft. or larger scale	Flat 0-2% Rolling 2-8% Steep 8%+	0.5 or 1 1 or 2 2, 5 or 10

- (f) Adjacent areas and features areas such as streams, lakes, residential areas, etc. which might be affected should be indicated on the plan.
- (g) Proposed structures or additions to existing structures and paved areas.
- (h) Delineate the 25-foot horizontal buffer adjacent to state waters and the specified width in MRPA areas.
- (i) Delineate the specified horizontal buffer along designated trout streams, where applicable.
- (j) Location of erosion and sedimentation control measures and practices using coding symbols from the Manual for Erosion and Sediment Control in Georgia, Chapter 6.

4. Maintenance of all soil erosion and sedimentation control practices, whether temporary or permanent, shall be at all times the responsibility of the property owner.

#### D. PERMITS

1. Permits shall be issued or denied as soon as practicable but in any event not later than forty-five (45) days after receipt by the Issuing Authority of a completed application, providing variances and bonding are obtained, where necessary.

2. No permit shall be issued by the Issuing Authority unless the erosion and sedimentation control plan has been approved by the District and the Issuing Authority has affirmatively determined that the plan is in compliance with this ordinance, any variances required by Section IV

C. 15. & 16. are obtained, bonding requirements, if necessary, as per Section V B. 5. (b) are met and all ordinances and rules and regulations in effect within the jurisdictional boundaries of the Issuing Authority are met. If the permit is denied, the reason for denial shall be furnished to the applicant.

3. If the tract is to be developed in phases, then a separate permit shall be required for each phase.

4. The permit may be suspended, revoked, or modified by the Issuing Authority, as to all or any portion of the land affected by the plan, upon finding that the holder or his successor in the title is not in compliance with the approved erosion and sedimentation control plan or that the holder or his successor in title is in violation of this ordinance. A holder of a permit shall notify any successor in title to him as to all or any portion of the land affected by the approved plan of the conditions contained in the permit.

5. No permit shall be issued unless the applicant provides a statement by the Lumpkin County Tax Commissioner certifying that all ad valorem taxes levied against the property and due and owing have been paid.

## **SECTION VI INSPECTION AND ENFORCEMENT**

A. The City of Dahlonega Building Inspection Department will periodically inspect the sites of land-disturbing activities for which permits have been issued to determine if the activities are being conducted in accordance with the plan and if the measures required in the plan are effective in controlling erosion and sedimentation. If, through inspection, it is deemed that a person engaged in land disturbing activities as defined herein has failed to comply with the approved plan, with permit conditions, or with the provisions of this ordinance, a written notice to comply shall be served upon that person. The notice shall set forth the measures necessary to achieve compliance and shall state the time within which such measures must be completed. If the person engaged in the land-disturbing activity fails to comply within the time specified, he shall be deemed in violation of this ordinance.

B. The City of Dahlonega Building Inspection Department shall have the power to conduct such investigations as it may reasonably deem necessary to carry out duties as prescribed in this ordinance, and for this purpose to enter at reasonable times upon any property, public or private, for the purpose of investigation and inspecting the sites of land-disturbing activities.

C. No person shall refuse entry or access to any authorized representative or agent of the Issuing Authority, the Commission, the District, or Division who requests entry for the purposes of inspection, and who presents appropriate credentials, nor shall any person obstruct, hamper or interfere with any such representative while in the process of carrying out his official duties.

D. The Districts or the Commission or both shall periodically review the actions of counties and municipalities which have been certified as Issuing Authorities pursuant to O.C.G.A. 12-7-8 (a). The Districts or the Commission or both may provide technical assistance to any county or municipality for the purpose of improving the effectiveness of the county's or municipality's erosion and sedimentation control program. The Districts or the Commission shall notify the Division and request investigation by the Division if any deficient or ineffective local program is found.

E. The Division may periodically review the actions of counties and municipalities which

have been certified as Issuing Authorities pursuant to Code Section 12-7-8 (a). Such review may include, but shall not be limited to, review of the administration and enforcement of a governing authority's ordinance and review of conformance with an agreement, if any, between the district and the governing authority. If such review indicates that the governing authority of any county or municipality certified pursuant to O.C.G.A. 12-7-8(a) has not administered or enforced its ordinances or has not conducted the program in accordance with any agreement entered into pursuant to O.C.G.A. 12-7-7 (d), the Division shall notify the governing authority of the county or municipality in writing. The governing authority of any county or municipality so notified shall have 30 days within which to take the necessary corrective action to retain certification as an Issuing Authority. If the county or municipality does not take necessary corrective action within 30 days after notification by the division, the division may revoke the certification of the county or municipality as an Issuing Authority.

## **SECTION VII PENALTIES AND INCENTIVES**

### **A. FAILURE TO OBTAIN A PERMIT FOR LAND-DISTURBING ACTIVITY**

If any person commences any land-disturbing activity requiring a land-disturbing permit as prescribed in this ordinance without first obtaining said permit, the person shall be subject to revocation of his business license, work permit or other authorization for the conduct of a business and associated work activities within the jurisdictional boundaries of the Issuing Authority.

### **B. STOP-WORK ORDERS**

1. For the first and second violations of the provisions of this ordinance, the Director or the Issuing Authority shall issue a written warning to the violator. The violator shall have five days to correct the violation. If the violation is not corrected within five days, the Director or the Issuing Authority shall issue a stop-work order requiring that land-disturbing activities be stopped until necessary corrective action or mitigation has occurred; provided, however, that, if the violation presents an imminent threat to public health or waters of the state or if the land-disturbing activities are conducted without obtaining the necessary permit, the Director or Issuing Authority shall issue an immediate stop-work order in lieu of a warning;

2. For a third and each subsequent violation, the Director or Issuing Authority shall issue an immediate stop-work order; and;

3. All stop-work orders shall be effective immediately upon issuance and shall be in effect until the necessary corrective action or mitigation has occurred.

### **C. BOND FORFEITURE**

If, through inspection, it is determined that a person engaged in land-disturbing activities has failed to comply with the approved plan, a written notice to comply shall be served upon that person. The notice shall set forth the measures necessary to achieve compliance with the plan and shall state the time within which such measures must be completed. If the person engaged in the land-disturbing activity fails to comply within the time specified, he shall be deemed in violation of this ordinance and, in addition to other penalties, shall be deemed to have forfeited his performance bond, if required to post one under the provisions of Section V B. 5. (b). The Issuing Authority may call the bond or any part thereof to be forfeited and may use the proceeds to hire a contractor to stabilize the site of the land-disturbing activity and bring it into compliance.

## D. MONETARY PENALTIES

1. Except as provided in paragraph (2) of this subsection, any person who violates any provisions of this ordinance, the rules and regulations adopted pursuant hereto, or any permit condition or limitation established pursuant to this ordinance or who negligently or intentionally fails or refuses to comply with any final or emergency order of the Director issued as provided in this ordinance shall be liable for a civil penalty not to exceed \$2,500.00 per day. For the purpose of enforcing the provisions of this ordinance, notwithstanding any provisions in any City charter to the contrary, municipal courts shall be authorized to impose penalty not to exceed \$2,500.00 for each violation. Notwithstanding any limitation of law as to penalties which can be assessed for violations of county ordinances, any magistrate court or any other court of competent jurisdiction trying cases brought as violations of this ordinance under county ordinances approved under this ordinance shall be authorized to impose penalties for such violations not to exceed \$2,500.00 for each violation. Each day during which violation or failure or refusal to comply continues shall be a separate violation.

2. The following penalties shall apply to land-disturbing activities performed in violation of any provision of this ordinance, any rules and regulations adopted pursuant hereto, or any permit condition or limitation established pursuant to this ordinance;

- (A) There shall be a minimum penalty of \$250.00 per day for each violation involving the construction of a single-family dwelling by or under contract with the owner for his or her own occupancy; and;
- (B) There shall be a minimum penalty of \$1,000.00 per day for each violation involving land-disturbing activities other than as provided in subsection (A) of this paragraph.

## **SECTION VIII ADMINISTRATIVE APPEAL JUDICIAL REVIEW**

### **A. ADMINISTRATIVE REMEDIES**

The suspension, revocation, modification or grant with condition of a permit by the Issuing Authority upon finding that the holder is not in compliance with the approved erosion and sediment control plan; or that the holder is in violation of permit conditions; or that the holder is in violation of any ordinance; shall entitle the person submitting the plan or holding the permit to a hearing before the City Council of Dahlonega within twenty (20) days after receipt by the Issuing Authority of written notice of appeal.

### **B. JUDICIAL REVIEW**

Any person, aggrieved by a decision or order of the Issuing Authority, after exhausting his administrative remedies, shall have the right to appeal to move to the Superior Court of Lumpkin County.

## **SECTION IX EFFECTIVITY, VALIDITY AND LIABILITY**

### **A. EFFECTIVITY**

This ordinance shall become effective on the 4<sup>th</sup> day of December, 2000.

#### B. VALIDITY

If any section, paragraph, clause, phrase, or provision of this ordinance shall be adjudged invalid or held unconstitutional, such decisions shall not effect the remaining portions of this ordinance.

#### C. LIABILITY

1. Neither the approval of a plan under the provisions of this ordinance, nor the compliance with provisions of this ordinance shall relieve any person from the responsibility for damage to any person or property otherwise imposed by law nor impose any liability upon the Issuing Authority or District for damage to any person or property.

2. The fact that a land-disturbing activity for which a permit has been issued results in injury to the property of another shall neither constitute proof of nor create a presumption of a violation of the standards provided for in this ordinance or the terms of the permit.

3. No provision of this ordinance shall permit any persons to violate the Georgia Erosion and Sedimentation Act of 1975, the Georgia Water Quality Control Act or the rules and regulations promulgated and approved thereunder or pollute any Waters of the State as defined thereby.

ORDAINED THIS 4<sup>th</sup> DAY OF December, 2000, BY THE MAYOR AND COUNCIL OF THE CITY OF DAHLONEGA.

Thomas C. Davis  
Mayor

ATTEST:  
Janet Jarrard, City Clerk

STANDARD SPECIFICATIONS - DAHLONEGA, GA

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# STANDARD SPECIFICATIONS, DAHLONEGA, GA

## SECTION 02112- ROUTE CLEARING

### PART 1- GENERAL

#### DESCRIPTION OF WORK:

The extent of route clearing is that minimum degree of clearing necessary to install utilities and appurtenances, and such additional clearing as may be shown on the drawings or required by other documents..

Route clearing operations include, but are not limited to, the following:

- Protecting existing trees and other vegetation.
- Removing trees and other vegetation.
- Clearing.
- Removing above-grade improvements.
- Removing underground improvements.
- Restoring damaged improvements.
- Protecting above-grade and underground improvements.

#### JOB CONDITIONS:

##### Protection of Existing Improvements:

Provide barricades, coverings, or other types of protection necessary to prevent unnecessary damage to existing improvements.

Protect improvements on adjoining properties as well as those along the project route. Restore improvements damaged by this work to their original condition, as acceptable to the owners or other parties or authorities having jurisdiction. Have property line monuments (such as iron pins) removed or disturbed by clearing operations, replaced by a Georgia registered land surveyor.

Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip lines, excess foot or vehicular traffic, or parking of vehicles or equipment within drip line. Provide temporary fences, barricades or guards as required to protect trees and vegetation to be left standing.

## STANDARD SPECIFICATIONS, DAHLONEGA, GA

Provide protection for ornamental tree roots over 1-112 inches diameter that are cut during any construction operation. Coat the cut faces with an emulsified asphalt, or other acceptable coating, especially formulated for horticultural use on cut or damaged plant tissues. Temporarily cover all exposed roots of ornamental trees with wet burlap to prevent roots from drying out; provide earth cover as soon as possible.

Repair or replace unnecessarily damaged trees and vegetation, as determined by the City, resulting from any construction operation, in a manner acceptable to the property owner and the City. Tree damage repair shall be performed by a qualified tree surgeon. Replace unnecessarily damaged trees which cannot be repaired and restored to full-growth status, as determined by the tree surgeon.

### Protection of Adjacent Property:

Protect improvements, trees and vegetation on adjoining property as well as those on property requiring route clearing work.

Execute work so as not to create a nuisance to persons utilizing adjacent property.

Use work methods and provide temporary facilities as necessary to prevent washing, erosion, siltation or dust damage, or hazard to persons and property, within and off the work area.

## PART 2- PRODUCTS

Not applicable to work of this section.

## PART 3- EXECUTION

### CLEARING:

Remove vegetation. trees, lawns, shrubbery, gardens and other plant growth to the minimum practicable extent. Limit clearing to a single lane work route without provision for construction vehicles to pass utility operation. Accurately determine limitations of construction easements or rights-of-way, and keep construction activity within such limits.

Remove lawn sod by cutting into maximum size which can be handled without tearing, stripping sod and underlying topsoil, and stockpiling for use in restoring the surface area. Water sod and otherwise maintain sod in viable, growing condition.

Remove above-grade structures only where specifically authorized.

Remove conflicting fences and provide effective temporary measures to prevent stock, cattle or other domestic animals from wandering to other lands. Reconstruct fences promptly.

Remove abandoned underground facilities such as utilities and structures, walls, footings, basements, wells, septic tanks, tanks, underground pipe, and other items which conflict with construction.

HOLES AND DEPRESSIONS:

Fill holes, depressions and voids created or exposed by clearing operations with non-organic soil material, unless further excavation or earthwork is indicated.

Place fill material in horizontal layers not exceeding six inches loose depth, and thoroughly compact to a density at least equal to adjacent original ground.

DISPOSAL OF WASTE MATERIALS:

Disposal General Requirements:

Accomplish disposal of cleared matter daily so as to maintain site in a safe and neat condition throughout the construction period.

Burning of cleared materials on the work site is only allowed when authorized and permitted by the Fire Chief.

On-Site Disposal:

Unless property owner requests complete removal, cut tree trunks and limbs, over two inches in diameter, into 24 inch lengths and neatly stack within work limits having the same property ownership as that on which the tree originally grew.

On undeveloped property, distribute brush, trees and limbs less than two inches in diameter, within the work area from which cut, in such a way as not to be objectionable to the property owner. On developed property, remove all such clearing waste and legally dispose of it.

END SECTION 02112

STANDARD SPECIFICATIONS-DAHLONEGA, GA

SECTION 02204 - TRENCHING AND BACKFILLING

PART I - GENERAL

DESCRIPTION OF WORK:

Trenching and backfilling operations include, but are not limited to, all earthwork associated with installation, modification, or abandonment of underground utilities and appurtenances, and restoration of damaged improvements and disturbed surfaces.

Related work specified elsewhere includes, but is not limited to, the following:

Route Clearing, Section 02112

Sampling and Testing:

Provide quality control testing during construction as necessary to assure the entire earthwork including all fill layers, sub grades, and bases meets specified requirements. Remove and reconstruct, or otherwise correct work which falls below specified density or is outside other specified limits.

Employ, at Contractor's expense, an independent testing laboratory to perform quality control testing during trenching and backfilling operations.

The City may perform sampling, surveying, inspection or testing activity during construction for its use, but such activity does not relieve the Contractor from responsibility to achieve specified results.

SUBMITTALS:

Quality Control Testing Reports: After completing utility earthwork construction and prior to acceptance by the City, the Contractor must file a copy of the quality control test results demonstrating compliance with these specifications with the City. At any time during the construction process, representatives of the City may request to review and the Contractor shall provide quality control test results.

SITE INFORMATION:

Verify existing site grades to be substantially consistent with grades shown on the drawings before commencing work. Report any significant conflict in grades to the design engineer before proceeding.

Subsurface conditions presented, if any, are not intended as representations or warrants of continuity of such conditions between soil borings or pits. It is expressly understood that the Contractor is solely responsible for interpretations or conclusions drawn there from. Data are made available for the convenience of the Contractor who may, without cost to the City, perform additional test borings and other exploratory operations, provided such operations are acceptable to the City.

## STANDARD SPECIFICATIONS-DAHLONEGA,GA

Existing Utilities: Locate all existing underground utilities in the areas of work including verification of nature and exact location of any utility indicated on drawings. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

Should unexpected piping or other utilities be encountered during excavation, consult the utility owner immediately for directions. Cooperate with City and other utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

Do not interrupt utilities serving existing facilities except when permitted in writing by City and then only within time periods acceptable to the City.

Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

Traffic Control: Schedule and conduct Work in a manner which will minimize inconvenience to vehicular and pedestrian traffic. Provide flaggers, barricades, warning signs, warning lights, and other warning means as appropriate. Flaggers, when utilized, must hold a valid Georgia D.O.T. flagging certificate. Maintain traffic on all roads and streets which must be crossed by trenching and making two separate cuts so that at least one traffic lane is open at all times. All traffic controls during construction must conform to Part VI of the Manual on Uniform Traffic Control Devices, ANSI D6.1e.

### PART 2- PRODUCTS

#### RIP RAP STABILIZATION:

##### Soil-Cement Bag Rip-Rap:

Cement: ASTM C 150 Portland Cement, Type I or II.

Soil: Select site excavation material of finely selected earth, stone dust, sand or similar material.

Bags: Cotton or burlap, capable of containing the soil-cement mixture without leakage during handling and placing. Do not use bags which have previously been used for sugar, or other material which will adversely affect the soil-cement mixture. Provide bags with a capacity between one cubic foot minimum and two cubic feet maximum.

Stone Rip-Rap: Individual stones not less than 6 inches thick nor 12 inches wide, not more than 2 cubic feet in volume and of proper shape to bring structures to accurate lines, shapes and elevations. Provide stone free of rounded, or worn surfaces and also free of segregation, seams, cracks, pyrite intrusions and other defects tending to reduce weather resistance.

## STANDARD SPECIFICATIONS -DAHLONEGA, GA

### PART 3- EXECUTION

#### PROTECTION OF PERSONS AND PROPERTY:

Prior to commencing other work, accurately locate above and below ground utilities and structures which may be affected by the Work, using whatever means be appropriate. Mark the location of existing utilities and structures, not otherwise readily visible, with flagging, stakes, barricades, or other suitable means.

Barricade open excavations and post warning lights for safety of persons. Operate warning lights during hours from dusk to dawn each day.

Protect structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations, from damage caused by settlement, lateral movement, undermining, washout and other hazards.

Take precautions and provide necessary bracing and shoring to guard against movement or settlement of existing improvements or new construction. Contractor is entirely responsible for strength and adequacy of bracing and shoring, and for safety and support of construction from damage or injury caused by the lack thereof or by movement or settlement.

Use work methods and provide temporary facilities as necessary to prevent washing, erosion, siltation or dust damage, or hazard to persons and property, within and outside the work area.

Place excavated material compactly alongside of the trench, and keep such material trimmed up so as to present the least practicable inconvenience to the public. Where necessitated by traffic conditions, remove from the roadway the first material excavated from a working length of trench so that further excavation is immediately used for backfilling, and thereby avoid stockpiling of material upon the roadway. Afterward, return first excavated material if needed for final backfilling.

Maintain all streets, alleys, sidewalks, pipe crossings, fire hydrants, water and gas valves, and other utilities accessible for their intended use except while the work is steadily advancing in the immediate vicinity of each such facility.

Keep every drain, gutter, culvert, sewer, and surface drainage route encountered, open for both temporary and permanent flow unless other effective provision for drainage is made.

Do not permit any hazardous condition to result from trenching and backfilling operations.

#### USE OF EXPLOSIVES:

Do not bring explosives onto site or use in work without prior written permission from authorities having jurisdiction.

Use explosives only as legally permitted and when other work methods are impractical.

Do not permit explosives on the project site other than during the least practicable use period.

Assume sole responsibility for handling, storage, and use of any explosive materials.

#### TRENCHING:

Trenching consists of removal and disposal of material encountered to obtain required subgrade

## STANDARD SPECIFICATIONS -DAHLONEGA, GA

elevations, usually, but not necessarily limited to that incidental to installation or modification of underground pipelines and appurtenances.

Unauthorized trenching consists of removal of materials beyond indicated subgrade elevations or dimensions without specific authorization of the City.

Rock excavation consists of removal and disposal of natural material encountered that cannot be excavated without continuous and systematic drilling and blasting or continuous use of a ripper or other special equipment. Intermittent drilling or blasting performed to increase production and unnecessary for excavation of material encountered will not be classified as rock excavation.

Stability of Excavation: Slope sides of excavations to comply with Subpart P of Part 1926 of the Occupational Safety and Health Act as amended. Shore and brace or use trench box where sloping is not possible either because of space restrictions or stability of material excavated.

Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

Shoring and Bracing: Provide portable trench boxes and materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.

Maintain shoring and bracing and/or portable trench boxes in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

Provide trench boxes and/or shoring and bracing to comply with Subpart P of Part 1926 of the Occupational Safety and Health Act as amended.

Dewatering: Perform earthwork in a manner to prevent surface water and minimize subsurface or ground water from flowing into excavations, and to prevent water from flooding project work and surrounding area.

Do not allow water to accumulate in excavations. Remove water using dewatering methods which will prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

Limit opening of additional trench length to that which can be dewatered with available equipment or methods.

Do not use trench as temporary drainage ditch.

Material Storage: Locate and retain materials away from edge of trench.

Dispose of excess soil material and waste materials, such as unsatisfactory excavated soil material, trash and debris, as specified hereinafter.

Excavating: Do not extend excavation below or wider than that which is necessary to construct work except as otherwise provided herein. Repair any unauthorized trenching as necessary to obtain an adequate subgrade.

## STANDARD SPECIFICATIONS -DAHLONEGA, GA

Limit open trench excavation to a maximum of 300 feet ahead of completed backfill.

Where specific utility system elevations or depths are indicated on the Drawings or elsewhere herein, accurately conform with such requirements. Otherwise, achieve a minimum earth and/or pavement cover of 30 inches above top of underground utilities being constructed unless a greater cover is made necessary by easement or permit requirement, by maintaining a minimum clearance of 18 inches below any existing or proposed structure or channel, or by achieving proper alignment with existing or proposed facilities.

Maintain a horizontal separation of at least 10 feet between sanitary sewers and any existing or proposed water main. A sewer may be laid closer than 10 feet to a water main if it is laid in a separate trench.

Maintain a vertical separation of at least 18 inches between the crown of sanitary sewers and the invert of existing or proposed water mains with the sewer located below the water main. Where a vertical separation of 18 inches cannot be provided and the water main cannot be relocated to provide adequate clearance, center one full length of water main over the sewer so that both joints of the water main will be as far from the sewer as possible.

Confine trench width from an elevation of one foot above top of underground pipe to the trench bottom, to that minimum which is necessary to pipe laying operations, but do not exceed maximum trench width determined by pipe foundation requirements.

Remove rock, masonry and concrete material to a distance of at least six inches from all parts of pipe and appurtenances being installed. Backfill and thoroughly compact to proper trench bottom elevation with select excavated material.

Do not mix excavated rock, masonry or concrete with backfill material placed within two feet of installed pipe, or within one foot of finished grade.

Pavement Removal: Remove all pavement, including curb and gutter, sidewalk and the like, which must be disturbed by trenching operations.

Saw cut edges of bituminous pavement. For concrete pavement, saw cut edges or remove and replace to nearest joint.

At sidewalks, curbs and gutters, and the like, remove entire width of damaged sections.

Extend pavement removal to the width required to accomplish trenching operations without damage to edge of remaining pavement. Correct any edge damage which occurs as requested by the City.

Removal of Unsatisfactory Soil Materials: To the extent necessary, over-excavate those soil materials which are unsatisfactory in the opinion of the City and backfill with approved materials.

### COMPACTION:

General: Control soil compaction during construction providing minimum percentage of density specified for each area classification.

Percentage of Maximum Density Requirements: Achieve not less than the following percentages of maximum density of soil material compacted at optimum moisture content, for each layer of soil material-in-place as determined by ASTM D 698 (Standard Proctor) test procedures:

## STANDARD SPECIFICATIONS-DAHLONEGA, GA

Rights-of-Way: Conform with the more stringent requirements of the permit issuing authority and the requirements herein.

Roadways: Under and within five feet horizontal distance of traffic using surfaces, compact each layer of backfill and fill material to 95 percent of maximum dry density.

Walkways: Under and within two feet horizontal distance of paved walks, compact top six inches of subgrade and each layer of backfill and fill material to 95 percent of maximum dry density.

Driveways and Parking Lots: Under and within two feet horizontal distance of traffic using surfaces, compact each layer of backfill and fill material to 95 percent of maximum dry density.

Lawn or Unpaved Areas: Compact each layer of backfill or fill material to 85 percent of maximum dry density.

Spoil Areas: Compact each layer of backfill or fill material to 85 percent of maximum dry density.

Moisture Control: Where a layer of soil material is too dry to achieve required compaction, uniformly apply water to layer as necessary to bring moisture within limits which permit compaction to at least the specified densities.

Remove, dry and replace, or scarify and air dry in place, soil material that is too wet to achieve required compaction.

### BACKFILL AND FILL:

General: Place acceptable soil material in uniform layers, to required elevations. Backfill excavations as promptly as work permits.

Backfill and Fill Materials: Use acceptable trench excavated soil material, free of stumps, trees, roots, muck, trash and other objectionable matter.

Placement and Compaction: Place backfill and fill materials in layers not more than eight inches in loose depth. Before compaction, moisten or aerate each layer as necessary to provide the proper moisture content. Compact each layer to not less than the required percentage of maximum density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

Commence backfill and fill operations close behind utility laying operations. Take care to prevent wedging action of backfill or fill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.

### GRADING:

General: Uniformly grade areas within limits of earthwork, including adjacent transition areas. Smooth and compact finished surface within specified tolerances, with uniform levels or slopes between points where elevations are shown, or between such points and existing grades, or between existing grades.

## STANDARD SPECIFICATIONS-DAHLONEGA, GA

Grading Outside Structures: Grade finished areas adjacent to structures to drain away from structures (except drainage inlets), and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:

Grassed or Landscaped Areas: Finish areas to within not more than 0.10 feet above or below the required elevations.

Walks and Pavements: Shape surface of areas under walks and pavements to line, grade and cross-section, with finish surface not more than 1/2 inch above or below the required subgrade elevation.

Compaction: After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

## STANDARD SPECIFICATIONS-DAHLONEGA, GA

### RIP RAP SURFACE STABILIZATION:

#### General:

Prior to placing rip rap, bring ground surface to correct line and grades. At Contractor's option, provide either soil cement bag rip rap or stone rip rap at all stream crossings, and/or at locations indicated on Drawings or requested by the City.

#### Soil Cement Bag Rip Rap:

Proportion select pipe line excavation material and cement in the ratio of 5:1 by volume. Uniformly fill bags to maximum capacity which will permit satisfactory tying, and which produces an in-place thickness of 6 inches. Place bagged rip rap by hand with the tied joint ends facing the same direction with close staggered joints.

When rip rap is placed above water level, do not add water to mix until bags have been finally placed. Then lightly sprinkle bags with water using methods which moisten soil-cement through its entire depth without causing washes or permitting bagged material to become fluid. Use minimum water necessary to moisten mix.

When rip rap is placed below water, temporarily place bagged mix above water level and moisten as outlined above. Use care in uniformly shaping bagged mixture to approximately rectangular cross section before adding water. After moistened bagged mixture has set up sufficiently to be handled without cracking, but not less than 7 days, the rip rap may be placed in its final position. Where bagged mix can be placed below water without danger of contents being washed out of bags, bags may be placed under water in the same manner as specified for placing above water.

When placing rip rap above water level, ram and pack bags against one another to produce the required thickness and form a consolidated mass. When placing rip rap below water, carefully handle bags so as not to crack the soil-cement. Place bags neatly and so that finished rip rap units are free of tendency to slip out of position. Place all rip rap so that no more than 3 inches variation exists above or below the required plane.

#### Stone Rip Rap:

Hand place stone rip rap into final position to form a compact layer not less than 6 inches in-place thickness. Use well graded stone sizes to eliminate void spaces between stones.

Place stones neatly and anchor units to be free of tendency to slip out of position. Place rip rap so that no more than 3 inches variation exists above or below the required plane.

### MAINTENANCE:

Protection of Graded Areas: Protect newly graded areas from traffic and erosion, and keep free of trash and debris.

Repair and re-establish grades in settled, eroded, and rutted areas to specified compaction and tolerances.

Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction, adverse weather, traffic, or other cause, scarify surface, re-shape, and compact to required density prior to further construction.

## STANDARD SPECIFICATIONS-DAHLONEGA, GA

Maintain temporary erosion and sediment control measures until permanent measures become effective.

### DISPOSAL OF EXCESS AND WASTE MATERIALS:

Disposal of Excess Excavation: Transport excess excavated material, including unsatisfactory soil material, to any designated spoil areas, and spread as specified; otherwise remove from the project work area and legally dispose of such material which cannot be acceptably distributed within project work area.

Disposal of Waste Material: Remove trash, debris, and waste materials from the project work area and legally dispose of such material.

### RESTORATION:

Plan and execute total work so as to minimize damage to property. Restore all surface materials, shrubbery, fences, lawns, walls, structures and other improvements to a condition no less desirable than that which existed before construction operations began.

Conduct all construction operations such that upon completion of any part of the work, the contour and topography of the construction area has not been substantially altered. No alteration of previously established storm drainage patterns will be permitted unless such alteration can be proven to the City's satisfaction to improve the drainage pattern without adverse impact on affected property owners.

Where necessary to temporarily remove or damage improvements of any significance, take professional quality photographs of such improvements before disturbing them. Make copies of such photographs available to the City on request.

Restore work area and accomplish site cleanup immediately after backfilling and fill operations.

Replace property line monuments which were damaged, removed or disturbed by trenching and backfilling operations. Employ, at Contractor's expense, a Georgia registered land surveyor for all property line monument replacement.

END SECTION 02204

# STANDARD SPECIFICATIONS-DAHLONEGA, GA

## SECTION 02408 - TUNNELING

### PART I - GENERAL

#### DESCRIPTION OF WORK:

Tunneling pertains to the installation of carrier pipe or tunnel liner below ground by means other than open cut excavation.

Tunnel liner sizes indicated on the Drawings are minimum nominal diameters. Use appropriate size and type of tunnel liner and construction methods as necessary to provide a complete tunnel liner installation

#### Related Work Specified Elsewhere:

Route Clearing, Section 02112

Trenching and Backfilling, Section 02204

Storm Sewer System, Section 02770

### PART 2- PRODUCTS

#### CARRIER PIPE:

Where carrier pipe is installed without tunnel liner by tunneling methods, conform with carrier pipe material specifications unless otherwise indicated.

#### PIPE TUNNEL LINER:

Where tunnel liner is installed using jacking or boring construction methods, comply with the following material specifications for tunnel liner:

##### Steel Pipe Tunnel Liner

Steel Pipe Tunnel Liner. 4 Inches and Smaller Conform to ASTM A120 material specifications. Use galvanized steel, Schedule 40 minimum, with threaded couplings.

Steel Pipe Tunnel Liner. Larger Than 4 Inches: Conform to ASTM A53 or A139 material specifications, except hydrostatic testing is not required. Join pipe sections with full strength, continuous welds in accordance with procedures approved by the American Welding Society to obtain a watertight seal.

## STANDARD SPECIFICATIONS-DAHLONEGA, GA

Use pipe having not less than the following wall thicknesses:

Nominal Diameter	Minimum Wall Thickness
<u>Inches</u>	<u>Inches</u>
12 or Smaller	0.188
14-16	0.282
18	0.313
20	0.344
22	0.375
24	0.407
26	0.438
28-30	0.469
32	0.501
34-36	0.532
38-42	0.563

### Reinforced Concrete Pipe Tunnel Liner:

Conform to ASTM C76, Class V material specifications for withstanding in-place vertical loads. Provide additional reinforcement or strength required to withstand jacking pressure. Except for end closures, provide pipe in eight foot minimum lengths. Use self centering tongue and groove joints such that outside of tunnel liner is uniform in diameter at all locations. Seal pipe joints with butyl based sealant manufactured for that purpose.

### SECTIONAL PLATE TUNNEL LINER:

Where carrier pipe is installed in tunnel liner and mining methods are utilized, comply with the following specifications:

#### Materials:

Fabricate tunnel liner sections of corrugated steel plate especially manufactured for tunnel liner service. Design liner sections and fasteners in consideration of actual tunnel location. For liner plate design purposes, use soil, wheel, and surcharge loads of sufficient magnitude to insure a safe liner plate system in actual use conditions.

Provide tunnel liner plate having a minimum thickness of 0.179 inches and liner plate fasteners having a minimum diameter of 0.625 inches.

#### Fabrication:

General: Tunnel diameters shown on the Drawings are in terms of the required minimum clear inside diameter of the erected liner plate tunnel. Fabricate liner plate sections so as to allow complete installation from within the tunnel, and with alternate liner plate rings in the erected tunnel containing two threaded grout holes in the vicinity of the tunnel invert and two grout bleed holes in the vicinity of the tunnel crown.

## STANDARD SPECIFICATIONS-DAHLONEGA, GA

Galvanized Coating: After tunnel liner plate sections have been formed and punched, hot dip galvanize plate sections with at least a two ounce coating of spelter per square foot total for both sides. Galvanized liner plates must not be warped, and the spelter coating must be free from defects such as blisters, flux, abrasion, poor adhesion and uncoated spots.

Bituminous Coating: After galvanizing, fully coat both sides of liner plate sections with an asphaltic bituminous coating not less than 0.05 inch thick and conforming to AASHTO N 190 for bituminous protected corrugated metal pipe.

### PART 3- EXECUTION

#### INSPECTION:

Examine areas and conditions under which tunneling is to be done, and notify design engineer in writing, of conditions detrimental to proper and timely completion of Work.

#### GENERAL:

Carry out Work in a safe manner, taking all necessary precautions and measures necessary to maintain a stable construction system which does not weaken existing earth or structures nor cause settlement of the overpassing roadway or railway section.

When tunneling operations are carried out under railroad tracks, highways, streets, or any other existing thoroughfare, perform operations in such manner as not to interfere with nor in any way endanger the normal operation of such thoroughfares.

Complete all tunneling work at one particular location before starting work at another location.

#### EXCAVATION:

The following requirements are supplemental to Section 02204, Trenching and Backfilling, of these specifications.

When required, excavate suitable pits or trenches for tunneling operations. Provide all necessary bracing, sheeting and/or other temporary means to insure safety of persons and property. Comply with Subpart P of Part 1926 of the Occupational Safety and Health Act as amended.

Maintain excavation free from water, mud and debris which will interfere with an efficient tunneling operation. Neatly dry-excavate material of whatever nature encountered within the tunnel. Do not use sluicing or jetting excavation techniques.

Limit excavation to the minimum diameter required for tunnel liner installation.

Pressure grout all excessive voids which may develop about the tunnel liner exterior.

Promptly backfill all pits and trenches.

## STANDARD SPECIFICATIONS-DAHLONEGA, GA

### JACKING:

When installing tunnel liner by jacking method, use guide rails or other jacking frame structure to effectively maintain tunnel liner at proper line and grade. Force tunnel liner into place with suitable jacks which apply uniform pressure around the tunnel liner end section. Excavate at the lead end of the tunnel as the jacking operation progresses, but do not excavate more than six inches in front of tunnel liner. Reduce the two feet distance where material character results in excess loss of soil. Remove excavated material through the tunnel liner. Once jacking is begun, continue operation without interruption to prevent the pipe from becoming firmly set in the embankment.

Perform tunneling such that the final tunnel liner position is within the following limits:

Lateral Alignment: Within two percent of tunnel liner length.

Vertical Elevation: Within one percent of tunnel liner vertical grade, provided that the final grade of flow line is in the direction indicated on the Drawings.

### BORING:

Mechanically bore by use of a cutting head on a continuous auger. Install tunnel liner in hole by jacking or other suitable methods. Accomplish boring of hole and tunnel liner installation simultaneously. Do not permit boring to proceed more than one foot in front of tunnel liner.

At contractor's option and to minimize abandoned tunnel liner, conduct initial boring using a pilot hole approximately 2 inches in diameter for the entire installation length. Verify required line and grade and use pilot hole as the center line of the larger hole to be bored. If rock is encountered in pilot hole, withdraw equipment and relocate tunnel location. Conduct pilot hole installation in revised location and repeat procedure. No extra payment will be considered for installations that encounter rock and must be abandoned.

Perform tunneling such that the final tunnel liner position is within the following limits:

Lateral Alignment: Within two percent of tunnel liner length.

Vertical Elevation: Within one percent of tunnel liner vertical grade, provided that the final grade of flow line is in the direction indicated on the Drawings.

### MINING:

When installing tunnel liner by mining methods, handle, maintain, and install liner plate sections in such manner as to avoid damage to plates and surface coating thereon. Install liner plates immediately after excavated material is removed from the tunnel. Do not permit liner plate installation to fall more than 24 inches behind the tunnel working face. Do not leave more than 12 inches of unlined tunnel at the end of the day's operation.

Provide all necessary bracing bulkheads and/or shields required to insure safety of persons and property. Provide well braced, temporary bulkhead against excavation face during each cessation of work while the heading is within 20 feet of railroad tracks or roadway pavement.

Pressure grout voids between excavated tunnel bore and liner plate at least daily as tunnel excavation and liner plate installation proceeds. In addition, do not extend liner plate installation more than 10 feet

## STANDARD SPECIFICATIONS-DAHLONEGA, GA

without placing grout. Introduce grout through all grout holes in tunnel liner plate at or near tunnel invert, continue grouting until grout mixture bleeds through grout holes located at tunnel crown. Use grouting pressure sufficient to fill all voids.

Perform tunneling such that the final tunnel liner position is within 0.2 feet of specified position, both laterally and vertically.

### ABANDONMENT:

Should it become necessary to abandon a tunnel for any reason, pressure grout the abandoned hole to prevent damage to surrounding earth and structures. When the tunnel liner is retained, fill entire tunnel with grout and pressure grout any voids about the tunnel liner exterior.

### TUNNEL LOCATIONS:

Locate tunnels as indicated on the drawings or by City.

To facilitate construction, changes in tunnel location may be permitted. Proposed changes must be submitted by the Contractor. Changes in location must be acceptable to the City, and any utility company or public agency having jurisdiction over the location.

### END SEALS:

Seal ends of tunnel liner to prevent debris and moisture from entering the annular space between the carrier pipe and tunnel liner. For pipe tunnel liner, provide end seal consisting of flexible synthetic rubber boot conforming to ASTM C-923 or Link Seal penetration seal with insulating plastic plate, galvanized bolts and nuts, and EPDM rubber element manufactured by Thunderline Corporation.

END SECTION 02408

1 **SECTION 02504 - GRADED AGGREGATE BASE AND SUBBASE**  
2

3  
4 **PART I - GENERAL**  
5

6  
7 **RELATED DOCUMENTS:**  
8

9 Drawings and general provisions of the Contract, including General and Supplementary  
10 Conditions and Division- 1 Specification Sections, apply to this section.  
11

12  
13 **DESCRIPTION OF WORK:**  
14

15 The extent of graded aggregate base and subbase is shown on the Drawings.  
16

17 Graded aggregate base and subbase construction includes, but is not limited to, the furnishing  
18 and placing of graded aggregate base or subbase on prepared subgrade or subbase.  
19

20 Related work specified elsewhere includes Earthwork and Site Grading, Section 02200.  
21

22  
23 **QUALITY ASSURANCE:**  
24

25 **Submittals:**  
26

27 For information, and as necessary to show compliance with these specifications, submit  
28 producer's technical data for graded aggregate including laboratory test reports or notarized  
29 certificates and other data.  
30

31 **Sampling and Testing:**  
32

33 Provide quality control testing during construction as necessary to assure the entire base or  
34 subbase including all courses meets contract requirements. Remove and reconstruct, or  
35 otherwise correct work which falls below specified density or is outside other specified limits.  
36

37 Provide quality control testing by an approved testing laboratory during construction as  
38 necessary to assure the entire base or subbase including all courses meets contract  
39 requirements.

40 Remove and reconstruct, or otherwise correct work which falls below specified density or  
41 is Outside other specified limits.

42 Minimum quality control testin2 to be provided by the Contractor consists of the  
43 following:

44 Moisture-density relationship curve for graded aggregate to be used on project.  
45

STANDARD SPECIFICATIONS - DAHLONEGA, GA

1 One-in-place density test (ASTM D 1556 or other method approved by the Engineer) per  
2 1200 square yards of base or subbase.

3  
4 One thickness measurement normal to base or subbase surface per 1200 square yards of base  
5 or subbase.

6  
7 One surface tolerance measurement using a 15 foot straight edge per 250 square yards of  
8 base or subbase.

9  
10 Report test results in writing to the Engineer promptly (normally same day tests are made).

11  
12 The Engineer may perform sampling, surveying, inspection or testing activity during  
13 construction for his use, but such activity does not relieve the Contractor from his responsibility  
14 to achieve specified results.

15  
16 The Owner may perform compaction, surface tolerance and thickness check tests on graded  
17 aggregate work when the Contractor indicates such work meets contract requirements. If these  
18 tests demonstrate work fails to meet contract requirements, it is the Contractor's responsibility to  
19 determine the extent to which the deficiency is present, to correct the deficiency, and to  
20 demonstrate by tests made by an approved testing laboratory, compliance with contract  
21 provisions in the deficient area. Check testing activity by the Owner does not relieve the  
22 Contractor from his responsibility to achieve specified results. All costs of determining the extent  
23 to which a deficiency is present and of retesting to demonstrate compliance with specified results  
24 are to be assumed by the Contractor. The Owner will pay all other check testing costs.

25  
26  
27 PART 2- PRODUCTS

28  
29  
30 GRADED AGGREGATE:

31  
32 Hard, strong, durable particles or fragments of crushed stone of uniform quality, free from dirt  
33 and other detrimental matter.

34  
35 Not more than a 50 percent wear as determined by ASTM C131.

36  
37 Not more than a 15 percent weight loss when subjected to 5 alterations of the magnesium sulfate  
38 soundness test (ASTM C88).

39  
40 Gradation:

<u>Sieve</u>	Percent by Weight <u>Passing</u>
41	
42	
43	
44	
45	100
46	60-97

STANDARD SPECIFICATIONS-DAHLONEGA, GA

1	No. 10	25-45
2	No. 60	5-30
3	No. 200	0-15

4  
5 Material passing No. 10 sieve to have a sand equivalent not less than 20 as determined by ASTM  
6 D2419

7  
8  
9 GRADED AGGREGATE:

10  
11 Hard, strong, durable particles or fragments of crushed stone of uniform quality, free from dirt  
12 and other detrimental matter.

13  
14 Not more than a 65 percent wear as determined by ASTM C131.

15  
16 Not more than a 15 percent weight loss when subjected to 5 alterations of the magnesium sulfate  
17 soundness test (ASTM C88).

18  
19 Gradation:

20		
21		
22		Percent by Weight
23		<u>Sieve</u> <u>Passing</u>
24		
25	1 ½ in	100
26	¾ in	65-100
27	½ in	50-90
28	3/8 in	45-70
29	No. 4	35-55
30	No 30	17-38
31	No. 200	6-15

32 Material to have a liquid limit not exceeding 25 and a plasticity index not exceeding 6.

33  
34  
35 PART 3- EXECUTION

36  
37  
38 GENERAL: Assure that subgrade or subbase conforms to specified compaction, line and grade  
39 and thickness requirements before commencing graded aggregate construction.

40  
41 Responsibility for placing the specified graded material lies with the Contractor. Approval by the  
42 engineer of material, source of supply, etc. in no way relieves the Contractor of his responsibility  
43 of providing the specified graded aggregate material.

44  
45  
46 PLACING AND SPREADING:

STANDARD SPECIFICATIONS - DAHLONEGA, GA

1  
2 Place homogeneously and uniformly mixed graded aggregate on prepared subgrade or subbase.  
3  
4 Spread material to a uniform depth not exceeding the thickness indicated on the Drawings nor 6  
5 inches after compaction. Where graded aggregate base or subbase is indicated more than 6  
6 inches in thickness, construct base or subbase in two or more courses of approximately equal  
7 thickness.

8  
9  
10 COMPACTION:

11  
12 General: Control graded aggregate compaction during construction providing no less than  
13 Minimum percentage of density specified.

14  
15 Percentage of Maximum Density Requirement: Achieve not less than 100 percent of maximum  
16 dry density as determined by ASTM D 698 (Standard Proctor) for each course of material-in-  
17 place.

18  
19  
20 FINISHING:

21  
22 After compaction, shape surface to required line, grade, and cross section. Compact loosened  
23 Material until the surface is smooth, closely knit, free from cracks, conforming to required line,  
24 Grade and cross section.

25  
26 Obtain a finished surface with no variation from design requirements in excess of 1/4 inch when  
27 measured with a 15 foot straightedge.

28  
29 Maintain graded aggregate base or subbase in a smooth, true to grade, compacted condition until  
30 it is covered by other construction.

31  
32  
33 THICKNESS TOLERANCE:

34  
35 Achieve compacted thickness which is no more than 1/2 inch less than the required thickness at  
36 any point.

37  
38 Correct any area deficient by more than 1/2 inch by adding additional graded aggregate and  
39 rebuilding the base or subbase to the required thickness in accordance with this section.

40  
41 END OF SECTION 02504

42

# STANDARD SPECIFICATIONS-DAHLONEGA,GA

## SECTION 02482 - GRASSING

### PART I - GENERAL

#### RELATED DOCUMENTS:

The Drawings and general provisions of the contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work of this section.

#### DESCRIPTION OF WORK:

The extent of grassing consists of those areas which are disturbed by operations of the Contractor and are not covered over by improvements, except where specifically noted otherwise, together with any additional areas shown on the drawings or designated by the City.

Grassin2 operations include, but are not limited to, the following:

- Ground preparation
- Seeding
- Liming
- Fertilizing
- Mulching
- Watering
- Maintenance of grassed areas

#### QUALITY ASSURANCE:

Source Quality Control: Use grassing materials with certificates of inspection as required by governmental authorities. Comply with regulations governing grassing materials.

Specified work is minimum required, and any and all necessary materials and operations including reworking, must be performed to obtain specified results.

### PART 2- PRODUCTS

#### GRASS MATERIALS:

Grass Seed: Provide fresh, clean, new-crop seed complying with the tolerance for purity and germination established by the Official Seed Analysts of North America. Provide seed of the grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified below:

STANDARD SPECIFICATIONS-DAHLONEGA,

<u>Common Name</u>	<u>Sowing Rate-lbs. Per Acre</u>	<u>% By WT.</u>	<u>Min. % Germ.</u>	<u>Min. % Purity</u>	<u>Max. % Weed Seed</u>
Bermuda Grass, Common	8		70	90	2

SOIL AMENDMENTS:

Lime: Natural limestone containing not less than 85 percent of total carbonates, ground so that not less than 90 percent passes a 10-mesh sieve and not less than 25 percent passes a 100-mesh sieve.

Fertilizer: Standard commercial grade fertilizer conforming to the standards of the Association of Official Agricultural Chemists. Provide either grade 4-12-12, 6-12-12 or 5-10-15 at Contractor's option.

Nitrogen: Standard commercial grade nitrogen conforming to state fertilizer laws. Provide in either granular or liquid form at Contractor's option.

WATER:

Water used to produce grass is to be free of excess and harmful chemicals, acids, alkalies and all other substances which are harmful to plant growth.

MULCH:

Wood Cellulose Fiber Mulch: Green colored wood cellulose fiber containing no germination or growth inhibiting ingredients, and suitable for uniform application by hydraulic mulching equipment. Mulch material to have the following packaged properties:

<u>Property</u>	<u>Nominal Value</u>
Percent Moisture Content	9.0% ± 3.0%
Percent Organic Matter (Oven Dried Basis)	99.2% ± 8.8%
Percent Ash Content	08% ± 02%
pH	4.8% ± 0.5%
Water Holding Capacity (g/1000g)	1150 Minimum

Natural Mulch: At Contractor's option, either threshed rye, oat or wheat straw or Bermuda grass hay free of noxious weed seeds.

Asphalt: Homogeneous emulsified asphalt meeting ASTM D 977 which contains no agents harmful or toxic to plant growth.

PART 3- EXECUTION

## STANDARD SPECIFICATIONS-DAHLONEGA, GA

### GENERAL:

Minimum Operations: These Specifications set forth minimum operations and material applications which are acceptable. However, a satisfactory stand of grass must be obtained by using supplemental methods and/or materials as may be required.

Grassing By Private Property: Where grassing is required between curbs and sidewalks or behind sidewalks in areas adjacent to private residential or commercial property, the City may change the type of grassing required to match any type of grass which may be planted and growing on the adjacent lawn.

### Ground Preparation:

Plow area to be grassed to a depth of not less than 4 inches. After plowing disk and harrow area until soil is well pulverized to a depth of at least 4 inches. Completed surface must be smooth, uniform, loose and free of large clods, boulders, stumps, large roots, debris and other similar undesirable matter.

### Lime and Fertilizer Application:

Spread lime uniformly over the ground surface at the following rate: 1000 pounds per acre

Spread fertilizer uniformly over the ground surface at the following rate: 1000 pounds per acre

Once lime and fertilizer are placed, blend into top 4 inches of soil with suitable harrows, rotary tillers or other appropriate equipment. Restore surface areas to line and grade.

### SEEDING:

Sowing: Sow seed within 24 hours following completion of placing lime and fertilizer using mechanical equipment that produces uniform application of seed. Once seed is sown, roll seeded areas before placing mulch. Sow seed only when weather conditions permit uniform distribution of seed and ground is not frozen, wet or otherwise non-tillable.

### MULCHING:

Mulch all grassed areas using either wood cellulose fiber mulch or natural mulch with bituminous treatment at the following rates:

Wood Cellulose Fiber Mulch: 1500 pounds per acre.

Natural Mulch-Bituminous Treated: 3/4 inch to 1 1/2 inch deep over entire area with sufficient asphalt material to hold mulch in place.

Apply mulch only when weather conditions will permit uniform distribution of mulch.

Exercise care at all times to protect the public, adjacent property, bridges, pavements, curbs, sidewalks and all other structures.

## STANDARD SPECIFICATIONS-DAHLONEGA, GA

Remove any mulch placed on facilities or areas other than areas authorized for grassing.

### APPLICATION OF NITROGEN:

Make two applications of nitrogen to all grassed areas using mechanical spreading equipment. Apply at a uniform rate of not less than 70 pounds per acre per application. Make both applications only when weather conditions will permit uniform and even distribution and when moisture conditions will not cause harm to grass.

Place first application of nitrogen when young grass reaches a height of at least one inch. Make the second application of nitrogen between 30 and 45 days after the first application.

### WATER:

Water grassed areas as required to obtain specified grass coverage.

### REQUIRED COVERAGE:

Grassed areas will be considered acceptable when a viable stand of grass covers at least 98 percent of the total area with no bare spots exceeding one square foot and the ground surface is fully stabilized against erosion.

### MAINTENANCE:

Maintain grassed areas until the later of (1) final project acceptance, or (2) the required grass coverage is achieved.

Maintain grassed areas by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable stand of grass free of eroded or bare areas. Mow areas as required to keep grass not more than 8 inches above ground surface until grassing work is accepted.

### Final Inspection and Acceptance:

When the grassing work is completed, including maintenance, the City will, upon request, make an inspection to determine acceptability.

Where inspected work does not comply with the requirements, replace rejected work and continue specified maintenance until re-inspected by the City and found to be acceptable.

END SECTION 02482

1 SECTION 02528 - PAVEMENT PATCHING

2

3

4 PART 1 - GENERAL

5

6

7 RELATED DOCUMENTS:

8

9 Drawings and general provisions of the Contract, including General and Supplementary  
10 Conditions and Division-I Specification Sections, apply to the Work specified in this section.

11

12

13 DESCRIPTION OF WORK:

14

15 The extent of pavement patching consists of the repair of all pavement removed or damaged in  
16 the course of constructing the Project.

17

18 Pavement patching includes repair of paved roads, streets, highways, walkways, driveways,  
19 patios, slabs on grade, and parking lots together with walls, curbing, gutters and headers, and  
20 other pavements and appurtenances. Pavement referred to under this Section, refers to  
21 asphaltic, cementious, brick, cobble or other large stone pavement materials together with  
22 underlying construction, irrespective of its composition.

23

24

25 JOB CONDITIONS:

26

27 Traffic Control: Schedule and conduct Work in a manner which will minimize inconvenience  
28 to vehicular and pedestrian traffic. Provide flaggers, barricades, waming signs, warning lights,  
29 and other warning means as appropriate.

30

31 Weather Limitations: Conduct all operations during weather conditions appropriate to the Work  
32 being performed

33 Grade Control: Establish and maintain lines and elevations which will assure finished  
34 Pavement patch having desirable appearance, function and strength.

35

36

37

38 SUBMITTALS:

39

40 Submit detailed material descriptions when requested by the Engineer.

41

42

43

44

45

46

STANDARD SPECIFICATIONS - DAHLONEGA, GA

1     PART 2- PRODUCT

2

3     General: For products not described below, use materials and gradations which have locally  
4 exhibited a satisfactory record of previous usage, and which for finished visible surfaces will  
5 permit obtaining appearance, color and texture reasonably matching remaining adjacent  
6 pavement of the same type.

7

8

9     Asphalt Concrete: Bituminous plant mixture of asphalt cement and aggregates complying  
10 with Type E or F hot plant mix of Section 828 of the Georgia Department of Transportation  
11 “Standard Specifications for Road and Bridge Constructions”.

12

13 Graded Aggregate Base: Uniform graded aggregate material complying with Section 815 of  
14 the Georgia Department of Transportation “Standard Specifications for Road and Bridge  
15 Construction”.

16

17 Bituminous Prime: Cutback asphalt complying with Section 821 of the Georgia  
18 Department of Transportation “Standard Specifications for Road and Bridge Construction  
19

20

21 Bituminous Tack Coat: Asphalt material complying with Section 413, topics 413.01  
22 Through 21 413.04 of the Georgia Department of Transportation “Standard Specifications  
23 for Road and Bridge Construction”.

24

25 Portland Cement Concrete: Concrete mix of Portland cement, aggregates, water, and air  
26 entraining admixture to produce the following properties: 3500 psi minimum compressive  
27 strength at 28 days per ASTM C39, 4 inches maximum slump per ASTM C143, and air  
28 content between 3% and 6%.

29

30 Cold Mix: Uniform bituminous mixture of aggregate, asphaltic material and, if it is required,  
31 mineral filler complying with Type E or F cold mix of Section 401 of the Georgia  
32 Department of Transportation “Standard Specifications for Road and Bridge Construction  
33

34

35

36     PART 3- EXECUTION

37

38

39 Pavement Cuts: Saw cut trench edges in paved areas to neat, straight lines before starting to  
40 break the pavement slab. Completely backfill the open half before opening the other half of  
41 pavement.

42

43 Backfill Placement: Place trench backfill materials in layers not more than six inches  
44 compacted  
45 thickness. Commence backfill immediately after utility is installed. Complete new  
46 replacement  
47 base construction immediately after trench backfill.

48

## STANDARD SPECIFICATIONS-DAHLONEGA, GA

1 Inspection: Examine areas and conditions under which pavement patching will be  
2 conducted, giving special attention to stability of subbase. Do not proceed with pavement  
3 patching work until unsatisfactory conditions have been corrected.

4

5 Preparation: Saw cut any ragged edges of existing pavement, or in the case of concrete  
6 work, remove existing pavement to nearest joint. Remove all loose material from underlying  
7 and adjacent surfaces.

8

9 Strength and Stability: Use materials and construction techniques as necessary to obtain  
10 strength, stability and durability of pavement patch at least equal to that of remaining  
11 adjacent pavement of the same type. As a minimum, conform with pavement patch details,  
12 if any, required elsewhere by the Contract Documents; and where such details are not  
13 provided, accomplish pavement patching utilizing strengths, thicknesses, etc. not less than  
14 that of remaining adjacent pavement of the same type.

15

16 Placing:

17

18 Construct pavement using methods and equipment in general use for the type of work  
19 being performed.

20

21 Immediately after new base construction, cover pavement cut with steel plates or similar  
22 devices of sufficient thickness to span the cut without noticeable deflection. Maintain  
23 plates in place for not less than 24 hours and not more than 7 days and until the concrete  
24 base (if used) has gained sufficient strength to withstand traffic loads. Traffic may resume  
25 after installation of metal plates.

26

27 Upon removal of the metal plates or similar devices, provide new pavement surface in  
28 accordance with one of the following options:

29

30 Immediately apply new permanent pavement surface materials indicated or

31

32 Immediately apply bituminous cold mixture over bond breaker paper over new base.

33 Monitor performance and repair or replace materials regularly to maintain smooth traffic  
34 surface until placement of permanent pavement surface materials. At Contractor's time

35 selection prior to substantial completion, remove cold mix and bond breaker paper and

36 provide new permanent pavement surface materials. If performance or maintenance of

37 cold mix patch is unsatisfactory in the opinion of the Owner or Engineer, remove materials

38 and provide new permanent pavement surface materials within 72 hours of notice by the

39 Owner or Engineer.

40

41 Traffic control devices in lieu of cover plates are permitted for pavement patching longitudinal  
42 to the street centerline in excess of 20 feet. Use traffic barricades, warning signs and lights,  
43 flagmen, and other means as appropriate to continuously control traffic 24 hours per day. Use  
44 devices such that at least 12 feet wide, one-way through traffic access is provided at all times.

44

45 Upon removal of traffic control devices, install permanent pavement surface.

46

STANDARD SPECIFICATIONS - DAHLONEGA, GA

1 Contractor assumes all responsibility for maintaining repairing and or replacing concrete base  
2 that may be damaged during curing period.

3

4 For existing surface of Portland cement concrete, furnish new Portland cement concrete structure  
5 thickness, including base and pavement surface, of not less than eight inches; except for  
6 driveways and sidewalks which shall be not less than four inches thick.

7

8 Provide not less than eight inches thickness of new graded aggregate base for replacement of  
9 asphalt concrete pavement at driveways, sidewalks and parking lots.

10

11 For repair of asphalt concrete pavement, clean base and adjacent surfaces and apply bituminous  
12 tack coat or bituminous prime (as appropriate) to such surfaces before placing new asphalt  
13 concrete surface.

14

15 Finish: Accomplish pavement patching using materials and techniques which result in visible,  
16 finished surfaces having appearance, color, and texture reasonably matching remaining adjacent  
17 pavement of the same type. Do not permit the finished surface to have dips, objectionable  
18 roughness or discontinuity or non-draining areas. Do not create any unsafe pavement condition.

19

20 Repairs: If pavement patch or adjacent pavement settles or shows evidence of other distress  
21 resulting from the Work, cut pavement out, repair subgrade, and reconstruct patch. Do not place  
22 additional pavement material on top of unsatisfactory previously repaired surfaces. At expense  
23 of Contractor, repair any pavement which he damages beyond that minimum amount necessary  
24 to construct the Work.

25

26 END SECTION 02528

27

STANDARD SPECIFICATIONS-DAHLONEGA,GA

SECTION 02770 - STORM SEWER SYSTEM

PART I - GENERAL

DESCRIPTION OF WORK:

The extent of storm sewer system is shown on the drawings.

Storm sewer system work includes, but is not limited to, the following:

Foundation preparation.

Furnishing and laying gravity sewer pipe.

Furnishing and/or constructing drainage structures and appurtenances.

Cleaning constructed work

Related Work Specified Elsewhere:

Route Clearing, Section 02112

Trenching and Backfilling, Section 02204

Pavement Patching, Section 02528

JOB CONDITIONS:

Traffic Control:

Schedule and conduct Work in a manner which will minimize inconvenience to vehicular and pedestrian traffic. Provide flaggers, barricades, warning signs, warning lights, and other warning means as appropriate. Flaggers, when utilized, must hold a valid Georgia D.O.T. flagging certificate. Maintain traffic on all roads and streets which must be crossed by sewer lines. All traffic controls during construction must conform to Part VI of the Manual on Uniform Traffic Control Devices, ANSI D6.1e.

Weather Limitations:

Conduct all operations during weather conditions appropriate to the Work being performed.

## STANDARD SPECIFICATIONS-DAHLONEGA, GA

### QUALITY ASSURANCE:

#### Manufacturer Experience:

Furnish manufactured products produced by firms having regularly produced such items as specified herein which have proven satisfactory in actual service over at least a two year period, as determined by the City.

#### Imperfections:

Regardless of tolerances permitted by industry standards specified herein, the City may reject pipe or precast structures at the manufacturing plant or project site, which have cracks, chips, blisters, lack of smooth interior or exterior surface, evidence of structural weakness, porosity, joint defect, significant variation from theoretical shape, or other imperfection which might, in the opinion of the City, contribute to a reduced functional capability, accelerated deterioration, or reduced structural strength.

#### Repairs:

Do not use patched or repaired pipe or precast structures unless each individual length or element has been approved and marked for repair by the City at the manufacturing plant. Repairs, other than at the manufacturing plant, are not permitted.

## PART 2- PRODUCTS

### Concrete Pipe (CPDV)

Basic specification, nominal 15 inch size and over: ASTM C 76, reinforced sewer pipe furnished in not less than 8 foot lengths.

Identification: Stamp each length or joint of concrete pipe at the plant of manufacture, showing strength or reinforcement class, wall thickness designation, date of manufacture, and manufacturer symbol.

Joints: At Contractor option use one of the following jointing systems. Once a system is selected, utilize system for entire project unless specified or authorized otherwise.

Cement grout type which results in entire joint annular space being filled with grout and inside of each joint being wiped smooth. Use grout mixture consisting of not more than five gallons of water per sack of cement. Utilize cement conforming to AASHTO M85 or M150.

AWWA C 302 0-ring rubber gasket style in which the completed joint confines the 0-ring on four sides with nominal clearance not to exceed 1/16 inch between smooth, accurately formed, bell and spigot surfaces.

### Elliptical Concrete Pipe (ECPD):

Basic Specification: ASTM C 507, reinforced elliptical sewer pipe furnished in not less than 8 foot lengths.

Additional Specification Requirements: Maximum absorption by standard ASTM test may not exceed 7.0 percent, and pipe must be aged at manufacturing plant for not less than five days.

## STANDARD SPECIFICATIONS-DAHLONEGA,GA

Identification: Stamp each length or joint of concrete elliptical pipe at the plant of manufacture, showing strength or reinforcement class, wall thickness designation, date of manufacture, manufacturer's symbol and quadrant reinforcing symbol.

Joints: At Contractor option use one of the following jointing systems. Once a system is selected, utilized system for entire project unless specified or authorized otherwise.

Cement grout type which results in entire joint annular space being filled with grout and inside of each joint being wiped smooth. Use grout mixture consisting of not more than five gallons of water per sack of cement. Utilize cement conforming to AASHTO M85 or MISO.

Preformed flexible pipe joint compound to be confined in the tongue and groove joint, meet Federal Specification SS-S-002 10.

### Corrugated Plastic Pipe (CPPD'):

Corrugated flexible conduit with slip-on joints made of polyethylene conforming with ASTM F 405 and F 449.

Subject to compliance with requirements, firms offering products which may be incorporated in the work include, but are not limited to, the following:

ADS Inc.

Hancor Inc.

### Bituminous Coated Corrugated Aluminum Pipe (BCCAP'):

Basic specification: AASI-ITO M 196 with full uniform bituminous coating having minimum thickness of 0.05 inch and conforming with AASHTO M 190.

Joints: Fully bituminous coated coupling bands manufactured from base metal as pipe. Utilize bands of same manufacturer as pipe.

### Pipe Fittings:

Use standard, factory fabricated adapters, wyes, tees, and other necessary fittings comparable to pipe with which connected.

### Coarse Granular Material For Pipe Bedding:

Crushed stone, crushed gravel, natural gravel, or crushed shell meeting ASTM C 33, and having No. 67 gradation (3/4 inch to No.4 sieve).

### Fine Granular Material For Pipe Bedding:

Uniformly graded natural or manufactured sand composed of hard, durable particles with 100 percent passing a No.4 sieve, not more than 25 percent passing a No. 100 sieve, and containing no more than 25 percent total of silt and clay.

Sewer System Structures: Conform with applicable provisions contained in Article V of the City's Development Regulations.

STANDARD SPECIFICATIONS-DAHLONEGA, GA

PART 3- EXECUTION

PIPE FOUNDATION:

Concrete Pipe Foundation:

Unless otherwise indicated, lay pipe in trenches and on foundations prepared as selected by the Contractor in conformance with the bedding class, trench width and depth, and pipe size tabulated below:

Pipe Size Inches	Maximum Trench Width Ft-in.	Maximum Trench Depth in Feet					
		Class C Bedding			Class B Bedding		
		Conc. Cl. 3	Conc. Cl. 4	Conc. Cl. 5	Conc. Cl. 3	Conc. Cl. 4	Conc. Cl. 5
15	3-0	8	13	30	11	21	30
18	3-3	9	15	30	12	24	30
21	3-6	9	16	30	13	26	30
24	4-0	10	16	30	13	23	30
27	4-0	11	19	30	15	29	30
30	4-6	11	18	30	14	25	30
36	5-6	11	17	29	14	23	30
42	6-0	12	16	26	15	21	30
48	7-0	12	18	28	15	23	30
54	7-6	13	18	29	16	24	30
60	8-6	13	19	28	16	23	30

Corrugated Plastic Pipe Foundation:

Unless otherwise approved, lay corrugated plastic pipe in trenches, or fills using not less than Class C Modified Bedding and in conformance with the maximum fill depth and pipe size tabulated below:

Pipe Size Inches	Maximum Fill Depth for Corrugated Plastic Pipe in Feet
18	11
24	7

Bituminous Coated Corrugated Aluminum Pipe Foundation:

Unless otherwise approved, lay bituminous coated corrugated aluminum pipe in trenches, or fills using not less than Class C Modified Bedding, and in conformance with the maximum fill depth, and pipe size tabulated below:

STANDARD SPECIFICATIONS-DAHLONEGA, GA

Pipe Size Inches	Maximum Fill Depth In Feet For Bituminous Coated Corrugated Aluminum Pipe With Wall Thickness				
	0.060 In. (16 Ga.)	0.075 In. (14 Ga.)	0.105 In. (12 Ga.)	0.135 In. 10 Ga.)	0.164 In. (8 Ga.)
18	30	30	52	54	56
24	22	22	39	41	42
30	18	18	31	32	34
36	15	15	26	27	28
42		26	43	43	44
48			40	41	43

Definition of Pipe Foundation Terms:

Trench depth is the vertical distance from pipe invert or flow line to finished ground surface.

Trench width is the horizontal distance between trench walls at any point from one foot above top of pipe to trench bottom.

Class B Bedding may be achieved by either of the following two construction methods.

(1) Shaped Bottom with Tamped Backfill: Shape bottom of trench excavation to conform to a cylindrical surface with a radius at least 2 inches greater than the radius to the outside of the pipe and with a width sufficient to allow six-tenths of the width of the pipe barrel to be bedded in fine granular material fill placed in the shaped excavation. Carefully place and compact backfill at sides of pipe to a thickness of at least 12 inches above top of pipe. Limit use of this bedding method to trenches with firm bottom and sides.

(2) Compacted Coarse Granular Bedding With Tamped Backfill: Bed pipe in compacted coarse granular material placed on a flat trench bottom. Thickness of granular bedding must be at least one-fourth the outside pipe diameter, but not less than 4 inches thick under pipe barrel, and extend at least halfway up the pipe barrel at the sides. Carefully place compacted backfill above the granular material up a minimum depth of 12 inches over the top of pipe.

Class C Bedding may be achieved by either of the following two construction methods:

(1) Shaped Bottom: Bed pipe with ordinary care in an earth foundation formed in the trench bottom by a shaped excavation which fits the pipe barrel with reasonable closeness for a width of at least 50 percent of the outside pipe diameter. Place compacted fill to a minimum depth of six inches above top of pipe.

(2) Compacted Coarse Granular Bedding with a Tamped Backfill: Bed pipe in compacted granular material placed on a flat trench bottom. Thickness of granular material must be at least 4 inches under the barrel and must extend one-tenth to one-sixth of the outside diameter up the pipe barrel at the sides. Place compacted backfill above the granular material to a minimum depth of six inches over top of pipe.

Class C Modified Bedding is defined as bedding pipe on a bedding blanket of sandy material roughly shaped to fit bottom of pipe. Thickness of bedding blanket must be not less than 0.1 of the nominal pipe diameter. Place compacted backfill above bedding blanket to a minimum depth of 12 inches over the top of pipe.

## STANDARD SPECIFICATIONS-DAHLONEGA, GA

### PIPE LAYING:

When either bituminous coated corrugated aluminum or corrugated plastic pipe is used, pipe installation must be observed by a Georgia registered professional engineer engaged by the contractor or developer. Upon completion of the pipe installation and prior to acceptance by the City, the observing engineer is to furnish to the City a certification that the storm drainage pipe has been installed in accordance with the approved plans and these specifications. Acceptance by the City will not be considered without the engineer's certification.

Clean interior of pipe and all joints before laying. When pipe laying activity is not in actual progress, tightly cover open ends of sewer. Avoid permitting mud or other material from entering sewer at all times.

Avoid damage or shock in handling pipe and accessories. Inspect each length of pipe, and reject any defective piece. Carefully protect pipe in place from damage or displacement until backfilling operations are complete.

Lay and joint pipe in strict conformance with manufacturer's written recommendations as submitted to and accepted by the City. Where cement joints are used, provide wet burlap or earth protective cover for joints immediately after initial grout set. Maintain protective cover until joint is covered by backfilling. Lay all pipe upgrade with spigots pointing downgrade.

Control geometric position of pipe as necessary to ensure that pipe and fittings accurately conform with required grade and alignment after sewer is completed.

Prevent water from accumulating or running in trench during pipe laying operations, and until the trench or excavation has been backfilled..

Remove and re-lay any length of pipe which does not accurately conform with required line or grade, is crushed, or is excessively deflected.

### PIPE CONNECTIONS:

Make all pipe connections with standard fittings, manholes, structures, or special construction detailed on Drawings.

At manholes and structures, neatly cut all connecting pipe flush with inside surface, and provide flexible pipe joint within 18 inches of outer surface. Make pipe connections to manholes and structures by laying pipe in mortar bed or concrete. Use supplemental materials and techniques as required to obtain watertightness.

Do not connect any flow to new work until authorized by the City.

### SEWER STRUCTURES

Conform with applicable provisions contained in Article V of the City's Development Regulations.

STANDARD SPECIFICATIONS-DAHLONEGA, GA

LINE CLEANING:

Avoid permitting dirt, rubbish, surplus construction material, and other foreign matter to enter structures or pipe during construction. Use whatever means may be necessary to obtain a clean and internally smooth sewer system prior to final acceptance.

SEWER LEAKAGE:

General Leakage Requirements:

Malce entire sewer line system as near watertight as practicable. Eliminate all visible points of ground water infiltration, and any other significant points of leakage which can be located.

END SECTION 02770

**APPENDIX C**

**STANDARD DETAILS**

Available at City Hall  
706/864-6133