City of Graham Post Construction Stormwater Program Information Sheet

The City of Graham is a NPDES Phase II Stormwater Permit holder. The City is required to review new development projects to determine concurrence with the City's Permit. The City's Post Development Construction Stormwater Program is governed by the City's Post-Construction Ordinance that was adopted in 2007. Projects that are subject to this ordinance are reviewed for stormwater runoff compliance according to the Development Ordinance, Post Construction Ordinance, the NC Division of Water Quality BMP Manual, the City's Storm Sewer Design Manual, the City's Floodplain Development Ordinance, the City's Riparian Buffer Protection Ordinance, and good engineering practice.

Projects that are not subject to the City's Post Development Construction Ordinance are generally those that do not disturb 1 acre during their construction. These projects are not required to comply with the water quality aspect of the Post Development Construction Program. However, these projects may be required to comply with the other aspects of sound stormwater design as described above in the following highlights. It should be noted that projects that have a larger common plan of development that exceeds 1 acre are **NOT EXEMPT** from the Post Development Construction Program.

General Notes on the Phase II Post Construction Program:

- Projects that are greater than 24% impervious (or built upon) are considered high density and must treat the first 1" of runoff to 85% Total Suspended Solids (TSS) for the entire project. The treatment area is to include the entire project area to the maximum extent practicable. High Density projects must also match predevelopment discharge rates for the 1 year – 24 hour storm as well as compliance with stream buffers and other items in the ordinance.
- Projects less than 24% impervious (or built upon) are considered low density and must use vegetated conveyances to the maximum extent practicable as well as comply with stream buffers and other items in the Ordinance.
- Streams shown on the USGS Quadmap **OR** the NRCS Soil Survey Map must comply with the Jordan Lake Riparian Buffer Protection Ordinance.

Local Stormwater Design Manual Requirements

The City has found the need to clarify some design requirements that may not be clear within the NC DWQ BMP Manual or may not be required within the NC DWQ BMP Manual but the City has seen the need to require due to the City's specific program.

- Peak runoff detention will be required when any of the following conditions are present:
    - Projects exceed 25% of the drainage area to the property discharge point,
    - Projects are upstream of known localized flooding areas, OR
    - The project may have a significant localized flooding impact on downstream properties or the environment.
- Peak runoff detention will be a minimum of post development runoff rates matching or being less than the pre-development runoff rates for the 10-year storm event. Larger storm peak runoff matching may be required as well.

- Even if detention is not required, the 10 year and 100 year storms will be evaluated and any stormwater management devices (BMPs) will be required to adequately pass the storms.
- Site development is to maintain existing discharge points to the maximum extent practicable. This includes matching of pre and post development discharge rates AND drainage area totals at each discharge point to the maximum extent practicable.
- Water Quality Ponds are highly recommended to be designed for 90% TSS. Ponds sized only for 85% TSS will be required to fully comply with the NC DWQ BMP Manual, which will generally require a 30' or 50' vegetative filter at the outlet of the pond. This filter strip must be outside of the Riparian Buffer.
- Bio-retention Basins are highly recommended to be designed with Internal Water Storage to enhance nutrient removal.

Jordan Lake Riparian Buffer Protection Requirements

- Streams shown on the USGS Quadmap **OR** the NRCS Soil Survey Map must comply with the Jordan Lake Riparian Buffer Protection Ordinance.
- Note that the NRCS Soil Survey Map for Alamance County is from April 1960.
- The buffer is measured from the top of the bank, in all directions, as determined in the field.
- The City of Graham will make stream determinations for reference to buffer applicability only. The City's jurisdiction is only from the top of bank outward from the stream.
- Owners, developers, and designers are encouraged to have streams delineated on their project. Once the City of Graham makes a determination that determination will be binding and any disputes to the City's determination must go through the regulated buffer appeal process.
- Zone 1 of the buffer extends from the top of bank outward 30' and is to remain undisturbed. Zone 2 of the buffer extends from 30' away from the stream (Zone 1 limits) to 50' from the top of bank and is to remain vegetated.
- Impacts to the buffer are described within the buffer ordinance and exempt, allowable, and allowable with mitigation uses are included in the Table of Uses.
- Diffuse flow into the buffer is required, unless the flows are adequately treated by an appropriate stormwater device.

Local Submittal Requirements

- ***Presubmittal Meetings are highly encouraged.***
- Stormwater Submittals are reviewed by Josh Johnson, P.E. of Alley, Williams, Carmen, and King, Inc. He can be contacted at josh@awck.com or at (336)226-5534.
- Submittals must include the following:
    - Stormwater Application.
    - Stormwater Calculation.
    - Full Set of 24"x36" plans (not larger).
    - Project and Stormwater Narrative.
    - Stormwater Fee (if applicable).

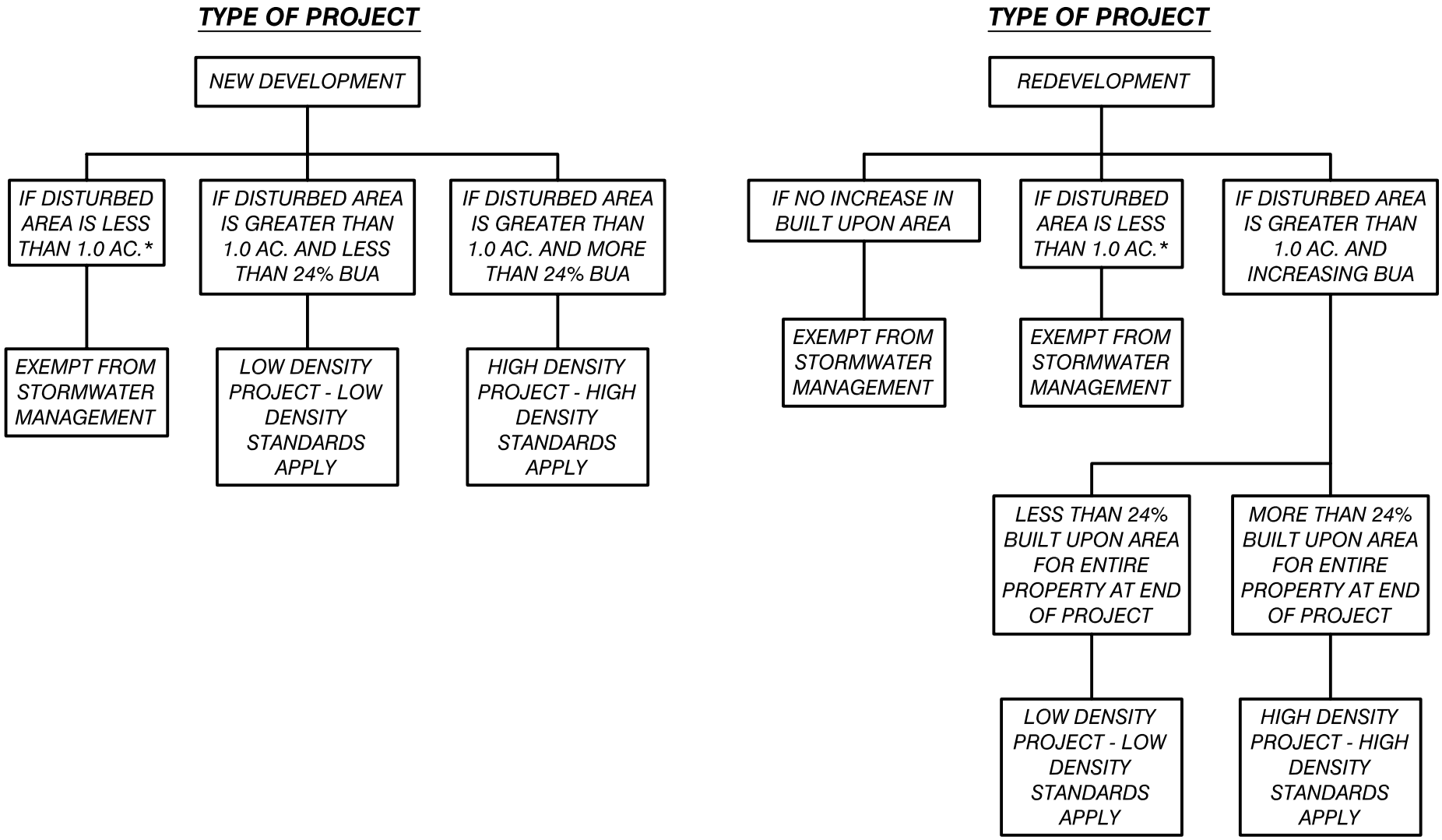
- Stormwater BMP's require an Operation and Maintenance Agreement. The O&M Agreement needs to be completed and submitted to the City prior to plan approval.
- NCDENR's Storm EZ may be used for design purposes, with a predesign approval.
- Projects subject to the Phase II Construction Program must complete the Jordan/Falls Lake Accounting Tool. Compliance with the tool is not required but completion of the tool is required. The tool is available from NCDENR.
- AutoCAD .dwg files or shapefiles are required for water quality asbuilts. Adobe PDFs of certifications and plan sheets should be included with the as-builts. As-builts should include pictures of the bmp to visually verify the status of the bmp.

Exhibits

- Stormwater Management Chart.
- Post Construction Ordinance.
- Storm Sewer Design Manual.
- Floodplain Development Ordinance.
- Riparian Buffer Protection Ordinance.
- Riparian Buffer Exhibit.
- Stormwater Application.
- Stormwater Operation and Maintenance Agreement.
- Stormwater As-built Forms.

STORMWATER MANAGEMENT DEVELOPMENT
BASED ON THE TYPE OF PROJECT

Phase II
Post-Construction
Ordinance



*** AND NOT A PART OF A LARGER COMMON PLAN**

Phase II Stormwater Ordinance

City of Graham

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Adopted by the City Council

May 1, 2007

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ARTICLE XII. STORMWATER ORDINANCE

Table of Contents

ARTICLE XII. STORMWATER ORDINANCE

DIVISION 1. GENERAL PROVISIONS

Sec. 10.486 Title

This ordinance shall be officially known as "The Phase II Stormwater Ordinance." It is referred to herein as "this ordinance."

Sec. 10.487 Authority

The City of Graham is authorized to adopt this ordinance pursuant to North Carolina law, including but not limited to Article 14, Section 5 of the Constitution of North Carolina; North Carolina General Statutes 143-214.7 and rules promulgated by the Environmental Management Commission thereunder; Session Law 2006-246; Chapter 160A, §§ 174, 185 and; as well as Chapter 113A, Article 4 (Sedimentation Pollution Control); Article 21, Part 6 (Floodway Regulation); Chapter 160A, Article 19 (Planning and Regulation of Development); Chapter 153A, Article 18.

Sec. 10.488 Findings

It is hereby determined that:

Development and *redevelopment* alter the hydrologic response of local watersheds and increases stormwater runoff rates and volumes, flooding, soil erosion, stream channel erosion, nonpoint and point source pollution, and sediment transport and deposition, as well as reducing groundwater recharge;

These changes in stormwater runoff contribute to increased quantities of water-borne pollutants and alterations in hydrology which are harmful to public health and safety as well as to the natural environment; and

These effects can be managed and minimized by applying proper design and well-planned controls to manage stormwater runoff from *development* sites.

Further, the Federal Water Pollution Control Act of 1972 ("Clean Water Act") and federal Phase II Stormwater Rules promulgated under it, as well as rules of the North Carolina Environmental Management Commission promulgated in response to federal Phase II requirements, compel certain urbanized areas, including this jurisdiction, to adopt the minimum stormwater controls such as those included in this ordinance.

Therefore, the Graham City Council establishes this set of water quality and quantity regulations to meet the requirements of state and federal law regarding control of stormwater runoff and discharge.

Sec. 10.489 Purpose

a.) General

The purpose of this ordinance is to protect, maintain and enhance the public health, safety, environment and general welfare by establishing minimum requirements and procedures to control the adverse effects of increased post-*development* stormwater runoff and nonpoint and point source pollution associated with new *development* and *redevelopment*. It has been determined that proper management of construction-related and post-*development* stormwater runoff will minimize damage to public and private property and infrastructure, safeguard the public health, safety, and general welfare, and protect water and aquatic resources.

b.) Specific

This ordinance seeks to meet its general purpose through the following specific objectives and means:

(1) Establishing decision-making processes for *development* that protect the integrity of watersheds and preserve the health of water resources;

(2) Requiring that new *development* and *redevelopment* maintain the pre-*development* hydrologic response in their post-*development* state as nearly as practicable for the applicable design storm to reduce flooding, streambank erosion, nonpoint and point source pollution and increases in stream temperature, and to maintain the integrity of stream channels and aquatic habitats;

(3) Establishing minimum post-*development* stormwater management standards and design criteria for the regulation and control of stormwater runoff quantity and quality;

(4) Establishing design and review criteria for the construction, function, and use of *structural stormwater BMPs* that may be used to meet the minimum post-*development* stormwater management standards;

(5) Encouraging the use of better management and site design practices, such as the use of vegetated conveyances for stormwater and the preservation of greenspace, riparian buffers, and other conservation areas to the maximum extent practicable;

(6) Establishing provisions for the long-term responsibility for and maintenance of *structural and nonstructural stormwater BMPs* to ensure that they

continue to function as designed, are maintained appropriately, and pose no threat to public safety;

(7) Establishing administrative procedures for the submission, review, approval and disapproval of *stormwater management plans*, for the inspection of approved projects, and to assure appropriate long-term maintenance.

Sec. 10.490 Applicability and Jurisdiction

a.) General

Beginning with and subsequent to its effective date, this ordinance shall be applicable to all *development* and *redevelopment*, including, but not limited to, site plan applications, planned unit developments, grading applications, and subdivision applications within the corporate limits and extraterritorial jurisdiction of the City of Graham, unless exempt pursuant to Subsection (b) of this Division, Exemptions, below.

b.) Exemptions

Development that cumulatively disturbs less than one acre and is not part of a larger common plan of *development* or sale is exempt from the provisions of this ordinance.

Redevelopment that cumulatively disturbs less than one acre and is not part of a larger common plan of *development* or sale is exempt from the provisions of this ordinance.

Development and *redevelopment* that disturb less than one acre are not exempt if such activities are part of a *larger common plan of development or sale*, even though multiple, separate or distinct activities take place at different times on different schedules.

Activities that are exempt from permit requirements of Section 404 of the federal Clean Water Act, as specified in 40 CFR 232 (primarily, ongoing farming and forestry activities) are exempt from the provisions of this ordinance.

c.) No **Development** *or* **Redevelopment** Until Compliance and Permit.

No *development* or *redevelopment* shall occur except in compliance with the provisions of this ordinance or unless exempted. No *development* for which a permit is required pursuant to this ordinance shall occur except in compliance with the provisions, conditions, and limitations of the permit.

d.) Stormwater Map

The provisions of this ordinance shall apply within the areas designated on the map titled "Phase II Stormwater Map of City of Graham, North Carolina" ("the Stormwater Map"), which is adopted simultaneously herewith. The Stormwater Map and all explanatory matter contained thereon accompanies and is hereby made a part of this ordinance.

The Stormwater Map shall be kept on file by the Stormwater Administrator and shall be updated to take into account changes in the land area covered by this ordinance and the geographic location of all *structural BMP*s permitted under this ordinance. In the event of a dispute, the applicability of this ordinance to a particular area of land or BMP shall be determined by reference to the North Carolina Statutes, the North Carolina Administrative Code, and local zoning and jurisdictional boundary ordinances.

Sec. 10.491 Interpretation

a.) Meaning and Intent

All provisions, terms, phrases, and expressions contained in this ordinance shall be construed according to the general and specific purposes set forth in Section 10-489, Purpose. If a different or more specific meaning is given for a term defined elsewhere in The City of Graham's development ordinances, the meaning and application of the term in this ordinance shall control for purposes of application of this ordinance.

b.) Text Controls in Event of Conflict

In the event of a conflict or inconsistency between the text of this ordinance and any heading, caption, figure, illustration, table, or map, the text shall control.

c.) Authority for Interpretation

The Stormwater Administrator has authority to determine the interpretation of this ordinance. Any person may request an interpretation by submitting a written request to the Stormwater Administrator who shall respond in writing within 30 days. The Stormwater Administrator shall keep on file a record of all written interpretations of this ordinance.

d.) References to Statutes, Regulations, and Documents

Whenever reference is made to a resolution, ordinance, statute, regulation, manual (including the *Stormwater BMP Design Manual***),** or document, it shall be construed as a reference to the most recent edition of such that has been finalized and published with due provision for notice and comment, unless otherwise specifically stated.

e.) Computation of Time

The time in which an act is to be done shall be computed by excluding the first day and including the last day. If a deadline or required date of action falls on a Saturday, Sunday, or holiday observed by the City of Graham, the deadline or required date of action shall be the next day that is not a Saturday, Sunday or holiday observed by the City of Graham. References to days are calendar days unless otherwise stated.

f.) Delegation of Authority

Any act authorized by this Ordinance to be carried out by the Stormwater Administrator of City of Graham may be carried out by his or her designee.

g.) Usage

(1) Mandatory and Discretionary Terms

The words “shall,” “must,” and “will” are mandatory in nature, establishing an obligation or duty to comply with the particular provision. The words “may” and “should” are permissive in nature.

(2) Conjunctions

Unless the context clearly indicates the contrary, conjunctions shall be interpreted as follows: The word “and” indicates that all connected items, conditions, provisions or events apply. The word “or” indicates that one or more of the connected items, conditions, provisions or events apply.

(3) Tense, Plurals, and Gender

Words used in the present tense include the future tense. Words used in the singular number include the plural number and the plural number includes the singular number, unless the context of the particular usage clearly indicates otherwise. Words used in the masculine gender include the feminine gender, and vice versa.

h.) Measurement and Computation

Lot area refers to the amount of horizontal land area contained inside the lot lines of a lot or site.

Sec. 10.492 Definitions

When used in this Ordinance, the following words and terms shall have the meaning set forth in this section, unless other provisions of this Ordinance specifically indicate otherwise.

1-year, 24-hour storm

A stormwater event with an intensity expected to be equaled or exceeded, on average, once in 12 months and with a duration of 24 hours. The 1-year, 24 hour storm produces approximately 3.0 inches of rain in the Graham area.

Built-upon area (BUA)

That portion of a ***development*** project that is covered by impervious or partially impervious surface including, but not limited to, buildings; pavement and gravel areas such as roads, parking lots, and paths; and recreation facilities such as tennis courts. "Built-upon area" does not include a wooden slatted deck, the water area of a swimming pool, or pervious or partially pervious paving material to the extent that the paving material absorbs water or allows water to infiltrate through the paving material.

Department

The North Carolina Department of Environment and Natural Resources.

Development

Any land disturbing activity which adds to or changes the amount of impervious or partially pervious cover on a land area or which otherwise decreases the infiltration of precipitation into the soil, other than rebuilding activity that does not qualify as redevelopment.

Division

The Division of Water Quality in the North Carolina **Department of Environment and Natural Resources**.

High-density project

Any project that exceeds the low density threshold for dwelling units per acre or built-upon area.

Larger common plan of development or sale

Any area where multiple separate and distinct construction or land disturbing activities will occur under one plan. A plan is any announcement or piece of documentation (including but not limited to a sign, public notice or hearing, sales pitch, advertisement, loan application, drawing, permit application, zoning request, or computer design) or physical demarcation (including but not limited to boundary signs, lot stakes, or surveyor markings) indicating that construction activities may occur on a specific plot.

Low-density project

A project that has no more than two dwelling units per acre or twenty-four percent ***built-upon area*** (BUA) for all residential and non-residential ***development***. A project with an overall density at or below the relevant low-density threshold, but containing areas with a

density greater than the overall project density, may be considered low density as long as the project meets or exceeds the post-construction model practices for low-density projects, as defined in DIVISION 3. Sec. 10.504, and locates the higher density in upland areas and away from surface waters and drainageways to the maximum extent practicable.

Owner

The legal or beneficial owner of land, including but not limited to a mortgagee or vendee in possession, receiver, executor, trustee, or long-term or commercial lessee, or any other person or entity holding proprietary rights in the property or having legal power of management and control of the property. "Owner" shall include long-term commercial tenants; management entities, such as those charged with or engaged in the management of properties for profit; and every person or entity having joint ownership of the property. A secured lender not in possession of the property does not constitute an owner, unless the secured lender is included within the meaning of "owner" under another description in this definition, such as a management entity.

Redevelopment

Any *development* on previously-developed land other than a rebuilding activity that results in no net increase in *built-upon area* and provides equal or greater stormwater control than the previous *development.*

Runoff

The water from rain, snowmelt or irrigation that flows over the land surface and is not absorbed into the ground, instead flowing into streams or other surface waters or land depressions.

Stormwater BMP Design Manual

The Stormwater Best Management Practice Design Manual approved for use in Phase II jurisdictions by the *Division* for the proper implementation of the requirements of the federal Phase II stormwater program. All references herein to the ***Stormwater BMP Design Manual*** are to the latest published edition or revision.

Structural BMP

A physical device designed to trap, settle out, or filter pollutants from stormwater runoff; to alter or reduce stormwater runoff velocity, amount, timing, or other characteristics; to approximate the pre-development hydrology on a developed site; or to achieve any combination of these goals. Structural BMP includes physical practices such as constructed wetlands, vegetative practices, filter strips, grassed swales, and other methods installed or created on real property. "Structural BMP" is synonymous with "structural practice", "stormwater control facility," "stormwater control practice," "stormwater treatment practice," "stormwater management practice," "stormwater control measures," "structural stormwater treatment systems," and similar terms used in this ordinance.

Substantial progress

For the purposes of determining whether sufficient progress has been made on an approved plan, one or more of the following construction activities toward the completion of a site or subdivision plan shall occur: obtaining a grading permit and conducting grading activity on a continuous basis and not discontinued for more than thirty (30) days; or installation and approval of on-site infrastructure; or obtaining a building permit for the construction and approval of a building foundation. "Substantial progress" for purposes of determining whether an approved plan is null and void is not necessarily the same as "substantial expenditures" used for determining vested rights pursuant to applicable law.

Sec. 10.493 Stormwater BMP Design Manual

a.) Reference to *Stormwater BMP Design Manual*

The Stormwater Administrator shall use the policy, criteria, and information, including technical specifications and standards, in the ***Stormwater BMP Design Manual*** as the basis for decisions about stormwater permits and about the design, implementation and performance of ***structural and non-structural stormwater BMPs***.

The ***Stormwater BMP Design Manual*** includes a list of acceptable stormwater treatment practices, including the specific design criteria for each stormwater practice. Stormwater treatment practices that are designed, constructed, and maintained in accordance with these design and sizing criteria will be presumed to meet the minimum water quality performance standards of the Phase II laws.

b.) Relationship of ***Stormwater BMP Design Manual*** to Other Laws and Regulations

If the specifications or guidelines of the ***Stormwater BMP Design Manual*** are more restrictive or apply a higher standard than other laws or regulations, that fact shall not prevent application of the specifications or guidelines in the ***Stormwater BMP Design Manual***.

c.) Changes to Standards and Specifications

If the standards, specifications, guidelines, policies, criteria, or other information in the ***Stormwater BMP Design Manual*** are amended subsequent to the submittal of an application for approval pursuant to this ordinance but prior to approval, the new information shall control and shall be utilized in reviewing the application and in implementing this ordinance with regard to the application.

Sec. 10.494 Relationship to Other Laws, Regulations and Private Agreements

a.) Conflict of Laws

This ordinance is not intended to modify or repeal any other ordinance, rule, regulation or other provision of law. The requirements of this ordinance are in addition to the requirements of any other ordinance, rule, regulation or other provision of law. Where any provision of this ordinance imposes restrictions different from those imposed by any other ordinance, rule, regulation or other provision of law, whichever provision is more restrictive or imposes higher protective standards for human or environmental health, safety, and welfare shall control.

b.) Private Agreements

This ordinance is not intended to revoke or repeal any easement, covenant, or other private agreement. However, where the regulations of this ordinance are more restrictive or impose higher standards or requirements than such an easement, covenant, or other private agreement, the requirements of this ordinance shall govern. Nothing in this ordinance shall modify or repeal any private covenant or deed restriction, but such covenant or restriction shall not legitimize any failure to comply with this ordinance. In no case shall the City of Graham be obligated to enforce the provisions of any easements, covenants, or agreements between private parties.

Sec. 10.495 Severability

If the provisions of any section, subsection, paragraph, subdivision or clause of this ordinance shall be adjudged invalid by a court of competent jurisdiction, such judgment shall not affect or invalidate the remainder of any section, subsection, paragraph, subdivision or clause of this ordinance.

Sec. 10.496 Effective Date and Transitional Provisions

a.) Effective Date

This ordinance shall become effective after the approval of both the City of Graham and the Division representing the State of North Carolina or July 1, 2007, whichever is the last to occur.

b.) Final Approvals, Complete Applications

All *development* and *redevelopment* projects which have obtained a vested right as specified in Section 10.255 of the Graham Development Ordinance, or projects for which complete and/or full applications were submitted and approved by the City of Graham prior to the effective date of this ordinance, and which remain valid, unexpired, unrevoked and not otherwise terminated at the time of *development* or *redevelopment* shall be exempt from complying with all provisions of this ordinance dealing with the control and/or management of post-

construction runoff, but shall be required to comply with all other applicable provisions.

A phased development plan shall be deemed approved prior to the effective data of this ordinance if it has been approved by all necessary government units, it remains valid, unexpired, unrevoked and not otherwise terminated, and it shows:

(1) For the initial or first phase of development, the type and intensity of use for a specific parcel or parcels, including at a minimum, the boundaries of the project and a subdivision plan that has been approved.

(2) For any subsequent phase of development, sufficient detail so that implementation of the requirements of this ordinance to that phase of development would require a material change in that phase of the plan.

c.) Violations Continue

Any violation of provisions existing on the effective date of this ordinance shall continue to be a violation under this ordinance and be subject to penalties and enforcement under this ordinance unless the use, ***development***, construction, or other activity complies with the provisions of this ordinance.

DIVISION 2. ADMINISTRATION AND PROCEDURES

Sec. 10.497 Review and Decision-Making Entities

a.) Stormwater Administrator

(1) Designation

The Stormwater Administrator shall be the City Manager or his designee. The Stormwater Administrator shall administer and enforce this ordinance.

b.) Powers and Duties

In addition to the powers and duties that may be conferred by other provisions of the City of Graham code and other laws, the Stormwater Administrator shall have the following powers and duties under this ordinance:

(1) To review and approve, approve with conditions, or disapprove applications for approval of plans pursuant to this ordinance.

(2) To make determinations and render interpretations of this ordinance.

(3) To establish application requirements and schedules for submittal and review of applications and appeals, to review and make recommendations to the Graham City Council on applications for *development or redevelopment* approvals.

(4) To enforce the provisions of this ordinance in accordance with its enforcement provisions.

(5) To maintain records, maps, forms and other official materials as relate to the adoption, amendment, enforcement, and administration of this ordinance.

(6) To provide expertise and technical assistance to the Graham City Council, upon request.

(7) To designate appropriate other person(s) who shall carry out the powers and duties of the Stormwater Administrator.

(8) To take any other action necessary to administer the provisions of this ordinance.

Sec. 10.498 Review Procedures

a.) Permit Required; Must Apply for Permit

A stormwater permit is required for all *development* and *redevelopment* unless exempt pursuant to this ordinance. A permit may only be issued subsequent to a properly submitted and reviewed permit application, pursuant to this section.

b.) Effect of Permit

A stormwater permit shall govern the design, installation, and construction of stormwater management and control practices on the site, including *structural BMPs* and elements of site design for stormwater management other than *structural BMPs*.

The permit is intended to provide a mechanism for the review, approval, and inspection of the approach to be used for the management and control of stormwater for the *development* or *redevelopment* site consistent with the requirements of this ordinance, whether the approach consists of *structural BMPs* or other techniques such as low-impact or low-density design. The permit does not continue in existence indefinitely after the completion of the project; rather, compliance after project construction is assured by the maintenance provisions of this ordinance.

c.) Authority to File Applications

All applications required pursuant to this Code shall be submitted to the Stormwater Administrator by the land *owner* or the land *owner's* duly authorized agent.

d.) Establishment of Application Requirements, Schedule, and Fees

(1) Application Contents and Form

The Stormwater Administrator shall establish requirements for the content and form of all applications and shall amend and update those requirements from time to time. At a minimum, the stormwater permit application shall describe in detail how post-*development* stormwater runoff will be controlled and managed, the design of all stormwater facilities and practices, and how the proposed project will meet the requirements of this ordinance.

(2) Submission Schedule

The Stormwater Administrator shall establish a submission schedule for applications. The schedule shall establish deadlines by which complete applications must be submitted for the purpose of ensuring that there is adequate time to review applications, and that the various stages in the review process are accommodated.

e.) Permit Review Fees

The Graham City Council shall establish permit review fees as well as policies regarding refund of any fees upon withdrawal of an application, and may amend and update the fees and policies from time to time.

f.) Administrative Manual

For applications required under this Code, the Stormwater Administrator shall compile the application requirements, submission schedule, fee schedule, a copy of this ordinance, and information on how and where to obtain the Stormwater BMP Design Manual in an Administrative Manual, which shall be made available to the public.

Sec. 10.499 Submittal of Complete Application

Applications shall be submitted to the Stormwater Administrator pursuant to the application submittal schedule in the form established by the Stormwater Administrator, along with the appropriate fee established pursuant to this section.

An application shall be considered as timely submitted only when it contains all elements of a complete application pursuant to this ordinance, along with the appropriate fee. If the Stormwater Administrator finds that an application is incomplete, the applicant shall be notified of the deficient elements and shall be provided with an opportunity to submit a complete application. However, the submittal of an incomplete application shall not suffice to meet a deadline contained in the submission schedule established above.

a.) Review

Within 30 working days after a complete application is submitted, the Stormwater Administrator shall review the application and determine whether the application complies with the standards of this ordinance.

(1) Approval

If the Stormwater Administrator finds that the application complies with the standards of this ordinance, the Stormwater Administrator shall approve the application. The Stormwater Administrator may impose conditions of approval as needed to ensure compliance with this ordinance. The conditions shall be included as part of the approval.

(2) Fails to Comply

If the Stormwater Administrator finds that the application fails to comply with the standards of this ordinance, the Stormwater Administrator shall notify the applicant and shall indicate how the application fails to comply. The applicant shall have an opportunity to submit a revised application.

(3) Revision and Subsequent Review

A complete revised application shall be reviewed by the Stormwater Administrator within 15 working days after its re-submittal and shall be approved, approved with conditions or disapproved.

If a revised application is not re-submitted within thirty (30) calendar days from the date the applicant was notified, the application shall be considered withdrawn, and a new submittal for the same or substantially the same project shall be required along with the appropriate fee for a new submittal.

One re-submittal of a revised application may be submitted without payment of an additional permit review fee. Any re-submittal after the first re-submittal shall be accompanied by a permit review fee additional fee, as established pursuant to this ordinance.

Sec. 10.500 Applications for Approval

a.) Concept Plan and Consultation Meeting

Before a stormwater management permit application is deemed complete, the Stormwater Administrator or developer may request a consultation on a concept plan for the post-construction stormwater management system to be utilized in the proposed *development* project. This consultation meeting should take place at the time of the sketch or preliminary plan of subdivision or other early step in the *development* process. The purpose of this meeting is to discuss the post-construction stormwater management measures necessary for the proposed project, as well as to discuss and assess constraints, opportunities and potential approaches to stormwater management designs before formal site design engineering is commenced. Other relevant resource protection plans should be consulted in the discussion of the concept plan.

To accomplish this goal, the following information should be included in the concept plan, which should be submitted in advance of the meeting:

(1) Existing Conditions / Proposed Site Plans

Existing conditions and proposed site layout sketch plans, which illustrate at a minimum: existing and proposed topography; perennial and intermittent streams; mapping of predominant soils from soil surveys (if available); boundaries of existing predominant vegetation; proposed limits of clearing and grading; and location of existing and proposed roads, buildings, parking areas and other impervious surfaces.

Existing and proposed topography shall be shown at two-foot contour intervals on the tract to be developed and a minimum of 100-feet beyond the property lines. All contour information shall be based on mean sea level and accurate to within one-half foot.

(2) Natural Resources Inventory

A written or graphic inventory of the natural resources at the site and surrounding area as it exists prior to the commencement of the project. This

description should include a discussion of soil conditions, forest cover, geologic features, topography, wetlands, and native vegetative areas on the site, as well as the location and boundaries of other natural feature protection and conservation areas such as lakes, ponds, floodplains, stream buffers and other setbacks (e.g., drinking water well setbacks, septic setbacks, etc.). Particular attention should be paid to environmentally sensitive features that provide particular opportunities or constraints for *development* and stormwater management.

(3) Stormwater Management System Concept Plan

A written or graphic concept plan of the proposed post-*development* stormwater management system including: preliminary selection and location of proposed structural stormwater controls; low impact design elements; location of existing and proposed conveyance systems such as grass channels, swales, and storm drains; flow paths; location of floodplain/floodway limits; relationship of site to upstream and downstream properties and drainages; and preliminary location of proposed stream channel modifications, such as bridge or culvert crossings.

b.) Stormwater Management Permit Application

The stormwater management permit application shall detail how post-*development* stormwater runoff will be controlled and managed and how the proposed project will meet the requirements of this ordinance, including Division 3, Standards. All such plans shall be prepared by a qualified registered North Carolina professional engineer, surveyor, soil scientist or landscape architect, and the engineer, surveyor, soil scientist or landscape architect shall perform services only in their area of competence,

The plans shall contain a signed and sealed statement certifying that the design of all stormwater management facilities and practices will control and treat the runoff from the from the first one inch of rain over the total drainage area, that the designs and plans are sufficient to comply with applicable standards and policies found in the *Stormwater BMP Design Manual*, and that the designs and plans ensure compliance with this ordinance.

The submittal shall include all of the information required in the submittal checklist established by the Stormwater Administrator. Incomplete submittals shall be treated pursuant to Section 10-499.

c.) As-Built Plans and Final Approval

Upon completion of a project, and before a certificate of occupancy shall be granted, the applicant shall certify, under seal, that the completed project is in accordance with the approved stormwater management plans and designs and

with the requirements of this ordinance. The applicant shall submit all of the information required in the As-Built submittal checklist established by the Stormwater Administrator. A final inspection and approval by the Stormwater Administrator shall occur before the release of any performance securities.

d.) Other Permits

No certificate of compliance or occupancy shall be issued by the City of Graham without final as-built plans and a final inspection and approval by the Stormwater Administrator, except where multiple units are served by the stormwater practice or facilities, in which case the City of Graham may elect to withhold a percentage of permits or certificates of occupancy until as-built plans are submitted and final inspection and approval has occurred.

Sec. 10.501 Approvals

a.) Effect of Approval

Approval authorizes the applicant to go forward with only the specific plans and activities authorized in the permit. The approval shall not be construed to exempt the applicant from obtaining other applicable approvals from local, state, and federal authorities.

b.) Time Limit/Expiration

An approved plan shall become null and void if the applicant fails to make *substantial progress* on the site within two years after the date of approval.

Sec. 10.502 Appeals

Any aggrieved person affected by any decision, order, requirement, or determination relating to the interpretation or application of this ordinance and made by the Stormwater Administrator may file an appeal to the Board of Adjustment within 30 days. Such appeals shall be taken within times prescribed by the board of adjustment by general rule, by filing with the Stormwater Administrator and with the board of adjustment a notice of appeal specifying the ground thereof. The Stormwater Administrator shall forthwith transmit to the board all the papers constituting the record upon which the action appealed from was taken. The board of adjustment shall fix a reasonable time for the hearing of the appeal or other matter referred to it, give public notice thereof, as well as due notice to the parties in interest, and decide the same within a reasonable time. At the hearing any party in interest may appear in person or by agent or attorney.

DIVISION 3. STANDARDS

Sec. 10.503 General Standards

All *development* and *redevelopment* to which this ordinance applies shall comply with the standards of this section. In addition to the Stormwater BMP Design Manual, the design and construction of stormwater improvements shall also be according to the City of Graham *Storm Sewer Design Manual* which requirements are hereby adopted and made a part of this Ordinance as if set out in full.

Sec. 10.504 Development Standards for Low-Density Projects

Low-density projects (no more than two dwelling units per acre or twenty-four percent built-upon area for all residential and non-residential development) shall comply with each of the following standards:

a.) Stormwater runoff from the *development* shall be transported from the *development* by vegetated conveyances to the maximum extent practicable.

b.) All ***built-upon area*** shall be at a minimum of 30 feet landward of all perennial and intermittent surface waters. A perennial or intermittent surface water shall be deemed present if the feature is approximately shown on either the most recent version of the soil survey map prepared by the Natural Resources Conservation Service of the United States Department of Agriculture (USDA) or the most recent version of the 1:24,000 scale (7.5 minute) quadrangle topographic maps prepared by the United States Geologic Survey (USGS). An exception to this requirement may be allowed when surface waters are not present in accordance with the provisions of 15A NCAC 2B .0233 (3)(a) or similar site-specific determination made using *Division*-approved methodology.

c.) The approval of the stormwater permit shall require an enforceable restriction on property usage that runs with the land, such as a recorded deed restriction or protective covenants, to ensure that future *development* and *redevelopment* maintains the site consistent with the approved project plans.

Sec. 10.505 Development standards for High-Density Projects

High-density projects (any project that exceeds the low density thresholds for dwelling units per acre or built-upon area) shall implement structural stormwater management systems that comply with each of the following standards:

a.) Control and treat the runoff from the first one inch of rain;

b.) Runoff volume drawdown time shall be a minimum of 48 hours, but not more than 120 hours;

c.) Discharge the storage volume at a rate equal to or less than the predevelopment discharge rate for the one-year, 24-hour storm;

d.) All structural stormwater treatment systems used to meet the requirements of the program shall be designed to have a minimum of 85% average annual removal for Total Suspended Solids (TSS);

e.) General engineering design criteria for all projects shall be in accordance with 15A NCAC 2H .1008(c), as explained in the *Stormwater BMP Design Manual***;**

f.) All ***built-upon area*** shall be at a minimum of 30 feet landward of all perennial and intermittent surface waters. A perennial or intermittent surface water shall be deemed present if the feature is approximately shown on either the most recent version of the soil survey map prepared by the Natural Resources Conservation Service of the United States Department of Agriculture (USDA) or the most recent version of the 1:24,000 scale (7.5 minute) quadrangle topographic maps prepared by the United States Geologic Survey (USGS). An exception to this requirement may be allowed when surface waters are not present in accordance with the provisions of 15A NCAC 2B .0233 (3)(a) or similar site-specific determination made using *Division*-approved methodology.

g.) The approval of the stormwater permit shall require an enforceable restriction on property usage that runs with the land, such as recorded deed restrictions or protective covenants, to ensure that future *development* and *redevelopment* maintains the *site* consistent with the approved project plans.

Sec. 10.506 Standards for Stormwater Control Measures

a.) Evaluation According to Contents of ***Stormwater BMP Design Manual***

All stormwater control measures and stormwater treatment practices (also referred to as Best Management Practices, or BMPs) required under this ordinance shall be evaluated by the Stormwater Administrator according to the policies, criteria, and information, including technical specifications and standards and the specific design criteria for each stormwater practice, in the ***Stormwater BMP Design Manual***. The Stormwater Administrator shall determine whether proposed BMPs will be adequate to meet the requirements of this ordinance.

b.) Determination of Adequacy; Presumptions and Alternatives

Stormwater treatment practices that are designed, constructed, and maintained in accordance with the criteria and specifications in the *Stormwater BMP Design*

Manual will be presumed to meet the minimum water quality and quantity performance standards of this ordinance. Whenever an applicant proposes to utilize a practice or practices not designed and constructed in accordance with the criteria and specifications in the *Stormwater BMP Design Manual*, the applicant shall have the burden of demonstrating that the practice(s) will satisfy the minimum water quality and quantity performance standards of this ordinance. The Stormwater Administrator may require the applicant to provide the documentation, calculations, and examples necessary for the Stormwater Administrator to determine whether such an affirmative showing is made.

c.) Separation from Seasonal High Water Table

For BMPs that require a separation from the seasonal high-water table, the separation shall be provided by at least 12 inches of naturally occurring soil above the seasonal high-water table.

Sec. 10.507 Dedication of BMP's, Facilities, and Improvements

Unless otherwise approved, ownership of any existing or future stormwater management facilities shall remain with the owner of the property or a legally established property owner's association. Such facilities shall meet all the requirements of this ordinance and include adequate and perpetual access and sufficient area, by easement or otherwise, for inspection and regular maintenance.

Sec. 10.508 Variances

a.) Any person may petition the Board of Adjustment for a variance granting permission to use the person's land in a manner otherwise prohibited by this ordinance. To qualify for a variance, the petitioner must show all of the following:

(1) Unnecessary hardships would result from strict application of this ordinance.

(2) The hardships result from conditions that are peculiar to the property, such as the location, size, or topography of the property.

(3) The hardships did not result from actions taken by the petitioner.

(4) The requested variance is consistent with the spirit, purpose, and intent of this ordinance; will secure public safety and welfare; and will preserve substantial justice.

b.) The City of Graham may impose reasonable and appropriate conditions and safeguards upon any variance it grants.

c.) Statutory exceptions

Notwithstanding subdivision (a.) of this section, exceptions from the 30-foot landward location of built-upon area requirement as well as the deed restrictions and protective covenants requirements shall be granted in any of the following instances:

(1) When there is a lack of practical alternatives for a road crossing, railroad crossing, bridge, airport facility, or utility crossing as long as it is located, designed, constructed, and maintained to minimize disturbance, provide maximum nutrient removal, protect against erosion and sedimentation, have the least adverse effects on aquatic life and habitat, and protect water quality to the maximum extent practicable through the use of BMPs.

(2) When there is a lack of practical alternatives for a stormwater management facility; a stormwater management pond; or a utility, including, but not limited to, water, sewer, or gas construction and maintenance corridor, as long as it is located 15 feet landward of all perennial and intermittent surface waters and as long as it is located, designed, constructed, and maintained to minimize disturbance, provide maximum nutrient removal, protect against erosion and sedimentation, have the least adverse effects on aquatic life and habitat, and protect water quality to the maximum extent practicable through the use of BMPs.

Sec. 10.509 Nutrient Sensitive Waters

In addition to the standards for stormwater handling set out in the *NCDENR Stormwater BMP Design Manual*, development and redevelopment shall be designed to implement the best stormwater practices that reduce nutrient loading, while still meeting the other requirements of this ordinance.

Sec. 10.510 Nutrient Application Management Program

a.) The City of Graham recommends anyone applying fertilizer for pay complete training provided by either the Cooperative Extension Service or the North Carolina Department of Environment and Natural Resources - Division of Water Quality. This training will provide participants with an understanding of the value and importance of proper management of nitrogen and phosphorus, the water quality impacts of poor nutrient management, and the ability to understand and properly carry out a nutrient management plan.

Sec. 10.511 On-site Wastewater Treatment Systems

For new development and redevelopment that includes the use of on-site wastewater treatment systems, a copy of the approved system permit issued by the Alamance County Environmental Health Department shall be provided to the Stormwater Administrator.

DIVISION 4. MAINTENANCE

Sec. 10.512 General Standards for Maintenance

a.) Function of BMPs As Intended

The *owner* of each *structural BMP* installed pursuant to this ordinance shall maintain and operate it so as to preserve and continue its function in controlling stormwater quality and quantity at the degree or amount of function for which the *structural BMP* was designed.

b.) Annual Maintenance Inspection and Report

The person responsible for maintenance of any *structural BMP* installed pursuant to this ordinance shall submit to the Stormwater Administrator an inspection report from one of the following persons performing services only in their area of competence: a qualified registered North Carolina professional engineer, surveyor, landscape architect, soil scientist, aquatic biologist, or person certified by the North Carolina Cooperative Extension Service for stormwater treatment practice inspection and maintenance. The inspection report shall contain all of the following:

(1) The name and address of the land *owner*;

(2) The recorded book and page number of the lot of each *structural BMP*;

(3) A statement that an inspection was made of all *structural BMP*s;

(4) The date the inspection was made;

(5) A statement that all inspected *structural BMP*s are performing properly and are in compliance with the terms and conditions of the approved maintenance agreement required by this ordinance; and

(6) The original signature and seal of the engineer, surveyor, or landscape architect.

All inspection reports shall be on forms approved by the Stormwater Administrator. An original inspection report shall be provided to the Stormwater Administrator beginning one year from the date of as-built certification and each year thereafter on or before the date of the as-built certification.

(7) Each annual report shall include color photographs of each BMP.

Sec. 10.513 Operation and Maintenance Agreement

a.) In General

Prior to the conveyance or transfer of any lot or building site to be served by a *structural BMP* pursuant to this ordinance, and prior to issuance of any permit for ***development*** or *redevelopment* requiring a *structural BMP* pursuant to this ordinance, the applicant or *owner* of the site must execute an operation and maintenance agreement that shall be binding on all subsequent *owner*s of the site, portions of the site, and lots or parcels served by the *structural BMP*. Until the transference of all property, sites, or lots served by the *structural BMP*, the original *owner* or applicant shall have primary responsibility for carrying out the provisions of the maintenance agreement.

The operation and maintenance agreement shall require the *owner* or *owner*s to maintain, repair and, if necessary, reconstruct the *structural BMP*, and shall state the terms, conditions, and schedule of maintenance for the *structural BMP*. In addition, it shall grant to the City of Graham a right of entry in the event that the Stormwater Administrator has reason to believe it has become necessary to inspect, monitor, maintain, repair, or reconstruct the *structural BMP*; however, in no case shall the right of entry, of itself, confer an obligation on the City of Graham to assume responsibility for the *structural BMP*.

The operation and maintenance agreement must be approved by the Stormwater Administrator prior to plan approval, and it shall be referenced on the final plat and shall be recorded with the Alamance County Register of Deeds upon final plat approval. A copy of the recorded maintenance agreement shall be given to the Stormwater Administrator within fourteen (14) days following its recordation.

b.) Special Requirement for Homeowners' and Other Associations

For all *structural BMP*s required pursuant to this ordinance and that are to be or are owned and maintained by a homeowners' association, property owners' association, or similar entity, the required operation and maintenance agreement shall include all of the following provisions:

(1) Acknowledgment that the association shall continuously operate and maintain the stormwater control and management facilities.

(2) Establishment of an escrow account, which can be spent solely for sediment removal, structural, biological or vegetative replacement, major repair, or reconstruction of the *structural BMP*s. If *structural BMP*s are not performing adequately or as intended or are not properly maintained, the City of Graham, in its sole discretion, may remedy the situation, and in such instances the City of Graham shall be fully reimbursed from the escrow account. Escrowed funds may be spent by the association for sediment removal, structural, biological or vegetative replacement, major repair, and reconstruction of the *structural BMP*s, provided that the City of Graham shall first consent to the expenditure.

(3) Both developer contribution and annual sinking funds shall fund the escrow account. Prior to plat recordation or issuance of construction permits, whichever shall first occur, the developer shall pay into the escrow account an amount equal to fifteen (15) per cent of the initial construction cost of the *structural BMP*s. Two-thirds (2/3) of the total amount of sinking fund budget shall be deposited into the escrow account within the first five (5) years and the full amount shall be deposited within ten (10) years following initial construction of the *structural BMP*s. Funds shall be deposited each year into the escrow account. A portion of the annual assessments of the association shall include an allocation into the escrow account. Any funds drawn down from the escrow account shall be replaced in accordance with the schedule of anticipated work used to create the sinking fund budget.

(4) The percent of developer contribution and lengths of time to fund the escrow account may be varied by the City of Graham depending on the design and materials of the stormwater control and management facility.

(5) Granting to the City of Graham a right of entry to inspect, monitor, maintain, repair, and reconstruct *structural BMP*s.

(6) Allowing the City of Graham to recover from the association and its members any and all costs the City of Graham expends to maintain or repair the *structural BMP*s or to correct any operational deficiencies. Failure to pay the City of Graham all of its expended costs, after forty-five days written notice, shall constitute a breach of the agreement. In case of a deficiency, the City of Graham shall thereafter be entitled to bring an action against the association and its members to pay, or foreclose upon the lien hereby authorized by the agreement against the property, or both, in case of a deficiency. Interest, collection costs, and attorney fees shall be added to the recovery.

(7) A statement that this agreement shall not obligate the City of Graham to maintain or repair any *structural BMP*s, and the City of Graham shall not be liable to any person for the condition or operation of *structural BMP*s.

(8) A statement that this agreement shall not in any way diminish, limit, or restrict the right of the City of Graham to enforce any of its ordinances as authorized by law.

(9) A provision indemnifying and holding harmless the City of Graham for any costs and injuries arising from or related to the structural BMP, unless the City of Graham has agreed in writing to assume the maintenance responsibility for the BMP and has accepted dedication of any and all rights necessary to carry out that maintenance.

Sec. 10.514 Inspection Program

Inspections and inspection programs by the City of Graham may be conducted or established on any reasonable basis, including but not limited to routine inspections; random inspections;

inspections based upon complaints or other notice of possible violations; and joint inspections with other agencies inspecting under environmental or safety laws. Inspections may include, but are not limited to, reviewing maintenance and repair records; sampling discharges, surface water, groundwater, and material or water in BMPs; and evaluating the condition of BMPs.

If the *owner* or occupant of any property refuses to permit such inspection, the Stormwater Administrator shall proceed to obtain an administrative search warrant pursuant to G.S. 15-27.2 or its successor. No person shall obstruct, hamper or interfere with the Stormwater Administrator while carrying out his or her official duties.

Sec. 10.515 Performance Security for Installation and Maintenance

a.) Shall Be Required

The City of Graham shall, at its discretion, require the submittal of a performance security or bond with surety, cash escrow, letter of credit or other acceptable legal arrangement prior to issuance of a permit in order to ensure that the *structural BMP*s are

(1) installed by the permit holder as required by the approved stormwater management plan**,** and/or

(2) maintained by the *owner* as required by the operation and maintenance agreement.

b.) Amount

(1) Installation

The amount of an installation performance security shall be 150% of the total estimated construction cost of the BMPs approved under the permit.

(2) Maintenance

The amount of a maintenance performance security shall be the present value of an annuity of perpetual duration based on a reasonable estimate of the annual cost of inspection, operation and maintenance of the BMPs approved under the permit, at a discount rate that reflects the jurisdiction's cost of borrowing minus a reasonable estimate of long term inflation.

c.) Uses of Performance Security

(1) Forfeiture Provisions

The performance security shall contain forfeiture provisions for failure, after proper notice, to complete work within the time specified, or to initiate or

maintain any actions which may be required of the applicant or *owner* in accordance with this ordinance, approvals issued pursuant to this ordinance, or an operation and maintenance agreement established pursuant to this ordinance.

(2) Default

Upon default of the *owner* to construct, maintain, repair and, if necessary, reconstruct any *structural BMP* in accordance with the applicable permit or operation and maintenance agreement, the Stormwater Administrator shall obtain and use all or any portion of the security to make necessary improvements based on an engineering estimate. Such expenditure of funds shall only be made after requesting the *owner* to comply with the permit or maintenance agreement. In the event of a default triggering the use of installation performance security, the City of Graham shall not return any of the unused deposited cash funds or other security, which shall be retained for maintenance.

(3) Costs in Excess of Performance Security

If City of Graham takes action upon such failure by the applicant or *owner*, the City may collect from the applicant or *owner* the difference between the amount of the reasonable cost of such action and the amount of the security held, in addition to any other penalties or damages due.

(4) Refund

Within sixty days of the final approval, the installation performance security shall be refunded to the applicant or terminated, except any amount attributable to the cost (plus 25%) of landscaping installation and ongoing maintenance associated with the BMPs covered by the security. Any such landscaping shall be inspected one (1) year after installation with replacement for compliance with the approved plans and specifications and, if in compliance, the portion of the financial security attributable to landscaping shall be released.

Sec. 10.516 Notice to *Owner*s

a.) Recorded Deed and Indications on Plat

The applicable operations and maintenance agreement pertaining to every *structural BMP* shall be referenced on the final plat and shall be recorded with the Alamance County Register of Deeds upon final plat approval. If no subdivision plat is recorded for the site, then the operations and maintenance agreement shall be recorded with the Alamance County Register of Deeds so as to appear in the chain of title of all subsequent purchasers under generally accepted searching principles.

b.) Signage

Where appropriate in the determination of the Stormwater Administrator to assure compliance with this ordinance, *structural BMP*s shall be posted with a conspicuous sign stating who is responsible for required maintenance and annual inspection. The sign shall be maintained so as to remain visible and legible.

Sec. 10.517 Records of Installation and Maintenance Activities

The *owner* of each *structural BMP* shall keep records of inspections, maintenance, and repairs for at least five years from the date of creation of the record and shall submit the same upon reasonable request to the Stormwater Administrator.

Sec. 10.518 Nuisance

The *owner* of each stormwater BMP, whether *structural* or non-*structural BMP*, shall maintain it so as not to create or result in a nuisance condition.

Sec. 10.519 Maintenance Easement

Every *structural BMP* installed pursuant to this ordinance shall be made accessible for adequate maintenance and repair by a maintenance easement. This access maintenance easement shall have a minimum width of 20 feet, a maximum slope of 15%, be connected to public right-of-way, be cleared, and be traversable by construction equipment. The easement shall be recorded and its terms shall specify who may make use of the easement and for what purposes.

DIVISION 5. ENFORCEMENT AND VIOLATIONS

Sec. 10.520 General

a.) Authority to Enforce

The provisions of this ordinance shall be enforced by the Stormwater Administrator, his or her designee, or any authorized agent of City of Graham. Whenever this section refers to the Stormwater Administrator, it includes his or her designee as well as any authorized agent of City of Graham.

b.) Violation Unlawful

Any failure to comply with an applicable requirement, prohibition, standard, or limitation imposed by this ordinance, or the terms or conditions of any permit or other ***development*** or *redevelopment* approval or authorization granted pursuant to this ordinance, is unlawful and shall constitute a violation of this ordinance.

c.) Each Day a Separate Offense

Each day that a violation continues shall constitute a separate and distinct violation or offense.

d.) Responsible Persons/Entities

Any person who erects, constructs, reconstructs, alters (whether actively or passively), or fails to erect, construct, reconstruct, alter, repair or maintain any structure, BMP, practice, or condition in violation of this ordinance shall be subject to the remedies, penalties, and/or enforcement actions in accordance with this section. Persons subject to the remedies and penalties set forth herein may include any architect, engineer, builder, contractor, developer, agency, or any other person who participates in, assists, directs, creates, causes, or maintains a condition that results in or constitutes a violation of this ordinance, or fails to take appropriate action, so that a violation of this ordinance results or persists; or an *owner*, any tenant or occupant, or any other person, who has control over, or responsibility for, the use or *development* of the property on which the violation occurs.

For the purposes of this Ordinance, responsible person(s) shall include but not be limited to:

(1) Person Maintaining Condition Resulting In or Constituting Violation

An architect, engineer, builder, contractor, developer, agency, or any other person who participates in, assists, directs, creates, causes, or maintains a

condition that constitutes a violation of this ordinance, or fails to take appropriate action, so that a violation of this ordinance results or persists.

(2) Responsibility for Land or Use of Land

The *owner* of the land on which the violation occurs, any tenant or occupant of the property, any person who is responsible for stormwater controls or practices pursuant to a private agreement or public document, or any person, who has control over, or responsibility for, the use, *development* or *redevelopment* of the property.

Sec. 10.521 Remedies and Penalties

The remedies and penalties provided for violations of this ordinance, whether civil or criminal, shall be cumulative and in addition to any other remedy provided by law, and may be exercised in any order.

a.) Remedies

(1) Withholding of Certificate of Occupancy

The Stormwater Administrator or other authorized agent may refuse to issue a certificate of occupancy for the building or other improvements constructed or being constructed on the site and served by the stormwater practices in question until the applicant or other responsible person has taken the remedial measures set forth in the notice of violation or has otherwise cured the violations described therein.

(2) Disapproval of Subsequent Permits and ***Development*** Approvals

As long as a violation of this ordinance continues and remains uncorrected, the Stormwater Administrator or other authorized agent may withhold, and the Planning Board of the City of Graham may disapprove, any request for permit or *development* approval or authorization provided for by this ordinance or the Planning Board of the City of Graham for the land on which the violation occurs.

(3) Injunction, Abatements, etc.

The City Council, may institute an action in a court of competent jurisdiction for a mandatory or prohibitory injunction and order of abatement to correct a violation of this ordinance. Any person violating this ordinance shall be subject to the full range of equitable remedies provided in the General Statutes or at common law.

(4) Correction as Public Health Nuisance, Costs as Lien, etc.

If the violation is deemed dangerous or prejudicial to the public health or public safety and is within the geographic limits prescribed by North Carolina G.S. § 160A-193, the Stormwater Administrator, with the authorization of the City Council, may cause the violation to be corrected and the costs to be assessed as a lien against the property.

(5) Stop Work Order

The Stormwater Administrator may issue a stop work order to the person(s) violating this ordinance. The stop work order shall remain in effect until the person has taken the remedial measures set forth in the notice of violation or has otherwise cured the violation or violations described therein. The stop work order may be withdrawn or modified to enable the person to take the necessary remedial measures to cure such violation or violations.

b.) Civil Penalties

Violation of this ordinance may subject the violator to a civil penalty to be recovered in a civil action in the nature of a debt if the violator does not pay the penalty within 30 days after notice of the violation is issued by the Stormwater Administrator. Civil penalties may be assessed up to the full amount of penalty to which the City of Graham is subject for violations of its Phase II Stormwater permit.

c.) Criminal Penalties

Violation of this ordinance may be enforced as a misdemeanor subject to the maximum fine permissible under North Carolina law.

Sec. 10.522 Procedures

a.) Initiation/Complaint

Whenever a violation of this ordinance occurs, or is alleged to have occurred, any person may file a written complaint. Such complaint shall state fully the alleged violation and the basis thereof, and shall be filed with the Stormwater Administrator, who shall record the complaint. The complaint shall be investigated promptly by the Stormwater Administrator.

b.) Inspection

The Stormwater Administrator, or other authorized personnel, shall have the authority, upon presentation of proper credentials, to enter and inspect any land, building, structure, or premises to ensure compliance with this ordinance.

c.) Notice of Violation and Order to Correct

When the Stormwater Administrator finds that any building, structure, or land is in violation of this ordinance, the Stormwater Administrator shall notify, in writing, the property *owner* or other person violating this ordinance. The notification shall indicate the nature of the violation, contain the address or other description of the site upon which the violation is occurring, order the necessary action to abate the violation, and give a deadline for correcting the violation. If civil penalties are to be assessed, the notice of violation shall also contain a statement of the civil penalties to be assessed, the time of their accrual, and the time within which they must be paid or be subject to collection as a debt.

The Stormwater Administrator may deliver the notice of violation and correction order personally, by the City Police Department, City Planning Department, by certified or registered mail, return receipt requested, or by any means authorized for the service of documents by Rule 4 of the North Carolina Rules of Civil Procedure.

If a violation is not corrected within a reasonable period of time, as provided in the notification, the Stormwater Administrator may take appropriate action under this ordinance to correct and abate the violation and to ensure compliance with this ordinance.

d.) Extension of Time

A person who receives a notice of violation and correction order, or the *owner* of the land on which the violation occurs, may submit to the Stormwater Administrator a written request for an extension of time for correction of the violation. On determining that the request includes enough information to show that the violation cannot be corrected within the specified time limit for reasons beyond the control of the person requesting the extension, the Stormwater Administrator may extend the time limit as is reasonably necessary to allow timely correction of the violation, up to, but not exceeding 30 days. The Stormwater Administrator may grant 15 -day extensions in addition to the foregoing extension if the violation cannot be corrected within the permitted time due to circumstances beyond the control of the person violating this ordinance. The Stormwater Administrator may grant an extension only by written notice of extension. The notice of extension shall state the date prior to which correction must be made, after which the violator will be subject to the penalties described in the notice of violation and correction order.

e.) Enforcement After Time to Correct

After the time has expired to correct a violation, including any extension(s) if authorized by the Stormwater Administrator, the Stormwater Administrator shall

determine if the violation is corrected. If the violation is not corrected, the Stormwater Administrator may act to impose one or more of the remedies and penalties authorized by this ordinance.

f.) Emergency Enforcement

If delay in correcting a violation would seriously threaten the effective enforcement of this ordinance or pose an immediate danger to the public health, safety, or welfare, then the Stormwater Administrator may order the immediate cessation of a violation. Any person so ordered shall cease any violation immediately. The Stormwater Administrator may seek immediate enforcement, without prior written notice, through any remedy or penalty authorized by this article.

CITY OF GRAHAM

STORM SEWER DESIGN MANUAL

OCTOBER, 2004

STORM SEWER DESIGN MANUAL

The purpose of this manual is to set forth a uniform procedure for designing and checking the designs of proposed storm sewer systems for the City of Graham. Individuals are to use this manual in the preliminary layout of storm sewer design to minimize revisions during the review process. It is not the intent of this manual to provide an explanation for every design problem encountered, nor is it a substitute for experience, sound judgement, and engineering knowledge.

The City of Graham will use these guidelines along with sound engineering principles to review the detailed drawings submitted for review. These standards shall apply to all storm sewer design installations within the City of Graham. Any deviation to these design standards must have written approval by the City Engineer prior to construction.

Table of Contents

Introduction

In the field of storm drainage design, there are numerous methods and theories to which engineers may refer. To simplify design and review processes, the procedures for design and construction are presented in this manual. It is not required that engineers designing storm drainage installation adhere to these methods; however, the methods presented in this manual will be considered minimum design standards and any other methods must equal or surpass these design standards.

Presented in this manual are procedures, charts, and tables, which will be helpful in the design of commercial and residential developments in Graham. Also listed are requirements concerning storm drainage design and construction.

DESIGN PROCEDURES

The procedures presented in this manual will consist of four distinct and separate steps to storm drainage design as it is applied to the storm sewer system for the City of Graham. In cases where roadway drainage is not a consideration, some of the steps will not apply.

1) Determine the amount of water discharged at the point of design. This is basic to the hydraulic design of any drainage structure whether it is a channel, culvert, pipe system, or an inlet.
2) Determine the capacity of the gutter and allowable roadway area to transport the quantity of runoff collected on the roadway.
3) Determine the intake capacity of the inlet structure receiving the runoff.
4) Determine the actual size for the discharge pipe based on the calculated discharge and the most economical slope.

DETERMINATION OF DISCHARGE

The City of Graham uses two methods for determining storm drainage, discharge design depending on whether the drainage basin is above or below 200 acres in area. Use the Rational Method for areas under 200 acres and the Basin Lag-time Method for areas over 200 acres.

The Rational Method
(Method for Estimating Rainfall Runoff in Drainage Areas Under 200 Acres)

The Rational Formula is:

$$Q=CIA$$

Where
Q = peak discharge of drainage basin in cubic feet per second (cfs)
C = coefficient of runoff
I = intensity of rainfall in inches per hour for a storm of a given frequency and duration equal to the time of concentration
A = area of drainage basin in acres

When selecting representative values used in the rational formula, consider the following:

1) Coefficient of Runoff = **C**
A list of runoff coefficients to be used in design computations is shown on page 8. Select a **C** value coinciding with the characteristics of the drainage area after development. When the drainage area involves a combination of coefficients a weighted average must be computed. The type of land and development used in selecting a **C** value will be compatible with the current zoning maps.

2) *Rainfall Intensity* = **I**

There is a direct relationship between rainfall intensity and the time of concentration. The duration of the design storm is equal to the time of concentration of the drainage basin in question. The time of concentration is the time required for a particle of water to flow from the most remote point in any section of the drainage area to the point of design.

A velocity of 8-feet per second would provide a reasonable design velocity for determining the time of concentration throughout the watershed of the Graham area. Since 8-feet per second = 480 ft./min., a design figure of 500 ft./min. is actually used to simplify computations.

A further assumption is made that in the uppermost reaches of the watershed where the following applies. The sheet velocity of the runoff will be such that it will travel 800-feet in 10 minutes in business areas and 500-feet in 10 minutes in residential areas, before being collected in well-defined watercourses where its velocity will then be 500 ft./min.

As an example of application, suppose that in a residential area it is found by scaling from a 200-foot scale topographic map that the distance from the ridgeline to a point on a watercourse is 3000-feet. The time of concentration will be found as follows:

3000 ft.		
- 500 ft.	=	10 min.
2500 ft. @ 500 ft./min	=	5 min.
Time of concentration	=	15 min.

Using the time of concentration determine the rainfall intensity (I) from the appropriate rainfall and runoff chart found on pages 9 – 13. Storm sewer systems carrying street or public runoff are to be designed to carry a 10-year return period storm. This requirement will apply to all public and private developments.

3) *Drainage Area* = **A**

The acreage of the watershed in question can be computed from topographic maps by marking the ridgelines and planimetering the designated areas. Provide copies of the drainage area delineation mapping.

Once the values for **C, I,** and **A** are determined it is a simple procedure to calculate the peak discharge rate for the site using the equation, **Q = CIA.**

AVERAGE VALUES OF THE RUNOFF COEFFICIENT

Below are the runoff coefficients to be used in calculating storm water runoff. All drainage must be designed based on proposed land use for the entire drainage basin and be assumed to be developed.

Type of Development:	Runoff Coefficient
Residential, Single Family	0.65
Apartments, Condominiums, and Industrial Parks	0.80
Paved Areas (Downtown Areas, Shopping Centers, etc.)	0.95
Playgrounds, Parks, Cemeteries, etc.	0.40

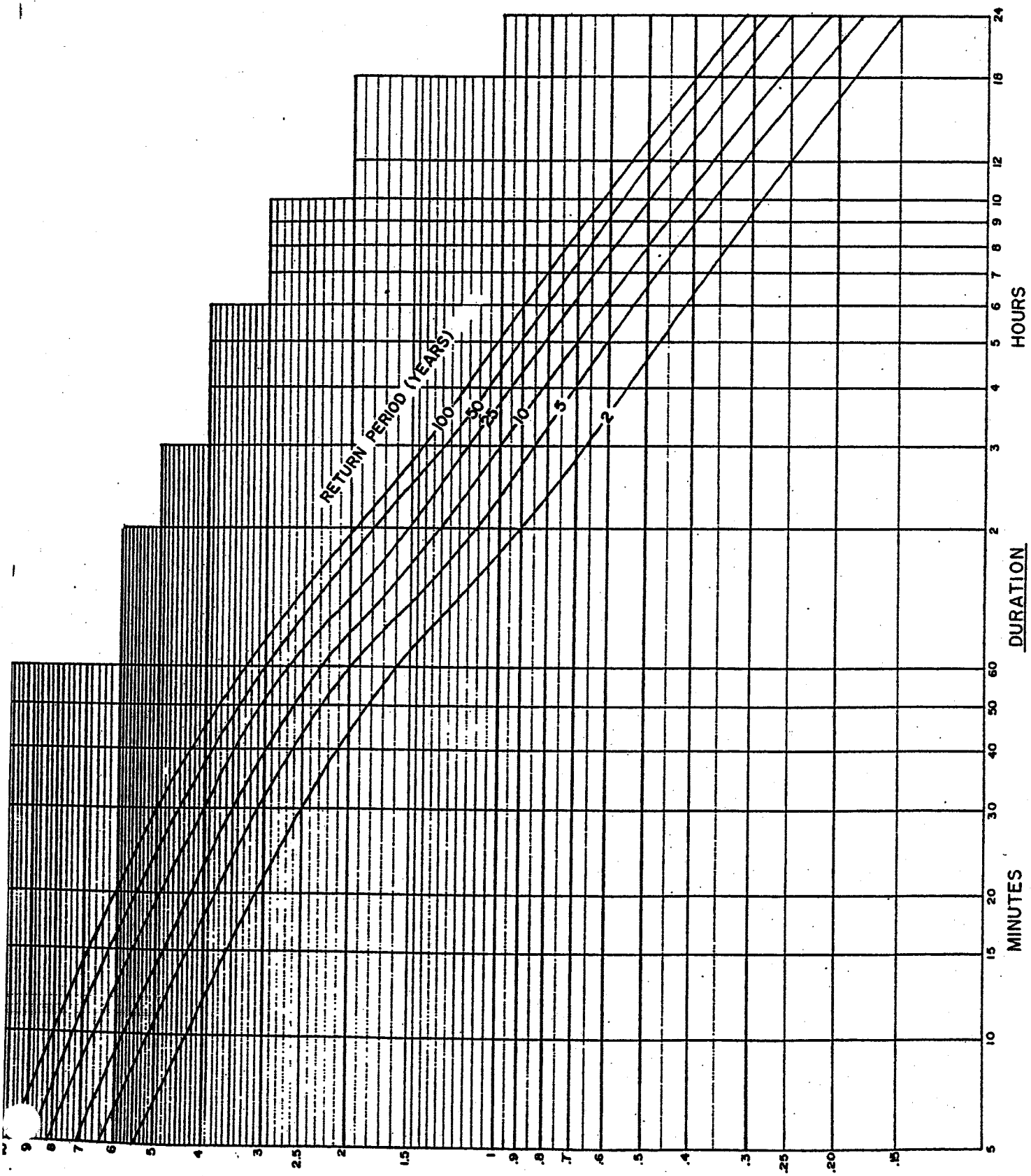
Storm Drainage Design Return Period

Street Runoff Drainage Systems	10-years
Drainage Structures for Main Drainage Channels	100-years

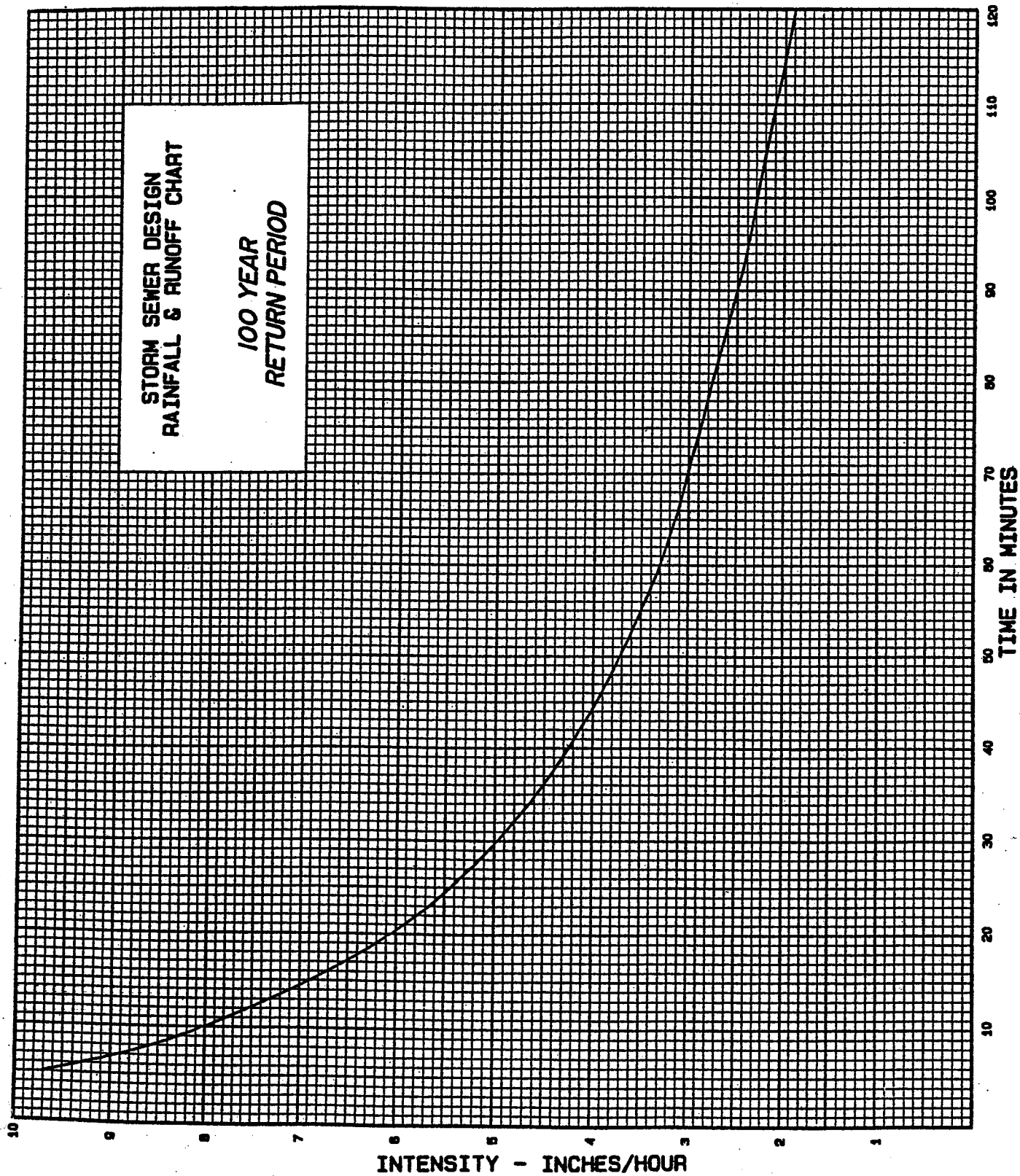
The finished floor elevation of all permanent structures and adjacent grade must be constructed a minimum of two feet above the 100-year flood elevation as established by the U.S. Army Corps Engineers or as established by flood studies.

In those areas with no flood study, the finished floor elevation of all permanent structures must be constructed at least 2 ft. above the elevation of the downstream roadway or embankment and must be at least 2 ft. above the highest adjacent grade.

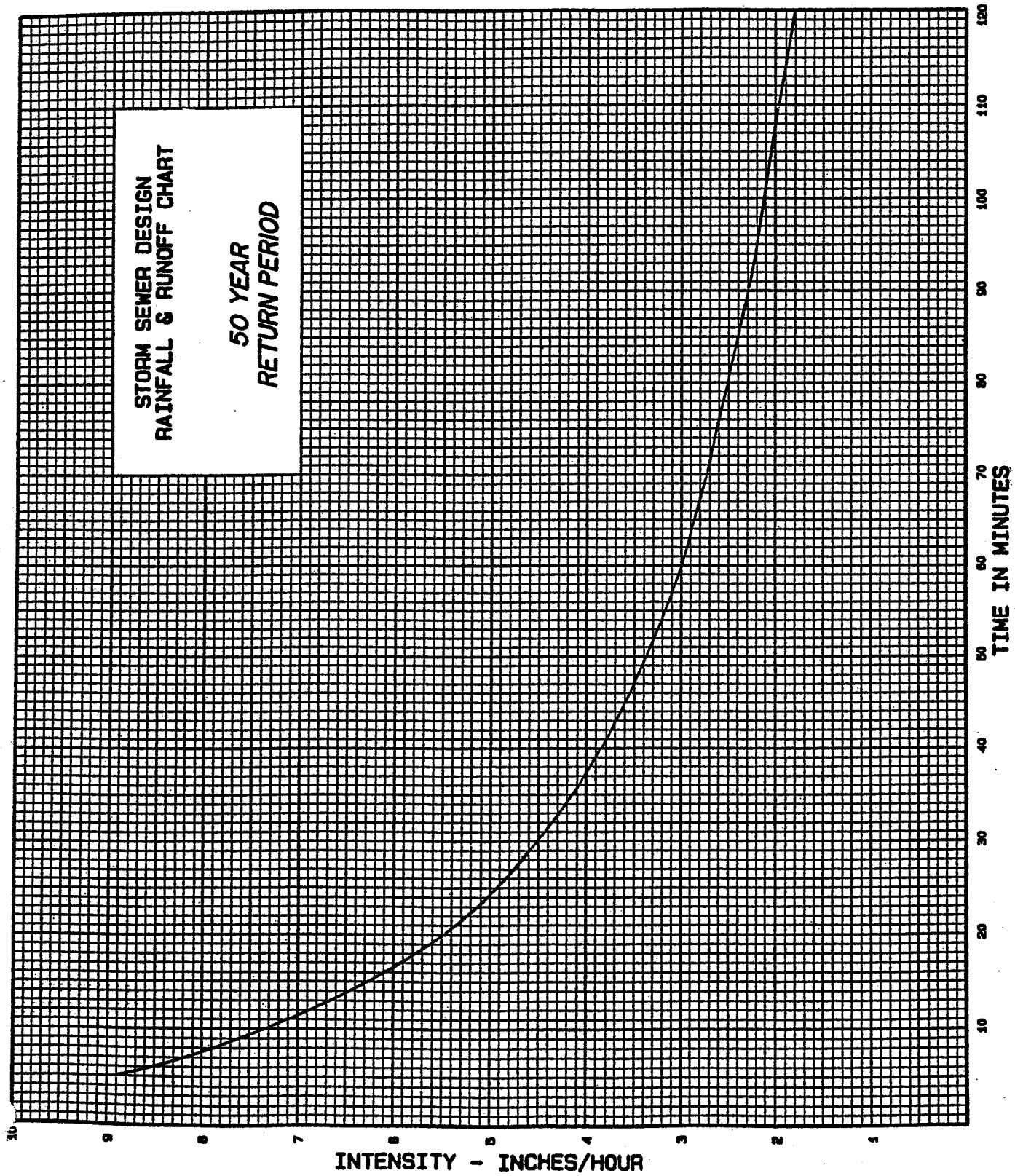
Rainfall Intensity - Duration - Frequency Curves



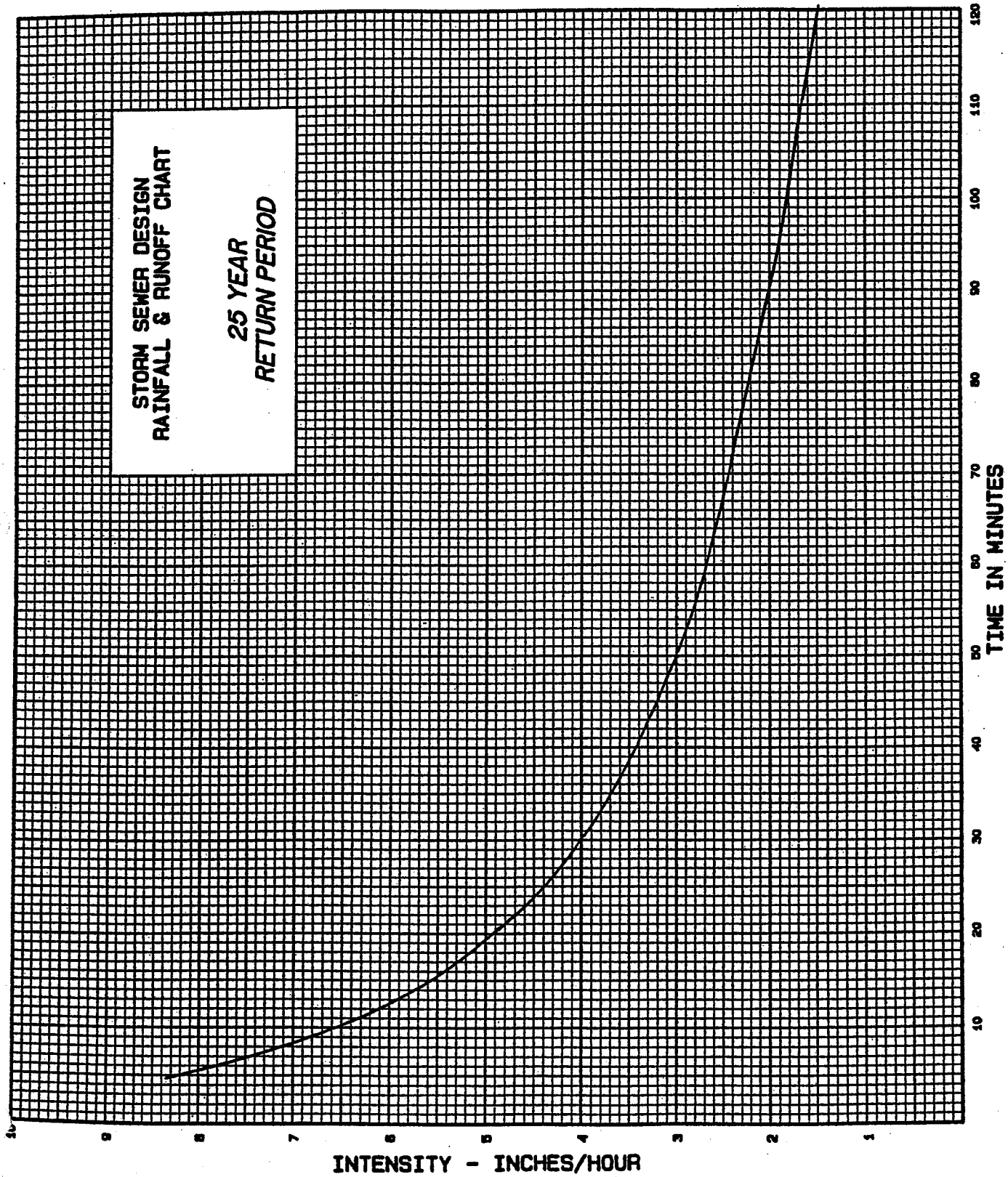
Storm Sewer Design Rainfall & Runoff Chart
100-year Return Period



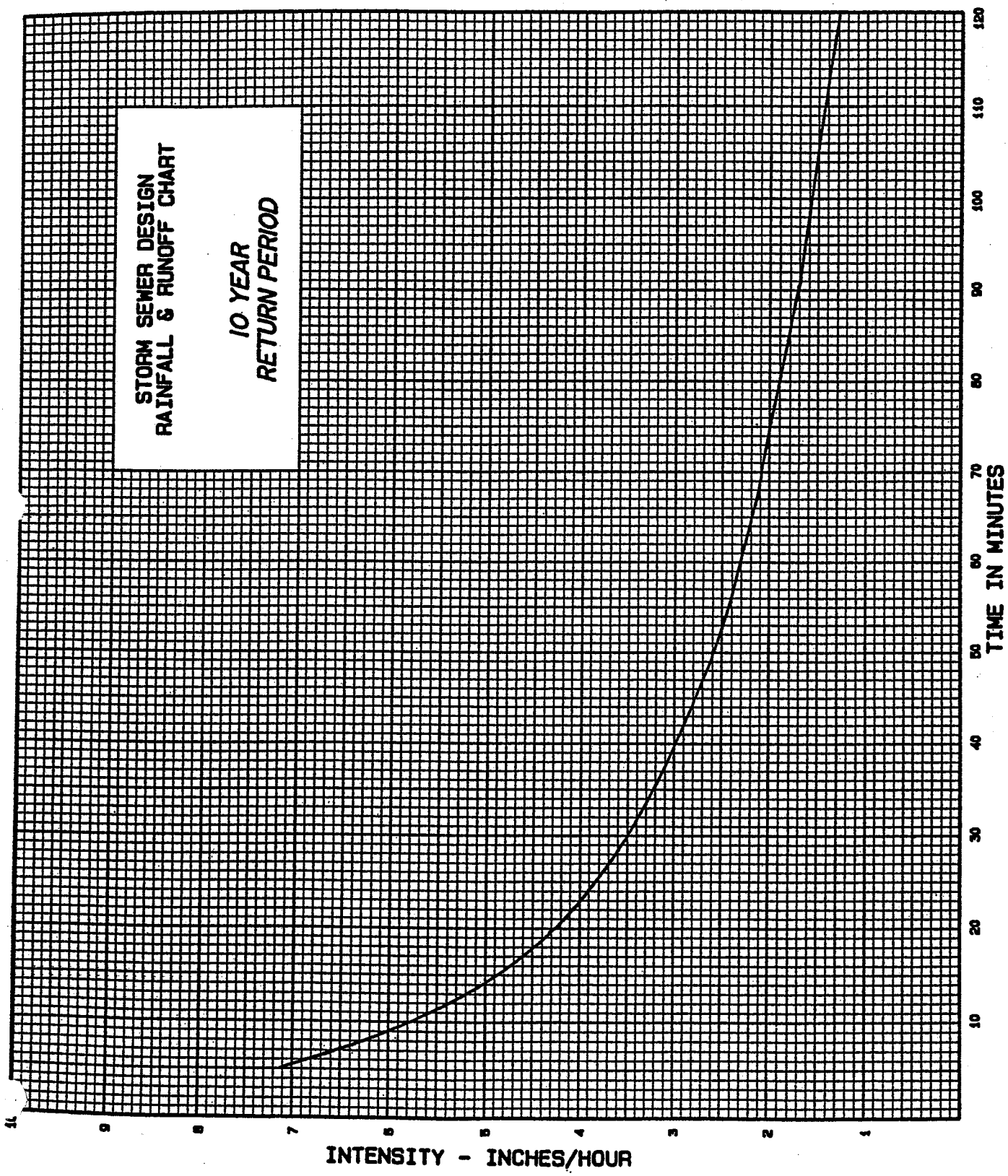
Storm Sewer Design Rainfall & Runoff Chart
50-year Return Period



Storm Sewer Design Rainfall & Runoff Chart
25-year Return Period



Storm Sewer Design Rainfall & Runoff Chart
10-year Return Period



Basin Lag-Time Method
(Method for Estimating Rainfall Runoff in Drainage Areas Over 200 Acres)

The Basin Lag-Time Method is a mathematical regression model developed for the Piedmont Area of North Carolina by the United States Geological Survey. This method is acceptable in calculating rainfall runoff rates for drainage areas greater in area than 200 acres. Details of the Basin Lag-Time Method, prepared by the U.S. Geologic Survey, can be found in the 1972 open file report, Effect of Urban Development on Floods in the Piedmont Province of North Carolina, by Arthur L. Putnam.

The Basin Lag-Time Method is a combination of two steps leading to the calculation of peak discharge rates for the two, five, ten, fifteen, twenty, twenty-five, fifty and one-hundred year floods.

The two steps include:

1) The estimation of basin lag-time which is the average time interval in hours, between the occurrence of peak rainfall and the resultant peak runoff.

The equation for estimating ***Basin Lag-Time*** is:

$$T = 0.49\left(L/\sqrt{S}\right)^{.50} I^{-.57}$$

T = Lag-Time in hours
L = Length of main water course in miles
S = Stream bed slope of the main water course in feet per mile
I = Ratio of the area of impervious cover to the total drainage area

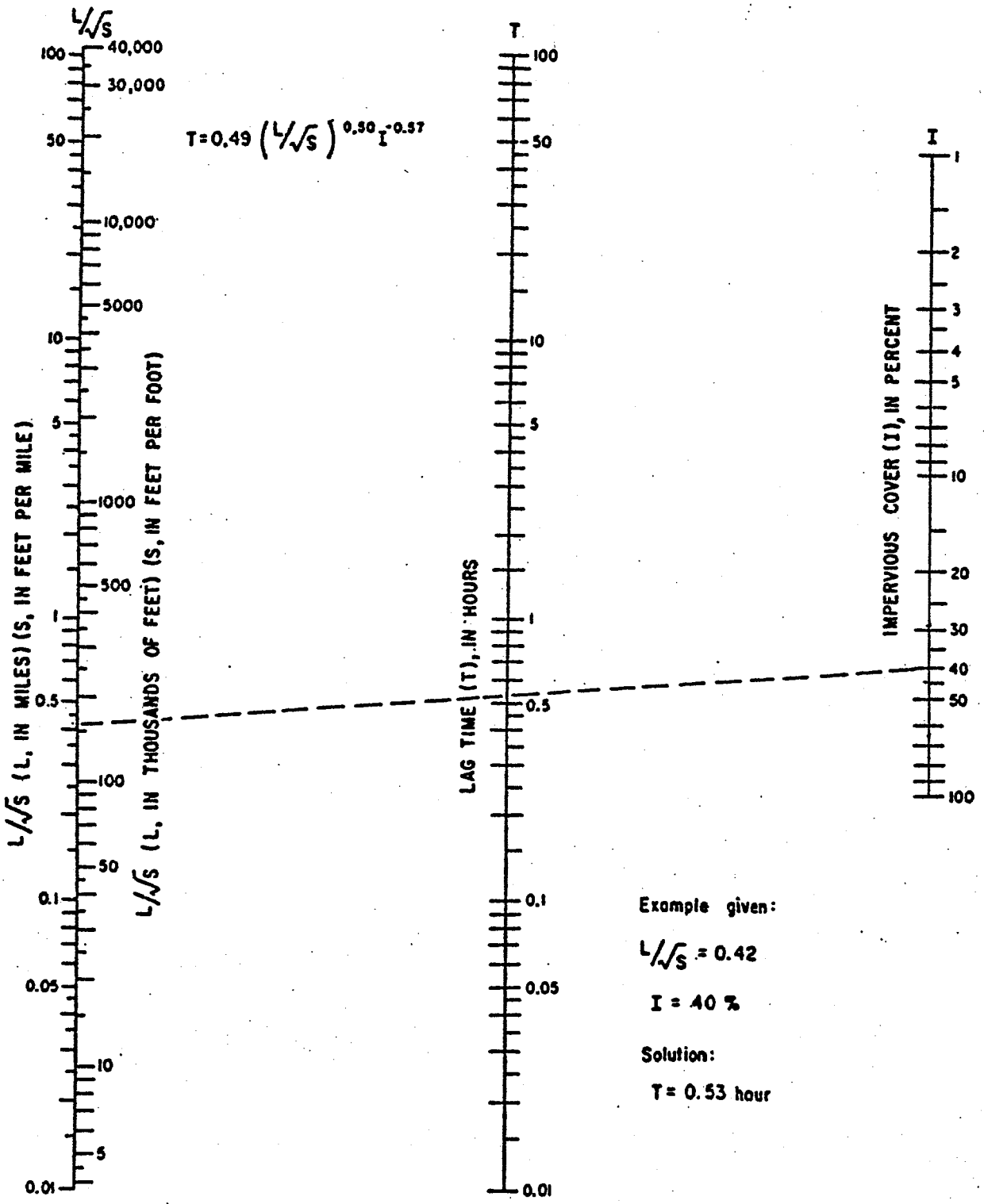
2) Once the Basin Lag-Time has been determined, the following equations can be used to determine the appropriate peak discharge.

$Q_2 = 221\,A^{0.87} \times T^{-0.60}$
$Q_5 = 405\,A^{0.80} \times T^{-0.52}$
$Q_{10} = 560\,A^{0.76} \times T^{-0.48}$
$Q_{15} = 630\,A^{0.74} \times T^{-0.45}$
$Q_{20} = 735\,A^{0.72} \times T^{-0.43}$
$Q_{25} = 790\,A^{0.71} \times T^{-0.42}$
$Q_{50} = 990\,A^{0.67} \times T^{-0.37}$
$Q_{100} = 1200\,A^{0.63} \times T^{-0.33}$

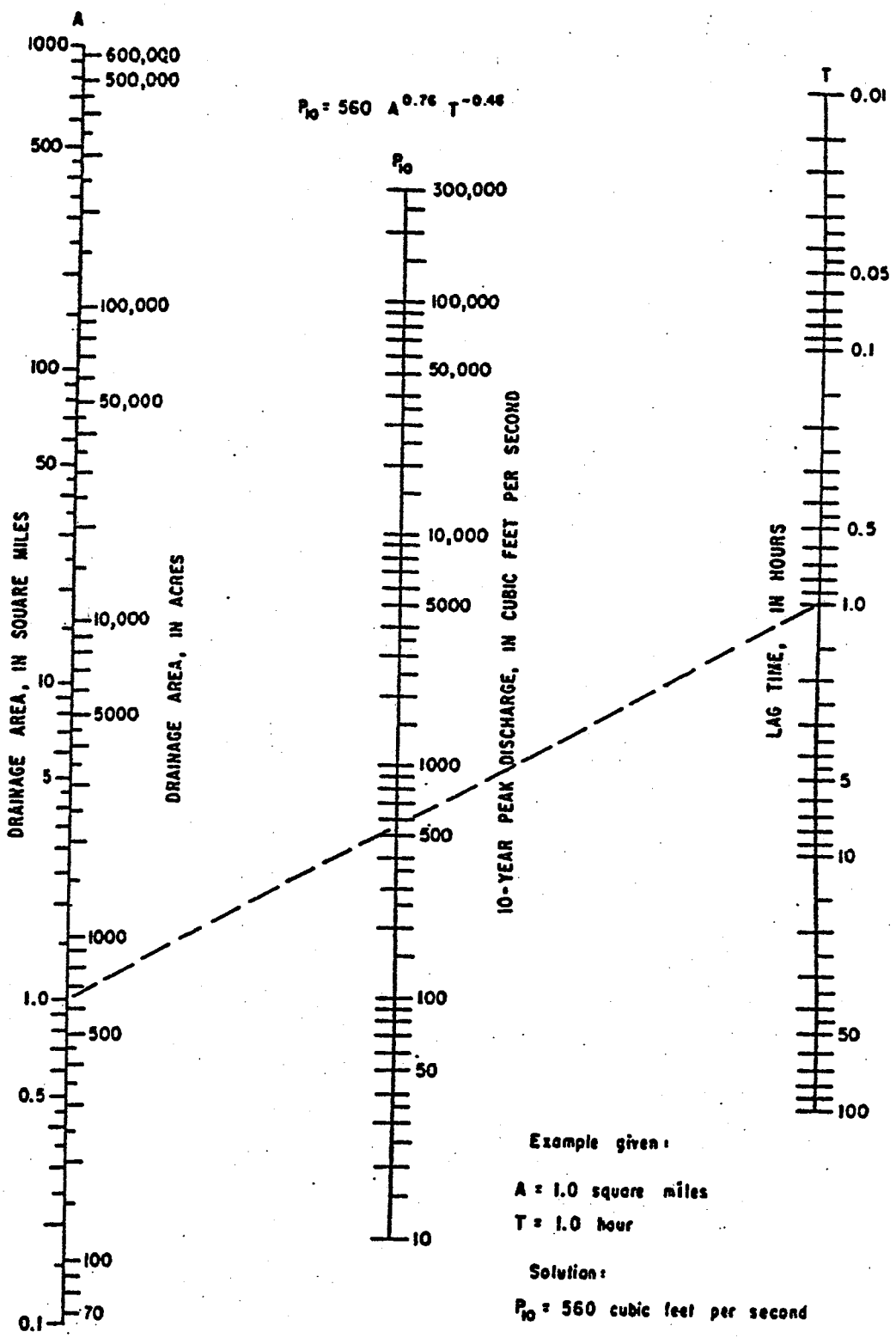
Q_I = Peak discharge for the flood having the recurrence interval indicated by the subscript in cfs.
A = Drainage Area in square miles
T = Lag-Time in hours

Pages 19 - 25 include a set of nomographs with an example, which can be used in lieu of the above formulas.

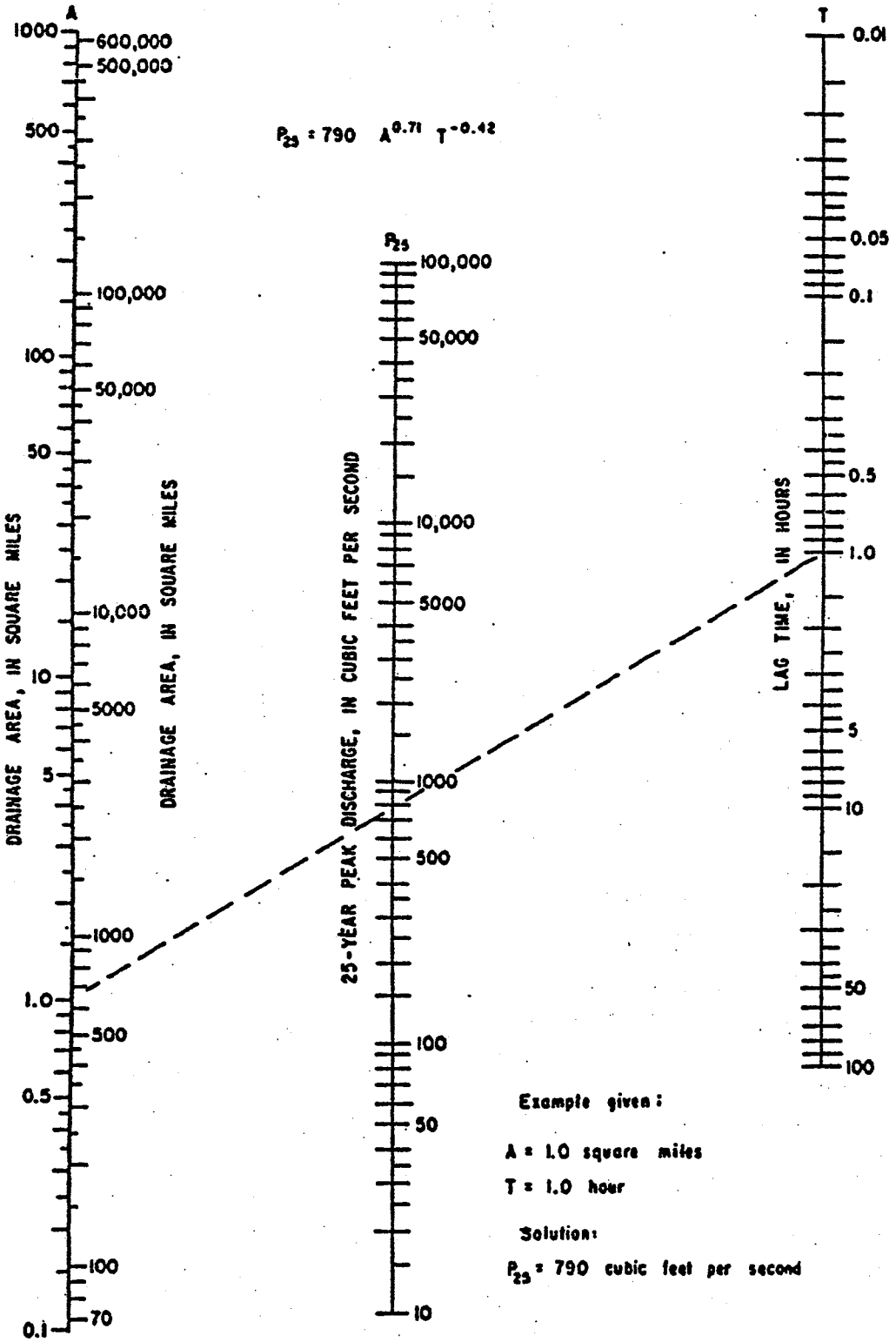
Nomograph for Estimating Basin Lag-Time



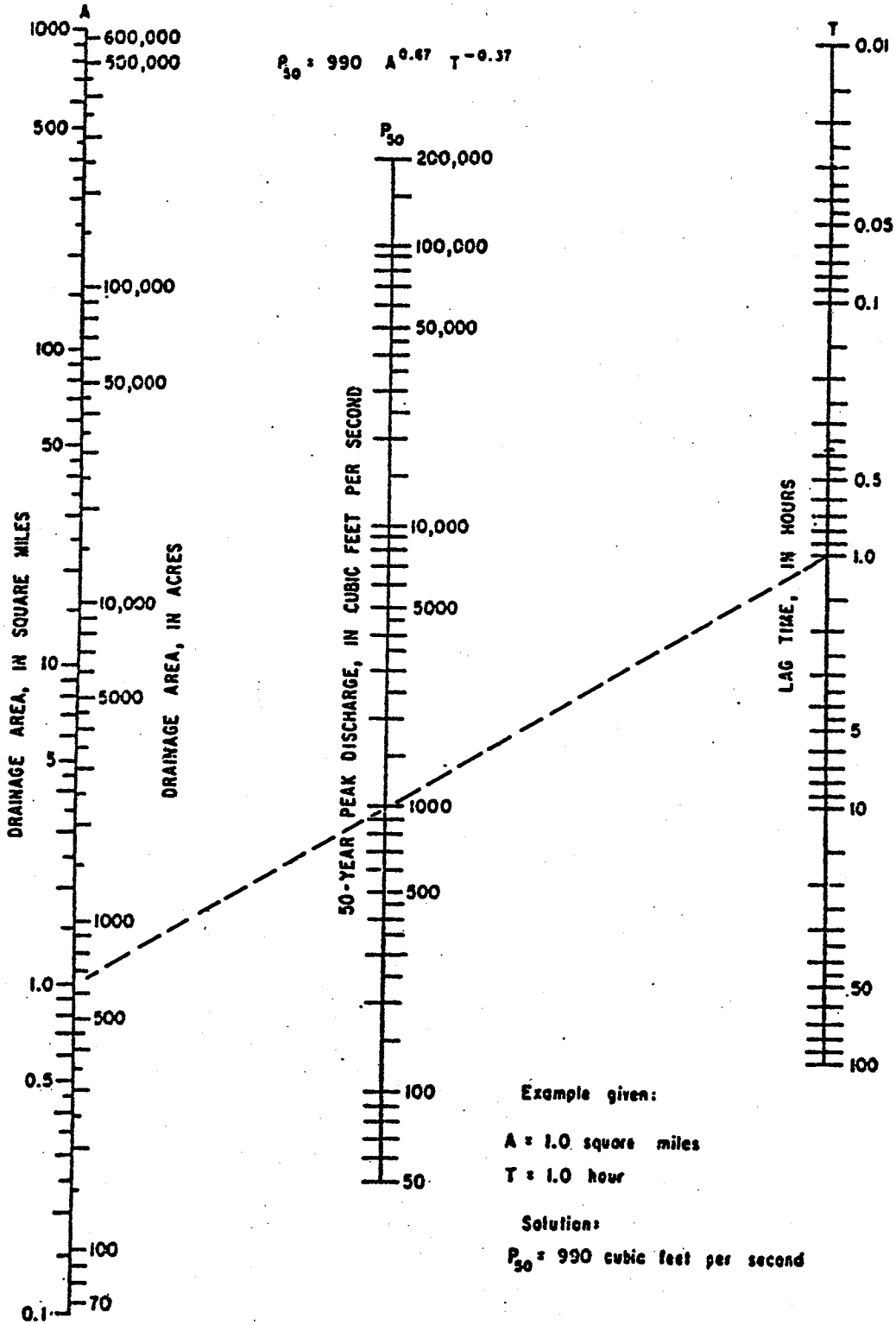
Nomograph for Estimating 10-year Flood-Peak Discharge



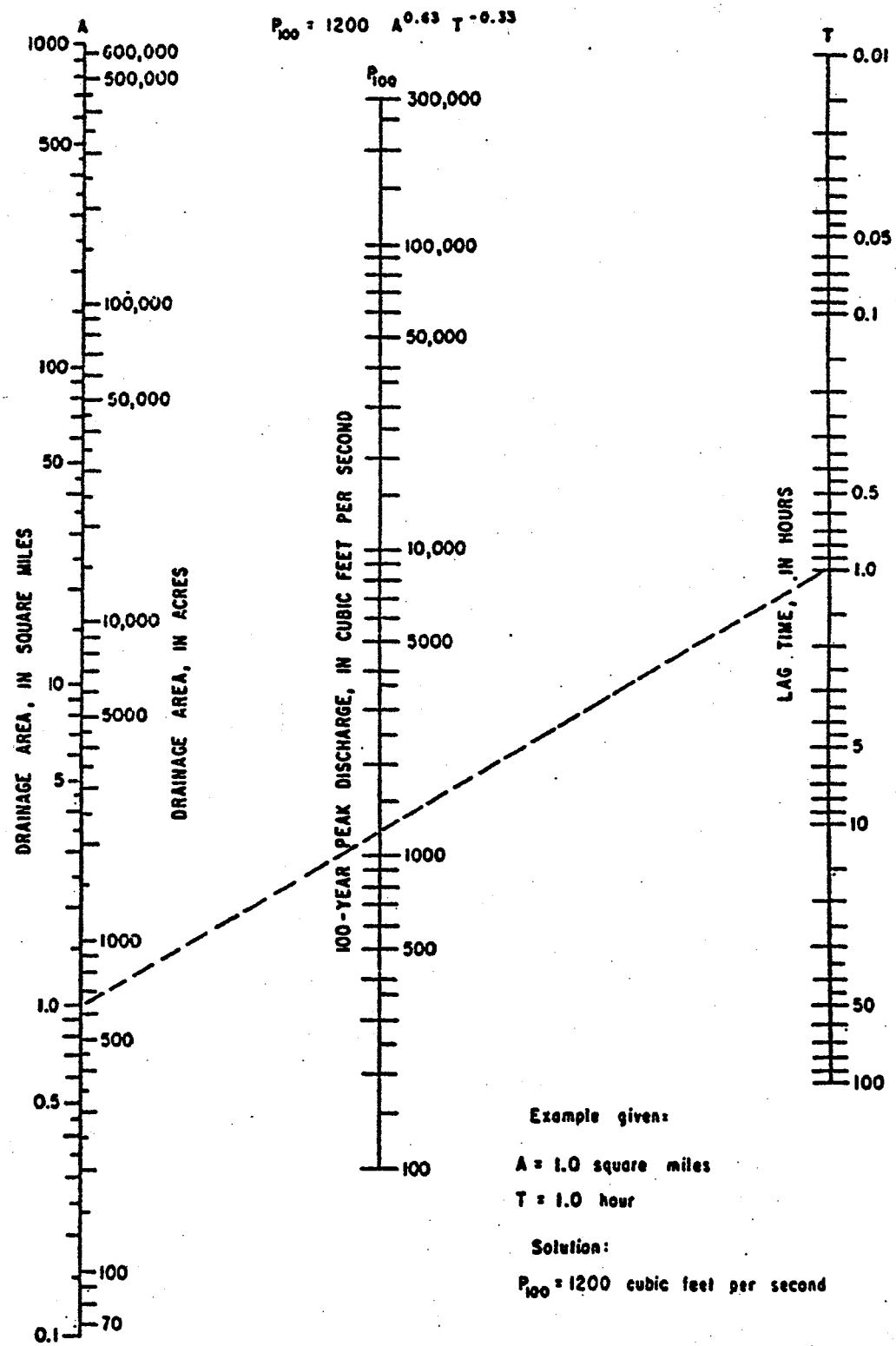
Nomograph for Estimating 25-year Flood-Peak Discharge



Nomograph for Estimating 50-year Flood-Peak Discharge



Nomograph for Estimating 100-year Flood-Peak Discharge



The following example illustrates the use of the Basin Lag-Time Nomographs:

1) Find the 25-year flood-peak discharge given the following Drainage Basin Information:

A = 2.72 square miles
I = 40 (impervious area)
L = 2.66 miles from the design site to the rim of the Drainage Basin.
= 0.27 miles from the design site to a point that is 10 percent of the distance to the rim of the drainage basin.
= 2.26 miles from the design site to a point that is 85 percent of the distance to the rim of the drainage basin.
Elevation = 605 feet at the point that is 10 percent of the distance to the rim of the drainage basin.
= 686 feet at the point that is 85 percent of the distance to the rim of the drainage basin.

2) Compute Slope:

$$S = \frac{686\,ft - 605\,ft}{2.26mi - 0.27mi} = \frac{81\,ft}{1.99mi} = 41.0\,ft\ per\ mile$$

3) Compute Length-Slope factors:

$$L/\sqrt{S} = 2.66/\sqrt{41.0} = 0.42$$

4) Determine lag-time from page 15, plot the value of impervious cover, **I** = 40, on the scale at the right; then plot the value of the length-slope factor, **L/ S** = 0.42, on the scale at the left. Connect these two points with a straight line and read the lag-time value, **T** = 0.53 hours, on the center scale.

5) Determine the 25-year flood-peak discharge from page 17. Plot the value of lag-time, **T** = 0.53 hours, on the scale at the right; then plot the value of drainage area, **A** = 2.72 square miles, on the scale at the left. Connect these two points with a straight edge and read the 25-year flood-peak discharge value, $\mathbf{Q_{25}}$= 1100 cubic feet per second, on the center scale.

It would be advisable that the answer be verified with the appropriate equation, until the use of the nomographs is understood.

DETERMINATION OF GUTTER CAPACITY

The capacity of the gutter and roadway pavement is dependent upon the physical characteristics of the facility in question. The cross slope of the pavement section, the slope of the gutter, the longitudinal grade and the roughness interrelate to determine the runoff carrying capacity of a street section. Equations and nomographs have been derived based on these parameters, as well as the depth of flow at the curb and the spread of water in the street.

Since the depth of flow and/or the spread into the street are normally the controlling factors, the approach taken for this section was to set limits for speed and develop tables showing the quantity of runoff allowable for the more commonly used street sections. **Two limits have been set for this purpose. The first is that the flow shall not encroach within 8-feet of the street centerline. The second limit is that the width of flow shall not exceed 10-feet from the face of curb.**

Curb inlets will be spaced so that these two limits will not be exceeded during a 10-year design storm. In special cases where flow is allowed to bypass inlets on a continuous slope, inlets located downhill in the sump will be designed to handle that extra flow. Normally, multiple inlets are not allowed. If there is enough flow to require multiple inlets, the gutter capacity requirements probably have been exceeded.

Using the maximum width of flow for a given street width, the maximum depth of flow can be determined for various pavement cross slopes. Using the maximum depth and spread to find the area (**a**) and the hydraulic radius (**R**) in the equation for open channel flow we have the maximum flow as a constant (for the given cross slope) multiplied by the longitudinal slope taken to the ½ power.

Example:

Given: *Street width 30' F-F*
S_t (Transverse Slope) = .025 ft./ft.
S_L (Longitudinal Slope) = 2% or .02 ft./ft.

Find: *Q_{max} (Maximum allowable flow)*

$$Q = A\frac{1.486}{n} R^{2/3} S^{1/2}$$

Using 7 ft. for maximum spread and .208 for maximum depth.

$$A = \left[\frac{(.208 + .125)}{2}(2)\right] + \left(\frac{.125}{2}\right)(5) = .646 \ sf$$

$$P = 7.208 \ ft$$

$$R = \frac{.646}{7.208} = 0.0896$$

$$Q = .646 \times \frac{1.486}{.015} \times (0.0896)^{2/3} \times S^{1/2}$$

$$Q = 12.80 \times S^{1/2}$$

$$for \ S = .02 \quad Q = 12.80 \times (.02)^{1/2} = 1.81 \ cfs$$

Using this method, tables have been developed showing maximum flow rates for different combinations of cross slope and longitudinal slope for three common street widths. Using these tables, the designer can quickly determine if the calculated flow is allowable at the designated location.

Gutter Capacity for Streets with 2'-6" Standard Curb and Gutter

Street Width (Face to Face)	**26** ft.
Centerline Encroachment Limit	**8** ft.
Maximum Spread	**5** ft.

Maximum Depth (ft.)	**Cross Slope (%)**					
	1.5	**2**	**2.5**	**3**	**3.5**	**4**
	0.128	0.143	0.158	0.173	0.188	0.203

Maximum Flow in Gutter at Maximum Spread (cfs)

Longitudinal Slope (%)	**Cross Slope (%)**					
	1.5	**2**	**2.5**	**3**	**3.5**	**4**
0.5	0.22	0.30	0.40	0.50	0.62	0.74
0.6	0.24	0.33	0.44	0.55	0.68	0.81
0.8	0.28	0.38	0.51	0.64	0.78	0.94
1	0.31	0.43	0.57	0.71	0.88	1.05
1.25	0.35	0.48	0.63	0.80	0.98	1.17
1.5	0.38	0.53	0.69	0.87	1.07	1.29
1.75	0.41	0.57	0.75	0.94	1.16	1.39
2	0.44	0.61	0.80	1.01	1.24	1.49
2.5	0.49	0.68	0.89	1.13	1.38	1.66
3	0.54	0.75	0.98	1.24	1.52	1.82
3.5	0.58	0.81	1.06	1.34	1.64	1.96
4	0.62	0.86	1.13	1.43	1.75	2.10
4.5	0.66	0.91	1.20	1.51	1.86	2.23
5	0.69	0.96	1.26	1.60	1.96	2.35
5.5	0.73	1.01	1.33	1.67	2.05	2.46
6	0.76	1.05	1.38	1.75	2.15	2.57

Gutter Capacity for Streets with 2'-6" Standard Curb and Gutter

Street Width (Face to Face)	**30** ft.
Centerline Encroachment Limit	**8** ft.
Maximum Spread	**7** ft.

Maximum Depth (ft.)	**Cross Slope (%)**					
	1.5	**2**	**2.5**	**3**	**3.5**	**4**
	0.158	0.183	0.208	0.233	0.258	0.283

Maximum Flow in Gutter at Maximum Spread (cfs)

Longitudinal Slope (%)	**Cross Slope (%)**					
	1.5	**2**	**2.5**	**3**	**3.5**	**4**
0.5	0.45	0.66	0.91	1.18	1.48	1.81
0.6	0.49	0.72	0.99	1.29	1.62	1.98
0.8	0.56	0.83	1.15	1.49	1.88	2.29
1	0.63	0.93	1.28	1.67	2.10	2.56
1.25	0.70	1.04	1.43	1.87	2.35	2.86
1.5	0.77	1.14	1.57	2.04	2.57	3.14
1.75	0.83	1.23	1.69	2.21	2.77	3.39
2	0.89	1.32	1.81	2.36	2.97	3.62
2.5	1.00	1.48	2.02	2.64	3.32	4.05
3	1.09	1.62	2.22	2.89	3.63	4.44
3.5	1.18	1.75	2.40	3.12	3.92	4.79
4	1.26	1.87	2.56	3.34	4.20	5.12
4.5	1.34	1.98	2.72	3.54	4.45	5.44
5	1.41	2.09	2.86	3.73	4.69	5.73
5.5	1.48	2.19	3.00	3.92	4.92	6.01
6	1.54	2.29	3.14	4.09	5.14	6.28

Gutter Capacity for Streets with 2'-6" Standard Curb and Gutter

Street Width (Face to Face)	**40** ft.
Centerline Encroachment Limit	**8** ft.
Maximum Spread	**10** ft.

Maximum Depth (ft.)	Cross Slope (%)					
	1.5	2	2.5	3	3.5	4
	0.203	0.243	0.283	0.323	0.363	0.403

Maximum Flow in Gutter at Maximum Spread (cfs)

Longitudinal Slope (%)	Cross Slope (%)					
	1.5	2	2.5	3	3.5	4
0.5	1.03	1.59	2.24	2.98	3.79	4.68
0.6	1.13	1.75	2.46	3.26	4.15	5.12
0.8	1.31	2.02	2.84	3.77	4.80	5.92
1	1.46	2.25	3.17	4.21	5.36	6.61
1.25	1.63	2.52	3.55	4.71	5.99	7.40
1.5	1.79	2.76	3.89	5.16	6.57	8.10
1.75	1.93	2.98	4.20	5.57	7.09	8.75
2	2.07	3.19	4.49	5.96	7.58	9.35
2.5	2.31	3.56	5.02	6.66	8.48	10.46
3	2.53	3.90	5.50	7.30	9.29	11.46
3.5	2.73	4.22	5.94	7.88	10.03	12.37
4	2.92	4.51	6.35	8.43	10.72	13.23
4.5	3.10	4.78	6.73	8.94	11.37	14.03
5	3.27	5.04	7.10	9.42	11.99	14.79
5.5	3.43	5.29	7.44	9.88	12.57	15.51
6	3.58	5.52	7.77	10.32	13.13	16.20

DETERMINATION OF INLET CAPACITY

All curb inlets on public or private streets will be spaced so that they can pick up the gutter flow for a 10-year storm event. They must be spaced using the capacities below so that the maximum gutter flows are not exceeded.

The maximum allowable volume of flow to curb inlets on continuous slopes or in a sump situation will be as follows:

1.) Continuous Slope:

- 4' - 0" wide curb inlet: 4.0 cfs
- 6' - 0" wide curb inlet: 6.0 cfs

2.) Sump Condition

- 4' - 0" wide curb inlet: 6.0 cfs
- 6' - 0" wide curb inlet 9.0 cfs

These are absolute maximum capacities. A flow greater than these values will require the inlet spacing to be adjusted.

GENERAL RULES FOR LOCATING CURB INLETS

1) All curb inlets on City of Graham maintained storm sewer lines must be City of Graham standard structures as shown in the Roadway and Utility Standard Drawings Manual and so designed on the plans. Non-standard inlets or other structures for special situations require prior approval from the City of Graham Engineering Division.

2) Curb inlets must be installed at any point along a continuous slope so that the gutter flow shall not exceed the maximum allowable gutter flow as established I the section of "Determination of Gutter Capacity" starting on page 21 and shown in tables on pages 22, 23, and 24.

3) Curb inlets must be installed at any point of radius so that no gutter flow will be allowed to sheet flow across an intersection.

4) Curb inlets must be located at any point of radius where the intersecting street falls away so steeply that the gutter flow will have a tendency to jump out of the gutter and sheet flow across the intersection.

5) Curb inlets must be installed above any driveway turnout so that no gutter flow will enter private property.

6) In certain cases, the NCDOT Standard Inlet No. 840.03 "Grate, Frame and Hood" will be allowed where conditions prohibit the use of City standard inlets. This will only be allowed with approval of the City.

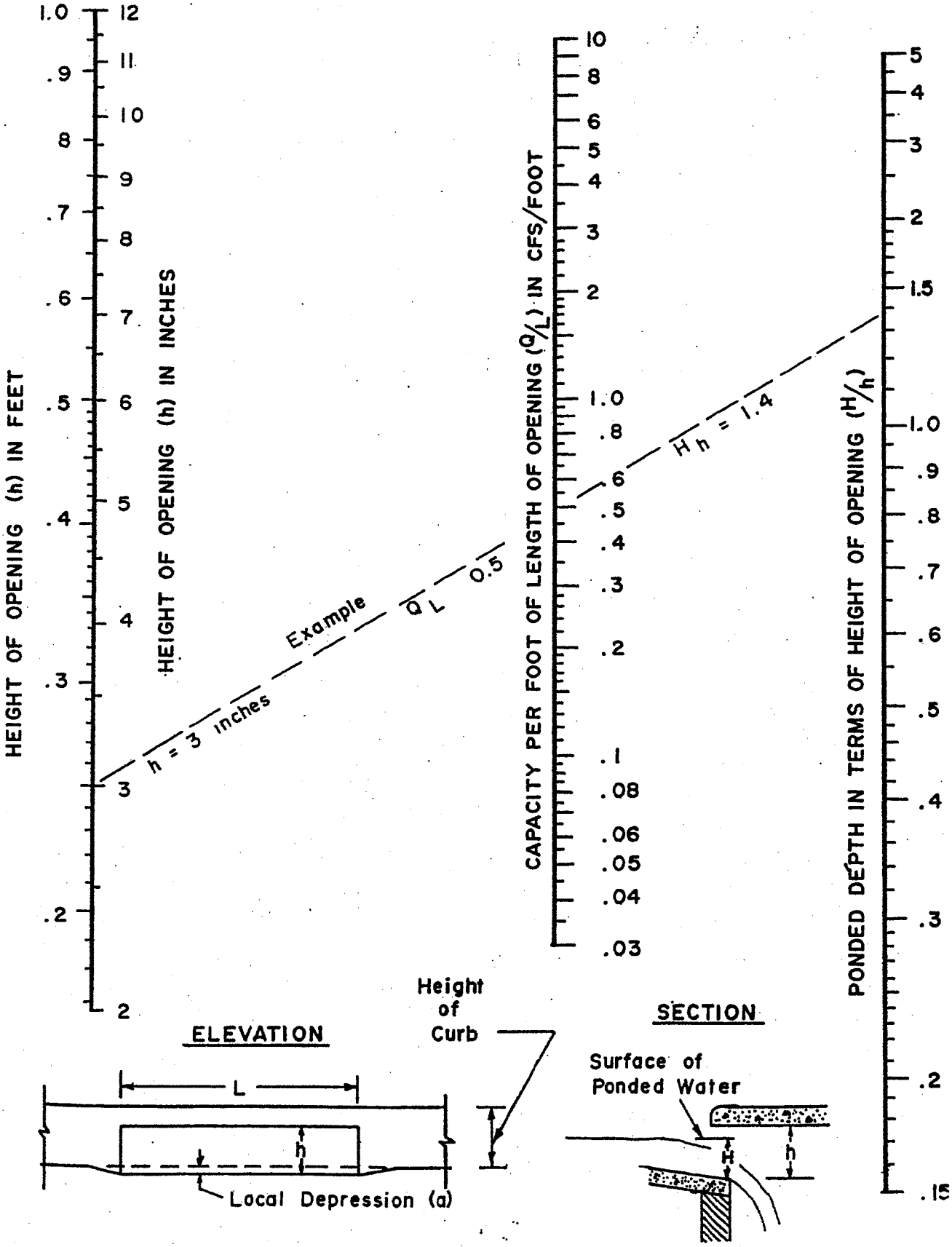
7) Double inlets are not allowed. Usually, if there is enough runoff to require a double inlet, the gutter capacity has been exceeded and additional inlets are required uphill.

8) Existing curb inlets in a sump cannot be converted to grate inlets to make room for a private drive entrance unless new curb inlets are installed at points of radius on both sides of the drive entrance. The grates have a tendency to get clogged up and create traffic hazards during heavy storm events.

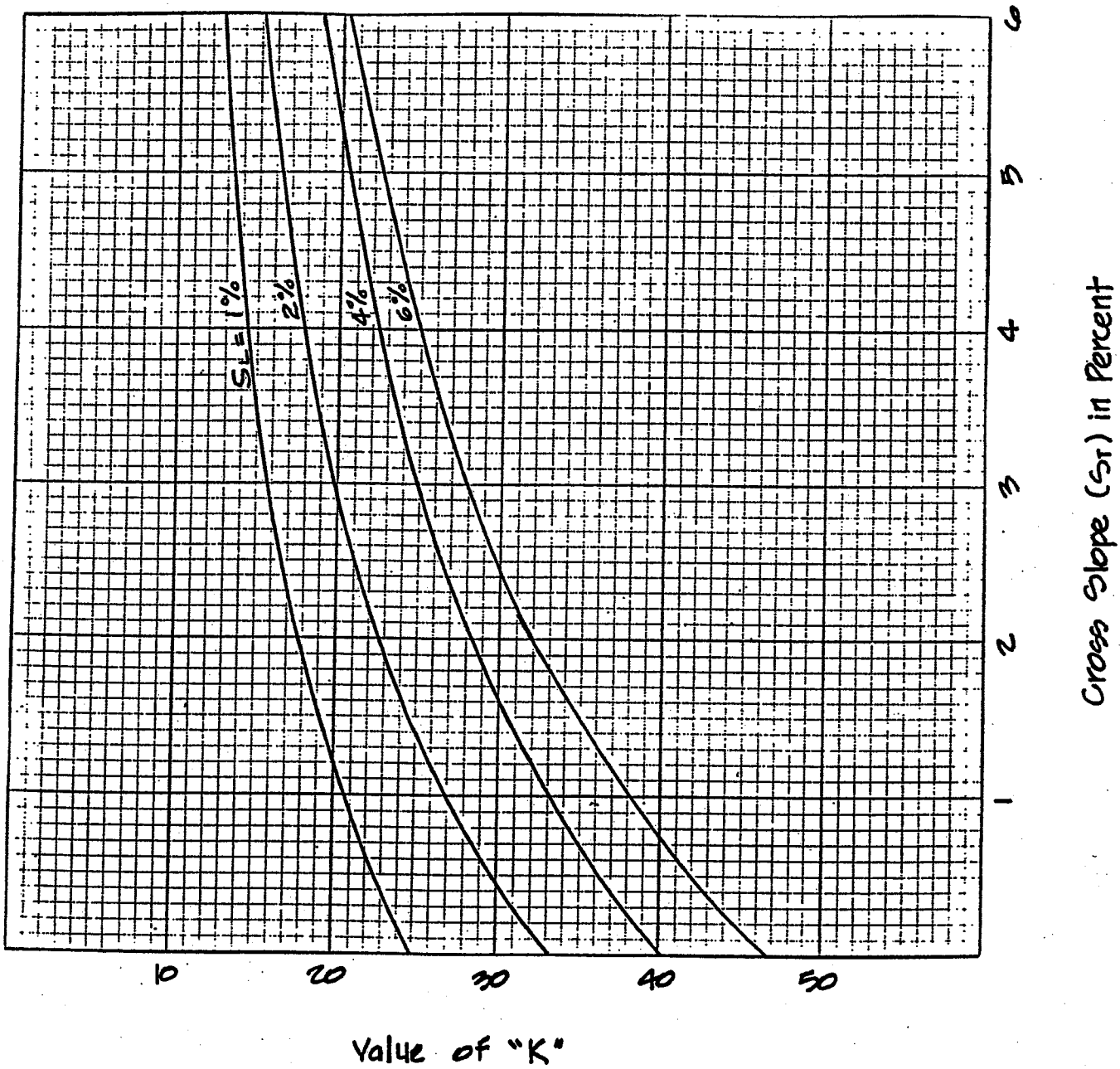
9) Curb inlets in locations other than sumps may be converted to grate inlets by permission as long as the grate inlet is installed in the gutter flow line and not over the existing curb inlet box. The existing box is not located in the flow line. In most cases the existing box will be removed and the new grate box will be built over the existing pipe and in the gutter line.

10) Spill gutter is not allowed because of the sheeting and freezing problems that can occur.

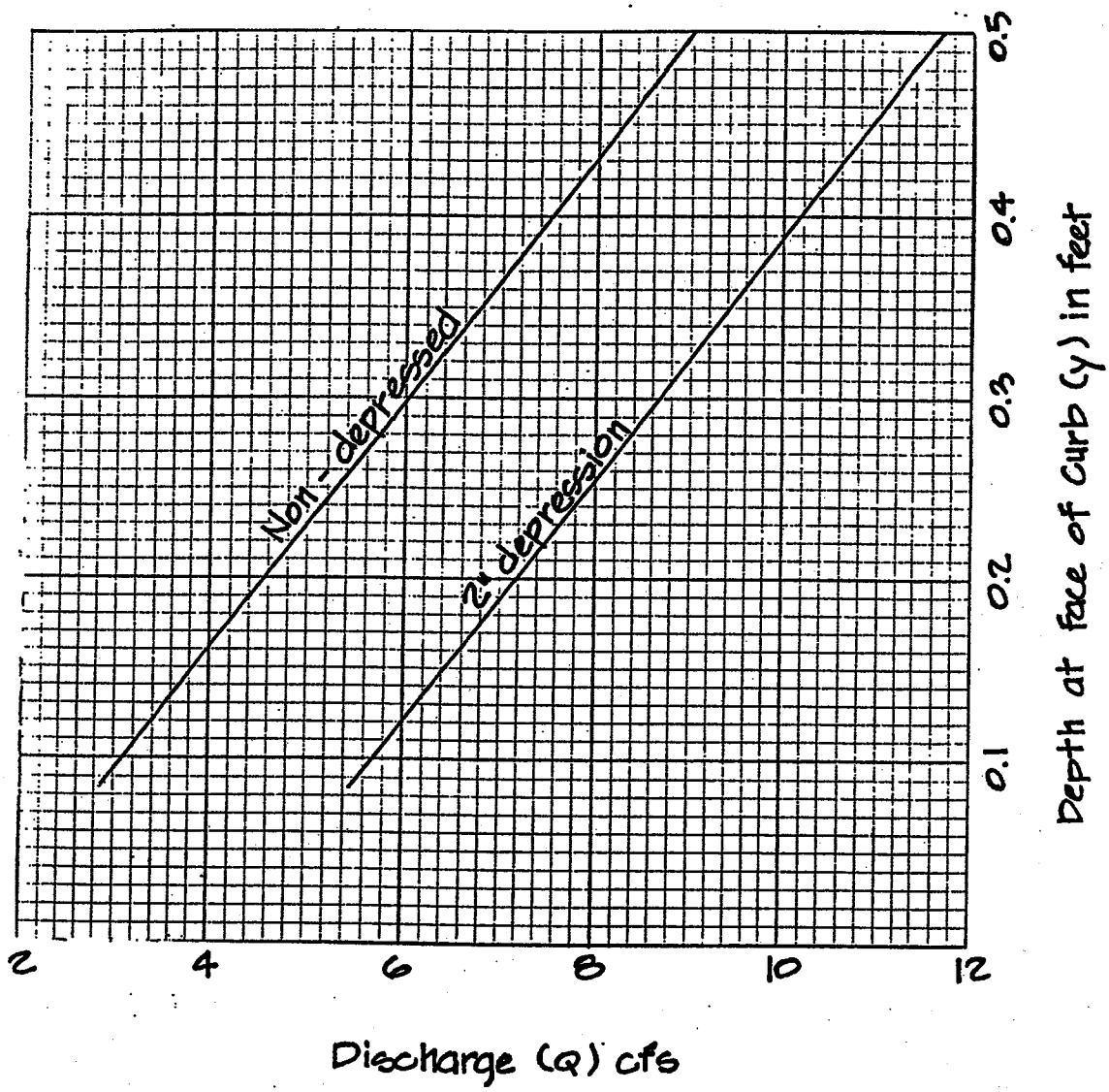
CAPACITY OF CURB OPENING INLETS AT A SUMP



K VALUES FOR GRATE WITH HOOD
NON-DEPRESSED



CAPACITY OF GRATE WITH HOOD AT THE LOW POINT IN GRADE



YARD INLETS

The capacity of the masonry yard inlet can be determined by using the nomograph for "Capacity of an Inlet at the Low Point in Grade", found on page 28. This nomograph is based on experimental determinations of the relation of head to discharge through a rectangular opening, operating submerged and unsubmerged.

This nomograph solves inlet capacity problems under the following conditions:

1) The inlet is located at a low point in the grade.
2) All flow coming to the inlet must eventually enter the inlet and will pond until sufficient head is built up so the outflow through the inlet will equal the peak inflow from the drainage area.

Procedure:

Enter the nomograph with any two of the three values **h**, **Q/L**, **H/h** and read the third.

Where **h** = Total height of opening in feet.
L = Total length of opening in feet.
H = Depth of water at the entrance in feet.
Q = Total peak rate of flow to the inlet in cfs.

Normally **Q**, **L**, and **h** will be known and the nomograph can be used to determine the depth of water **H** at the inlet. Where more than one side of the inlet will be open to receive water the nomograph can still be used by dividing the flow (**Q**) by the number of openings or by multiplying the length (**L**) by the number of openings.

The height of opening on yard inlets is normally set at two courses of brick or 5-inches. For unusual conditions the height can be set by the designer to fit the situation. However, safety is a major concern, especially, in residential areas. Large openings can become a hazard to children and pets. In those cases more than one inlet is advised.

DETERMINATION OF PIPE SIZES

The following are two methods to be used for determining the required pipe size:

1) The Manning Formula is used to determine a pipe size within a system.
2) This method is for pipes in a culvert situation. Whenever there is a possibility of water pounding at the mouth of a pipe or if it might have a submerged outlet, the pipe should be checked for inlet or outlet control. See the section on Culvert Design on page 33.

Sizing pipes within a system

The capacity of a pipe, which is a link in a drainage system, can be calculated using the Manning Formula. Nomographs or hydraulic calculators may be used to determine the required pipe size by using the calculated discharge, a roughness coefficient of 0.013 (Manning's roughness coefficient for concrete pipe) and the design slope.

The pipe system should be sized starting at the uppermost collection point and proceeding down stream. Each run of pipe shall be sized to transport the runoff already in the system plus the discharge intercepted at the inlet pipe or structure at the upstream end of the run of pipe under consideration.

Where corrugated metal pipe is used, the method of sizing is basically the same as for sizing concrete pipe. The only difference is in the roughness coefficient. The value of the coefficient **n** is obtained as a weighted value from the values of 0.024 for uncoated galvanized steel pipe in a ½-inch deep corrugation and 0.012 for a completely and smoothly asphalt lined pipe. For example, if 25 percent of the pipe's periphery is smoothly lined (paved) with asphalt and the remainder is galvanized of ½-inch depth corrugation the **n** is computed thus:

$$\frac{(.25\times.012)+(.75\times.024)}{1.00}=.021$$

In a similar manner the value for **n** for a 1-inch deep corrugation may be computed using 0.027 for unpaved pipe and 0.012 for fully paved pipe.

The following table gives values for **n** obtained by such computations:

Composite Values of (n)		
Type of pipe	*½-inch deep corrugations*	*1-inch deep corrugations*
Unpaved	0.024	0.027
25% paved	0.021	0.023
Fully paved	0.012	0.012

Nomographs in which the variables of slope, discharge, pipe diameter and velocity are plotted with each nomograph having the value of pipe roughness as a constant are included in this section, pages 35 - 38.

The following formula derived from the Manning Formula may be used to determine round pipe size:

$$D = 16\left[\frac{Qn}{\sqrt{S}}\right]^{3/8}$$

D = Diameter in inches
Q = Flow in cfs
n = roughness coefficient
S = Slope in ft. per ft.

Culvert Design

Anytime there is the possibility of water ponding at the entrance of a pipe or if the outlet is submerged, that pipe is in a culvert situation. There are two types of control that can have an effect on the capacity of a culvert: inlet and outlet control. Both of these types of control must be considered in the design of culverts.

Nomographs are included on pages 39-45 which can be used to determine culvert capacity. Select the appropriate chart according to type of structure for each condition of inlet control or outlet control.

Inlet Control

Inlet control exists when the culvert is not flowing full and the entrance conditions of the culvert control the amount of flow through the culvert. Headwater depth is the depth of water on the upstream end of the culvert and is used on the nomograph to determine the capacity of the culvert. The designer must limit the allowable headwater depth to minimize the affect of backwater on the property upstream from the culvert. In any case the maximum headwater ratio of 1:2 should not be exceeded.

Outlet Control

For outlet control to exist the culvert must be flowing full and the outlet must be submerged. Nomographs on pages 35 - 45 may be used to to determine headwater depths for culverts under outlet control.

Three pieces of information about the culvert are required in order to use the nomographs:

1) The entrance loss coefficient K_e values may be found on the chart below.

2) The tailwater conditions or the tailwater depth may be determined by downstream conditions or from known flood information. If the tailwater depth cannot be determined it may be assumed that the tailwater elevation is the crown of the pipe. The designer is warned that this may be an oversimplification and extra effort should be taken to determine the tailwater elevation.

3) The length of the culvert is required.

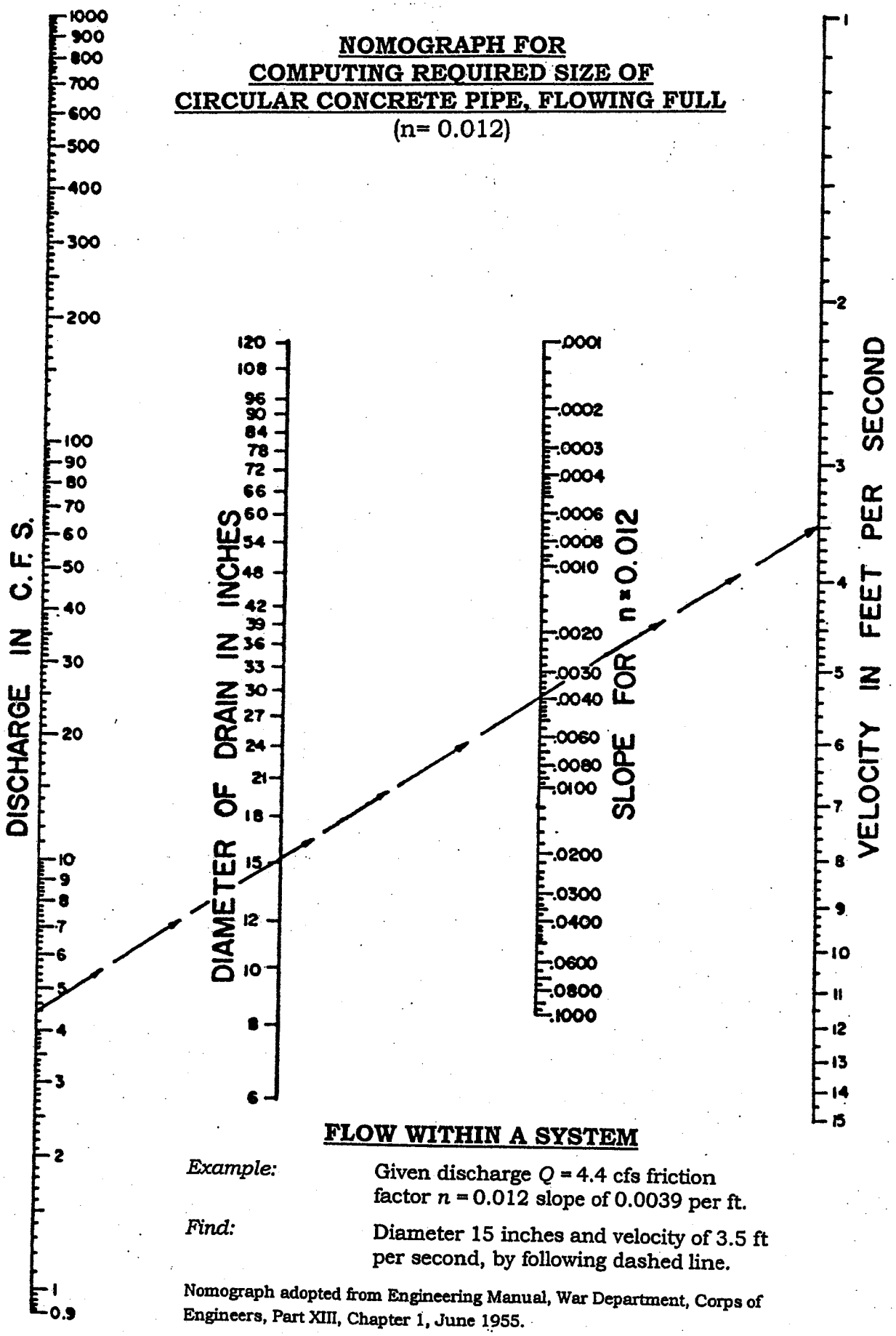
By following the examples on the nomographs the designer can determine the head (**H**) created by the culvert. Once that is known, headwater can be determined as shown on the nomographs.

COEFFICIENT OF ENTRANCE LOSS K_e

Type of Structure and Design of	Entrance Coefficient Ke
Pipe, Concrete	
Projecting from fill	0.5
Headwall or headwall and wingwalls	0.5
Mitered to conform to fillslopes	0.7
Pipe or pipearch, corrugated metal	
Projecting (no headwall)	0.9
Headwall or headwall and wingwalls	0.5
Mitered to conform to fillslopes	0.7
Reinforced concrete box culvert	
Headwall	0.5
Wingwall at 30 degrees to 75 degrees to barrel	0.4
Wingwalls at 10 degrees to 25 degrees to barrel	0.5

NOMOGRAPH FOR COMPUTING REQUIRED SIZE OF CIRCULAR CONCRETE PIPE, FLOWING FULL

(n= 0.012)



FLOW WITHIN A SYSTEM

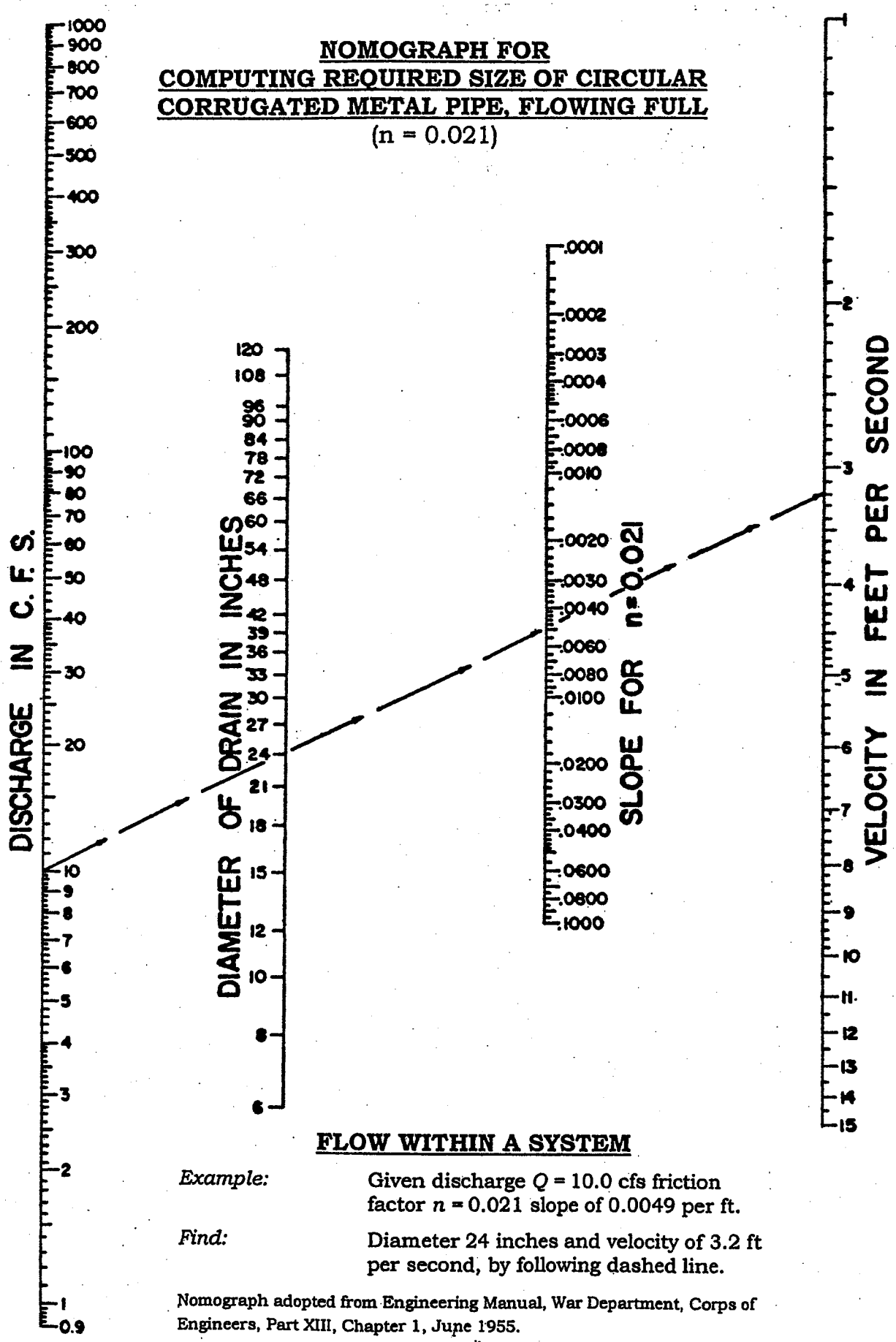
Example: Given discharge $Q = 4.4$ cfs friction factor $n = 0.012$ slope of 0.0039 per ft.

Find: Diameter 15 inches and velocity of 3.5 ft per second, by following dashed line.

Nomograph adopted from Engineering Manual, War Department, Corps of Engineers, Part XIII, Chapter 1, June 1955.

NOMOGRAPH FOR COMPUTING REQUIRED SIZE OF CIRCULAR CORRUGATED METAL PIPE, FLOWING FULL

(n = 0.021)



FLOW WITHIN A SYSTEM

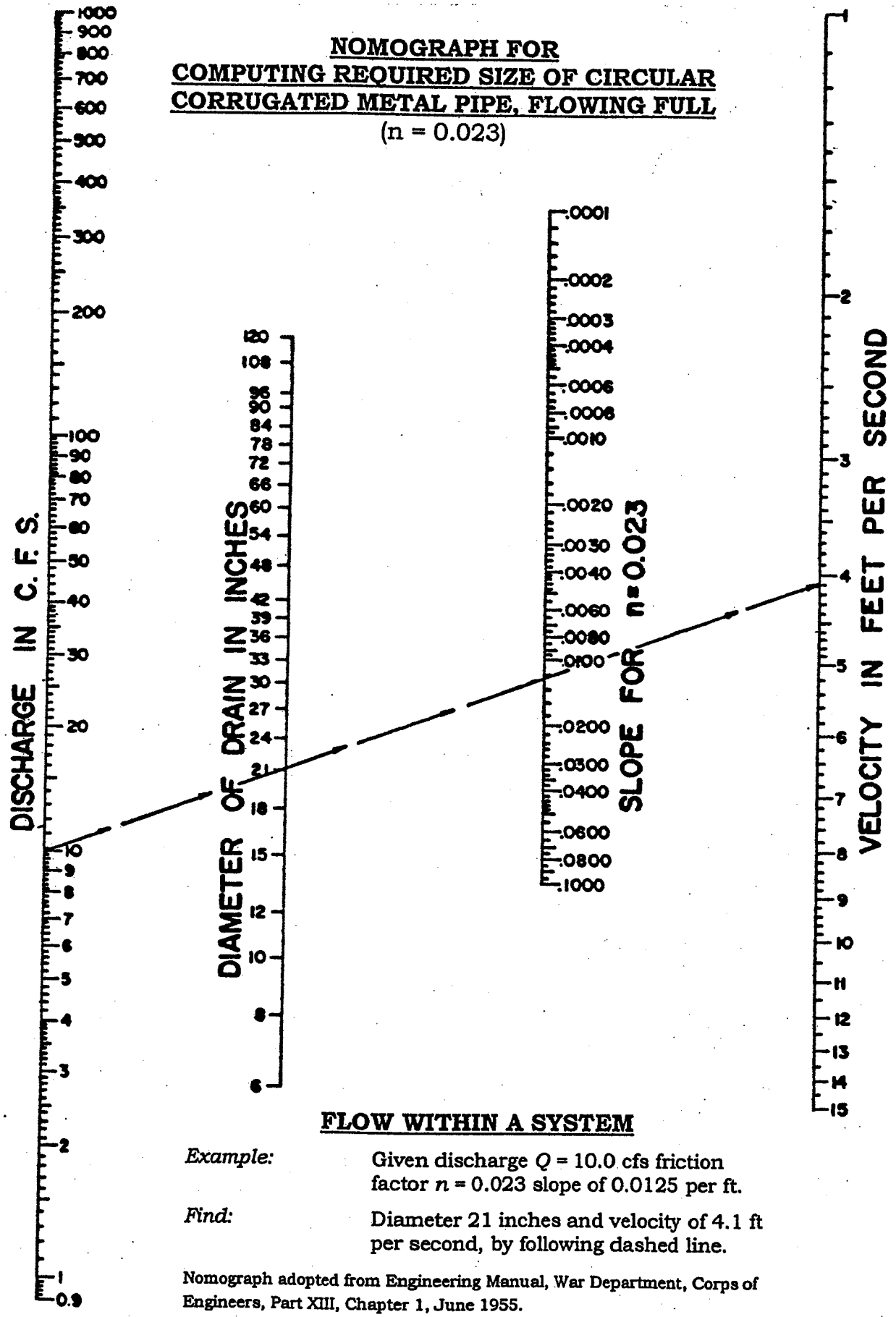
Example: Given discharge Q = 10.0 cfs friction factor n = 0.021 slope of 0.0049 per ft.

Find: Diameter 24 inches and velocity of 3.2 ft per second, by following dashed line.

Nomograph adopted from Engineering Manual, War Department, Corps of Engineers, Part XIII, Chapter 1, June 1955.

NOMOGRAPH FOR COMPUTING REQUIRED SIZE OF CIRCULAR CORRUGATED METAL PIPE, FLOWING FULL

(n = 0.023)

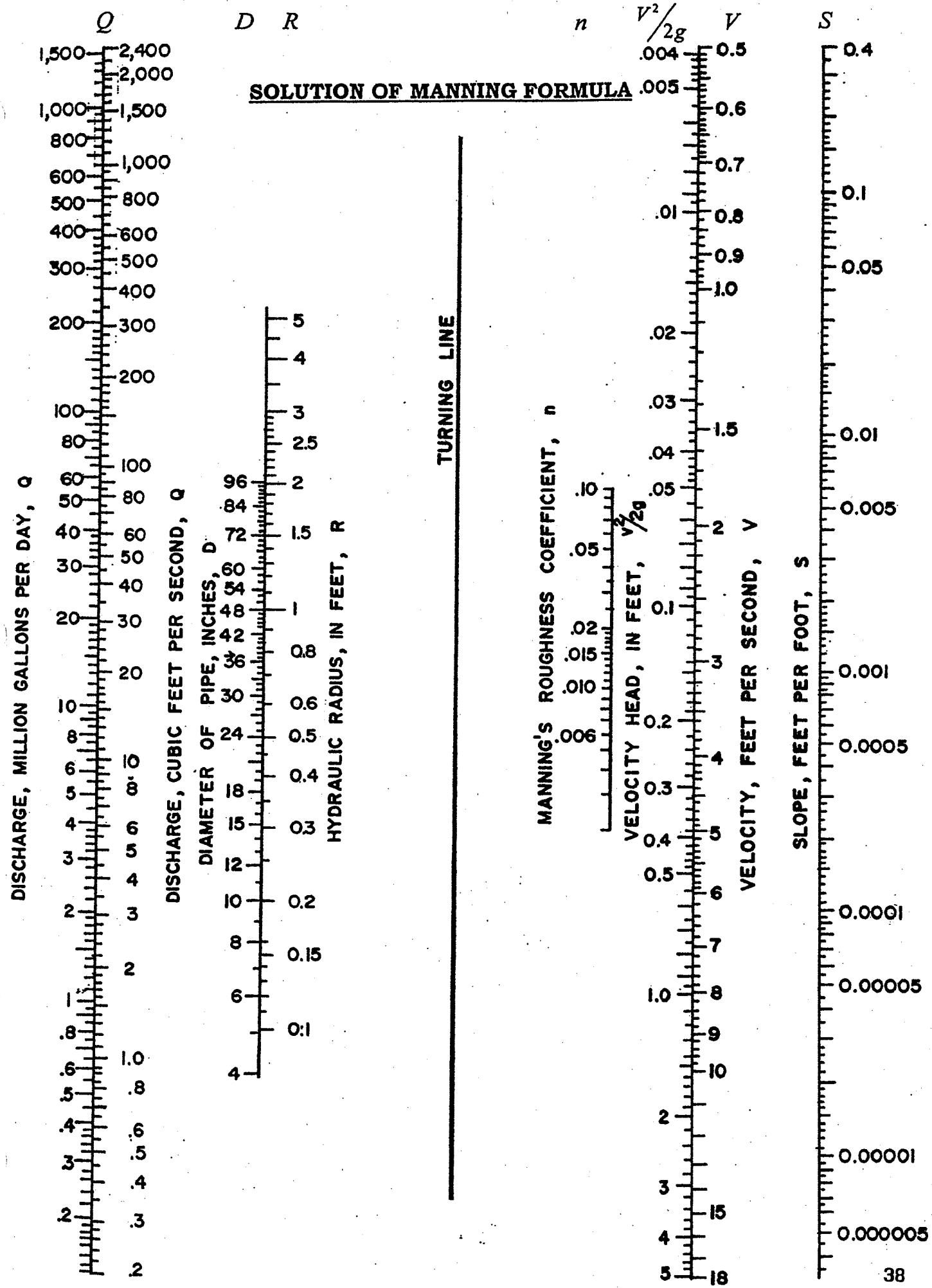


FLOW WITHIN A SYSTEM

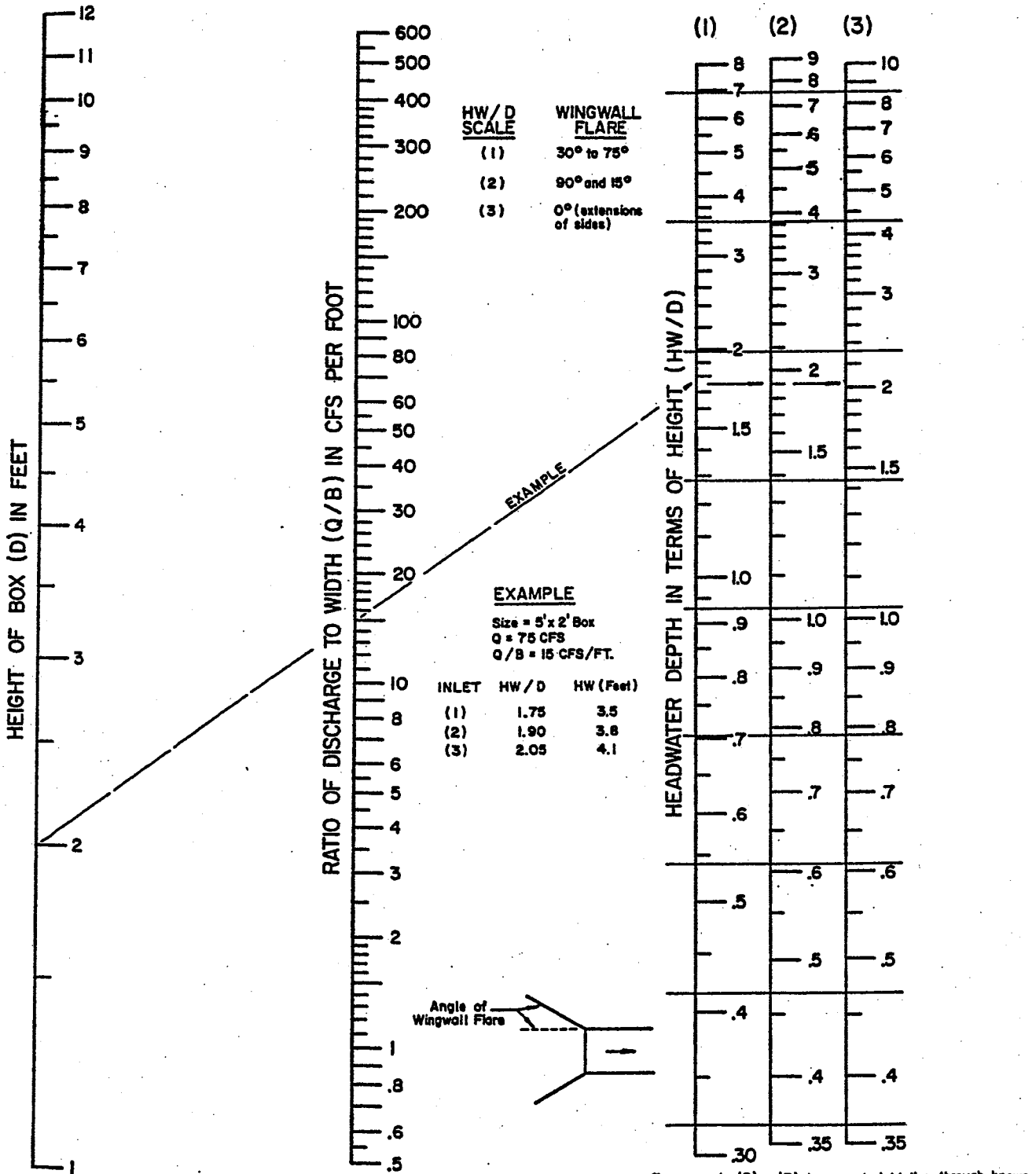
Example: Given discharge Q = 10.0 cfs friction factor n = 0.023 slope of 0.0125 per ft.

Find: Diameter 21 inches and velocity of 4.1 ft per second, by following dashed line.

Nomograph adopted from Engineering Manual, War Department, Corps of Engineers, Part XIII, Chapter 1, June 1955.


SOLUTION OF MANNING FORMULA
Q
D
R
n
$V^2/2g$
V
S
DISCHARGE, MILLION GALLONS PER DAY, Q
DISCHARGE, CUBIC FEET PER SECOND, Q
DIAMETER OF PIPE, INCHES, D
HYDRAULIC RADIUS, IN FEET, R
TURNING LINE
MANNING'S ROUGHNESS COEFFICIENT, n
VELOCITY HEAD, IN FEET, $V^2/2g$
VELOCITY, FEET PER SECOND, V
SLOPE, FEET PER FOOT, S

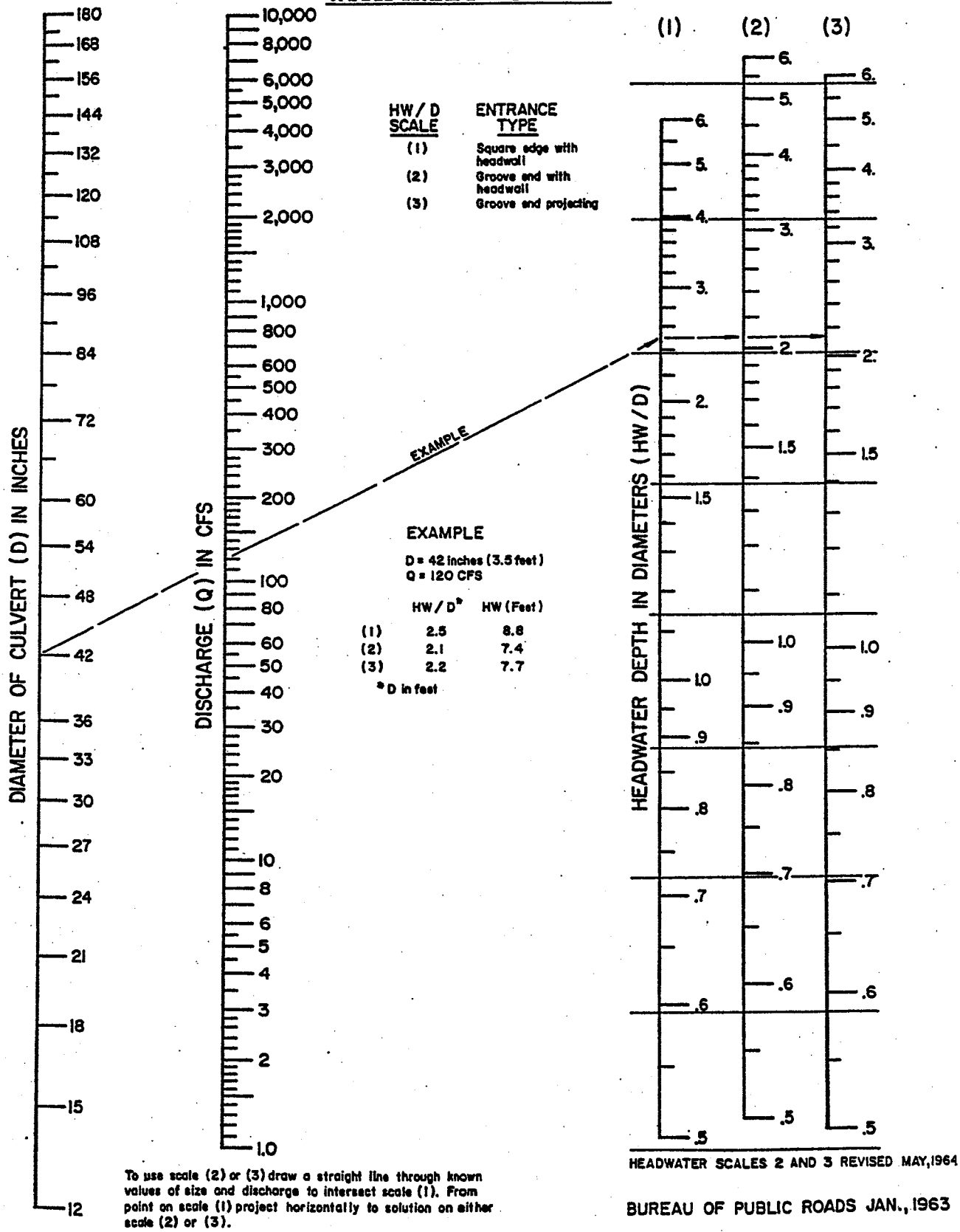
CULVERT DESIGN-INLET CONTROL
HEADWATER DEPTH FOR BOX CULVERTS WITH INLET CONTROL



To use scale (2) or (3) draw a straight line through known values of size and discharge to intersect scale (1). From point on scale (1) project horizontally to solution on either scale (2) or (3).

BUREAU OF PUBLIC ROADS JAN., 1963

CULVERT DESIGN-INLET CONTROL
HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL



To use scale (2) or (3) draw a straight line through known values of size and discharge to intersect scale (1). From point on scale (1) project horizontally to solution on either scale (2) or (3).

HEADWATER SCALES 2 AND 3 REVISED MAY, 1964

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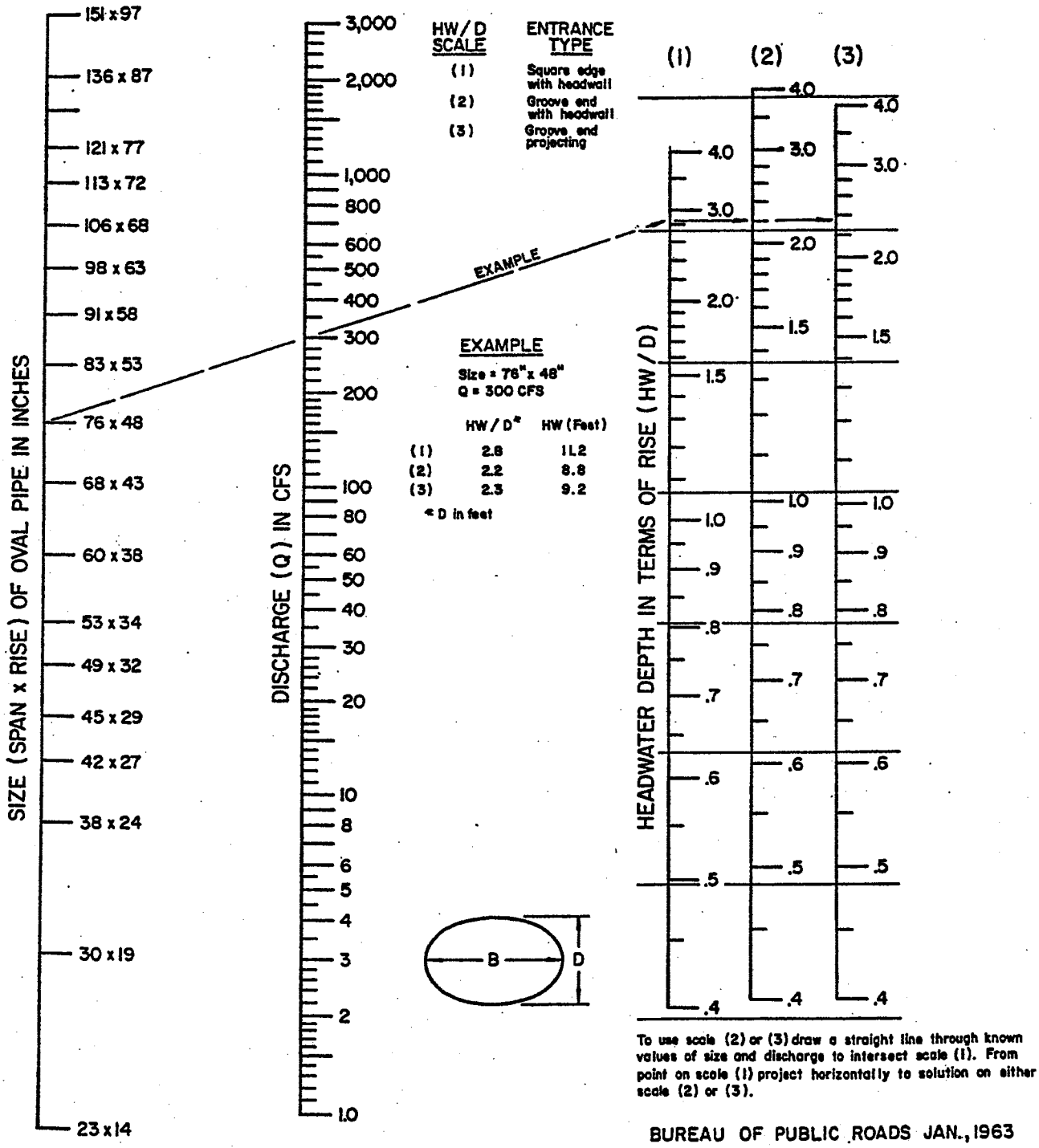
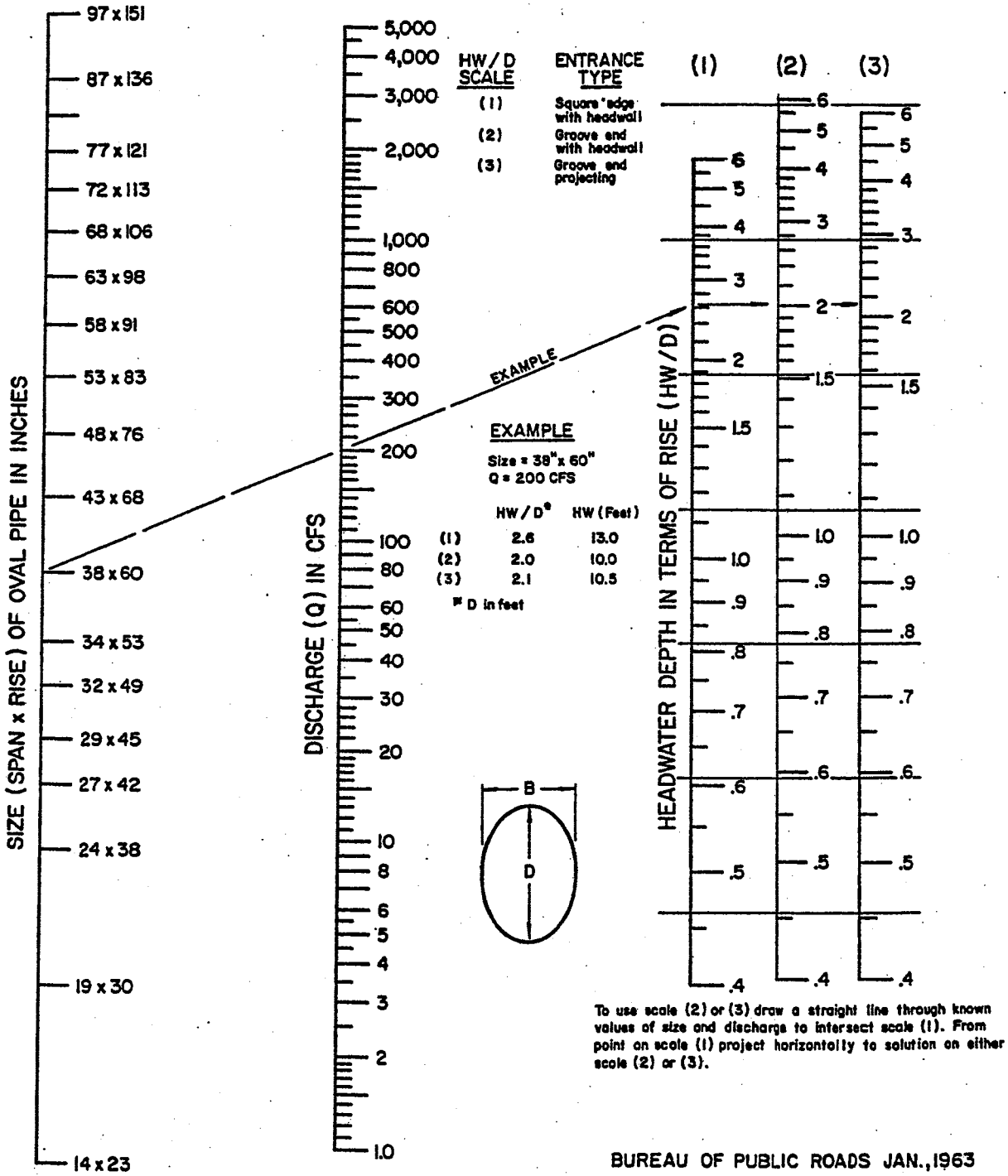
CULVERT DESIGN-INLET CONTROL
HEADWATER DEPTH FOR OVAL CONCRETE PIPE CULVERTS
LONG AXIS HORIZONTAL WITH INLET CONTROL



To use scale (2) or (3) draw a straight line through known values of size and discharge to intersect scale (1). From point on scale (1) project horizontally to solution on either scale (2) or (3).

BUREAU OF PUBLIC ROADS JAN., 1963

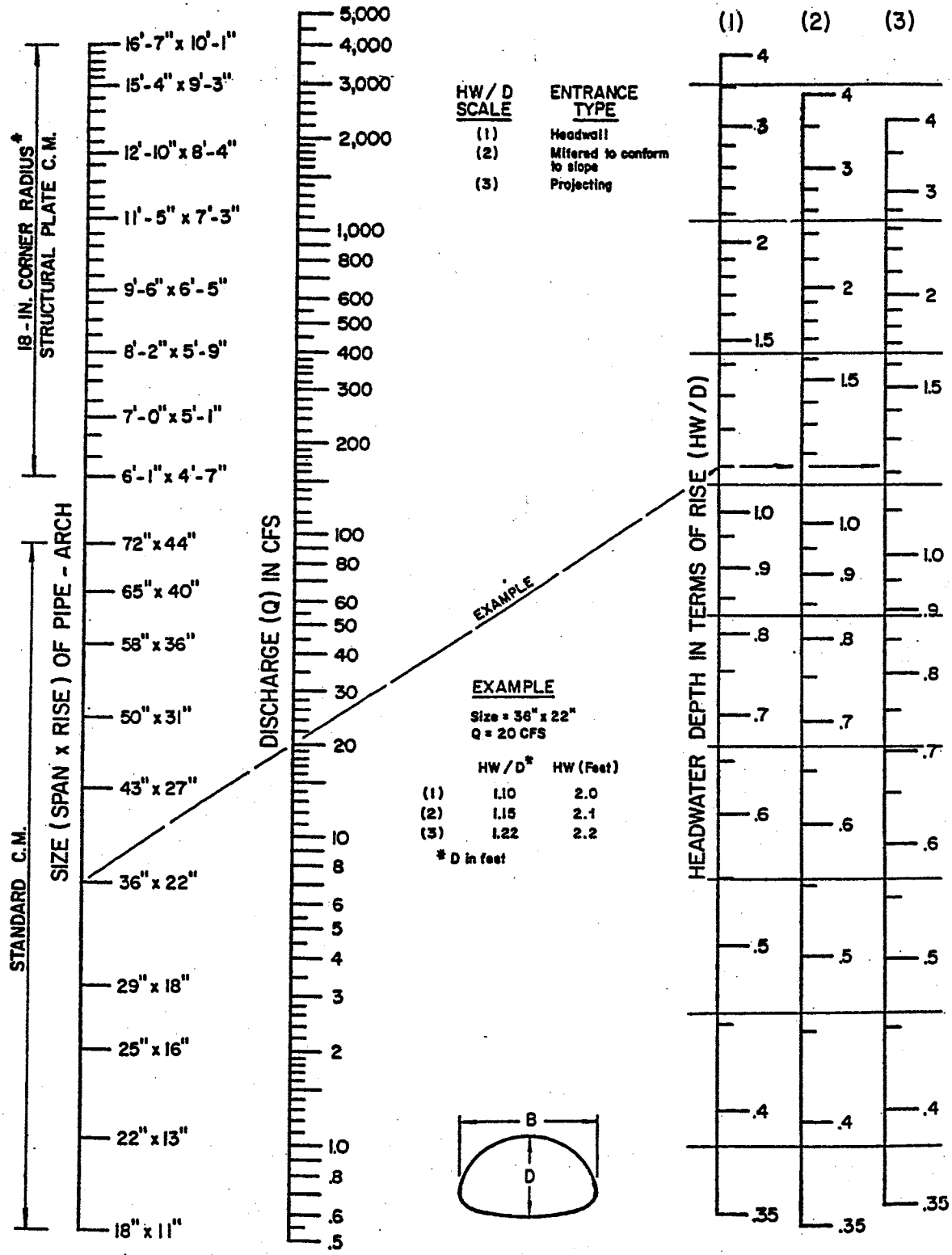
CULVERT DESIGN-INLET CONTROL
HEADWATER DEPTH FOR OVAL CONCRETE PIPE CULVERTS
LONG AXIS VERTICAL WITH INLET CONTROL



To use scale (2) or (3) draw a straight line through known values of size and discharge to intersect scale (1). From point on scale (1) project horizontally to solution on either scale (2) or (3).

BUREAU OF PUBLIC ROADS JAN., 1963

CULVERT DESIGN-INLET CONTROL
HEADWATER DEPTH FOR CORRUGATED METAL PIPE CULVERTS WITH INLET CONTROL



To use scale (2) or (3) draw a straight line through known values of size and discharge to intersect scale (1). From point on scale (1) project horizontally to solution on either scale (2) or (3).

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*ADDITIONAL SIZES NOT DIMENSIONED ARE LISTED IN FABRICATOR'S CATALOG

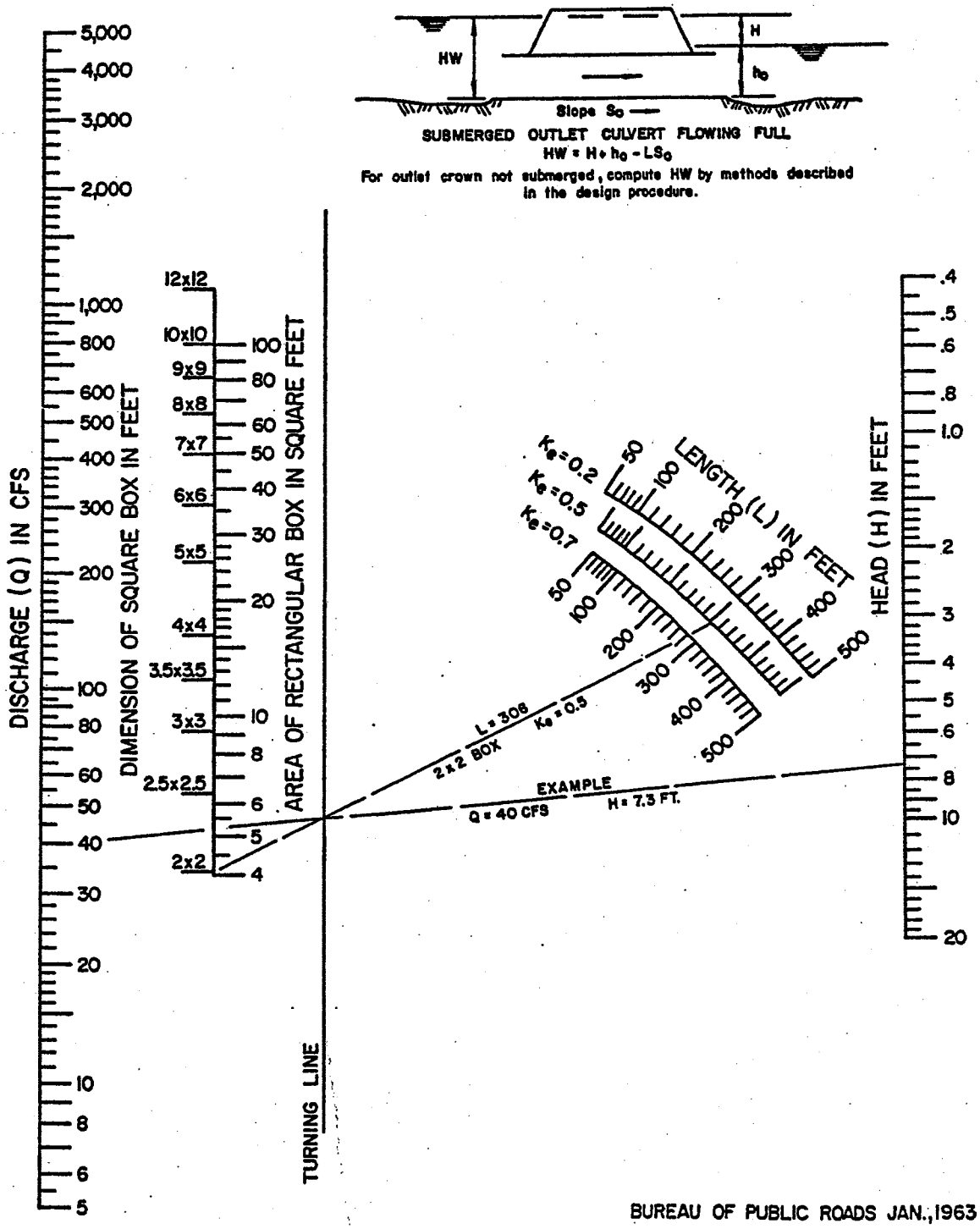
CULVERT DESIGN-OUTLET CONTROL
HEAD FOR CONCRETE BOX CULVERTS
FLOWING FULL

(n = 0.012)

SUBMERGED OUTLET CULVERT FLOWING FULL

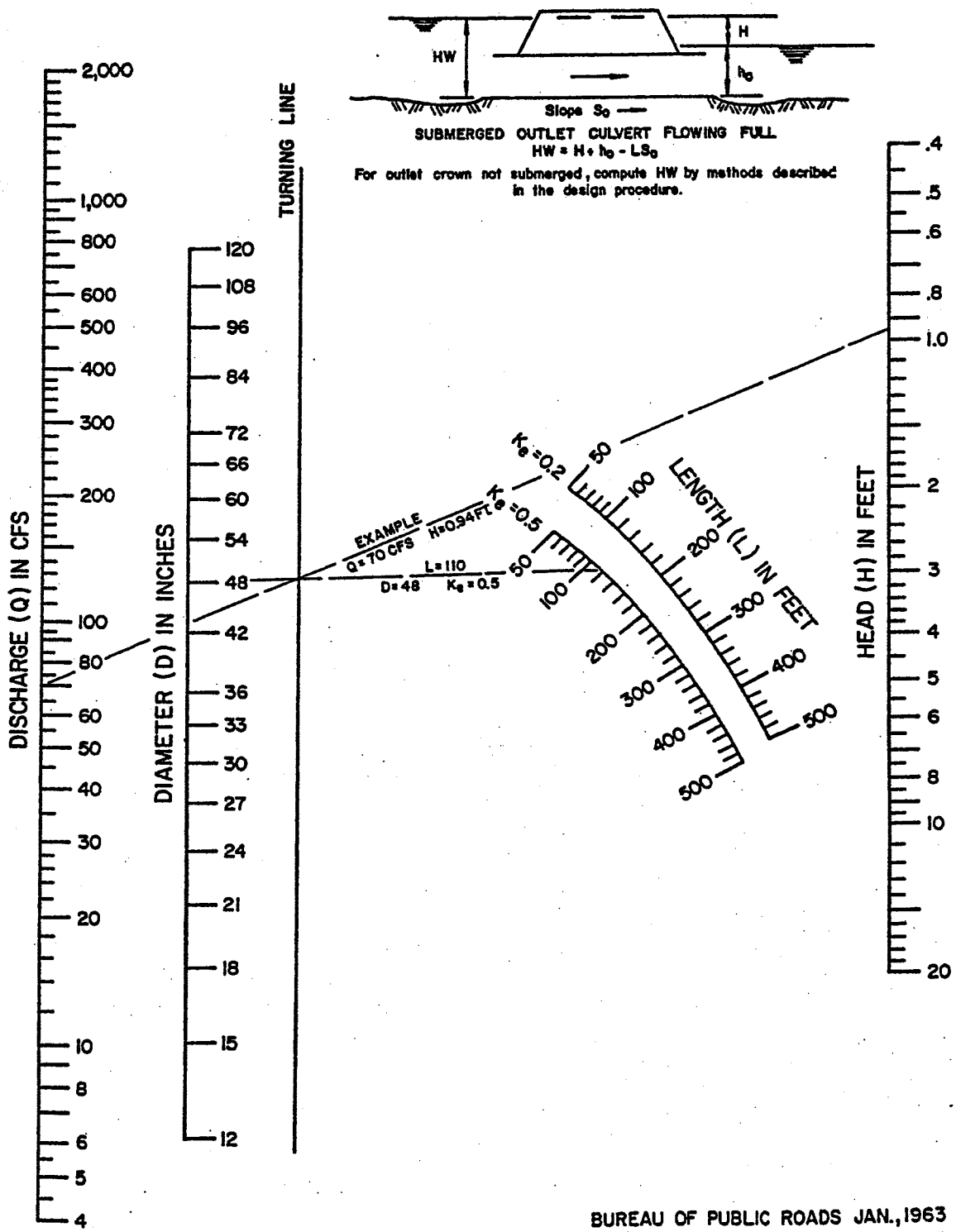
$HW = H + h_o - LS_o$

For outlet crown not submerged, compute HW by methods described in the design procedure.



BUREAU OF PUBLIC ROADS JAN., 1963

CULVERT DESIGN-OUTLET CONTROL
HEAD FOR CONCRETE PIPE CULVERTS
FLOWING FULL
(n = 0.012)



BUREAU OF PUBLIC ROADS JAN., 1963

Storm Drainage Design Requirements

The following is a list of requirements for storm drainage plans and for storm drainage lines that will eventually be maintained by the City of Graham.

General Requirements

1) Storm sewers will have capacity to convey a 10-year storm within the pipe.

2) Culverts on major streams (Over 200 acres) will have capacity to convey a 100-year storm. **Q** will be determined using methods in this manual.

3) Storm sewer systems on culverts under inlet or outlet control will be designed accordingly to accommodate the maximum allowable headwater depth to fit surrounding terrain. The headwater to depth ratio should be held as close as possible to 1:2.

4) Storm sewer lines with size 15-inches through 66-inches will be reinforced concrete Class III or Class IV, or HDPE pipe (outside of road right-of-way) as approved by the NCDOT, unless otherwise approved by the City.

5) Corrugated metal pipe, either aluminized steel or aluminum, above 66-inches diameter may be used under the following conditions:
   a) Materials, gauge, corrugation, fabrication, etc. must meet NCDOT design criteria, specifications, and the City of Graham policy on acceptable corrugated metal pipe products.
   b) Full bituminous coating to be used where ph dictates.

6) Minimum size for storm sewer pipe in streets is 15-inches in diameter.

7) Minimum storm sewer pipe grade is 0.5 percent.

8) Maximum storm sewer pipe grade is 10.0 percent.

9) Minimum grade for tailditching is 1.0 percent.

10) Manholes are required at changes in grade, changes in alignment, and at intersection of sewers.

11) Recommended manhole drops:
   a) Change in alignment 0° to 45°, 0.10 ft.
   b) Change in alignment greater than 45°, 0.20 ft.
   c) Change in pipe size, match top insides of pipes.
   d) Reverse flow conditions in a storm sewer system created by a tie in at a structure will not be allowed unless a manhole drop equal to the diameter of the outgoing pipe is provided.

12) MINIMUM DESIRABLE CURB INLET DEPTH

15"	-Front	3.4'	36"	-Front	5.3'
15"	-Back or Side	1.9'	36"	-Back or Side	3.8'
18"	-Front	3.7'	42"	-Front	5.8'
18"	-Back or Side	2.1'	42"	-Back or Side	4.4'
24"	-Front	4.2'	48"	-Front	6.4'
24"	-Back or Side	2.7'	48"	-Back or Side	5.0'
30"	-Front	4.8'	54"	-Front	6.9'
30"	-Back or Side	3.2'	54"	-Back or Side	5.5'

13) MINIMUM MANHOLE DEPTHS:

15"	-	3.6'
18"	-	3.8'
24"	-	4.0'
30"	-	4.3'

14) Headwalls or flared end sections plus an appropriate energy dissipater will be required at the release point of all pipe systems. Velocities exiting energy dissipaters to be less than 5 ft./sec.

15) Pipe in culvert situations or storm sewer lines that will probably not be extended in the near future (see *) will have a headwall or flared end section on the upstream end.

* A headwall or flared end section will not be required if the property upstream from the pipe is:

a) Owned by the same property owner and the pipe will be extended in the near future within one year).
b) A different section of the same subdivision and the pipe will be extended in the near future (within one year) with development of that section.

16) On all multi-family and commercial projects, approval is required prior to building permit approval.

17) The lower end of a storm sewer line will end far enough from the property line to allow the installation of an energy dissipater; except that it must be tied into existing storm sewer piping if available.

18) Tail ditches from pipe ends to existing creeks will be armored beyond outlet erosion control device to prevent channel scour.

19) The upper end of a storm sewer line will be stubbed to the property line. However, if the upper property has a storm sewer line stubbed short of the property line for erosion control purposes, the new line must be extended across the property line to tie the systems together. No gaps will be left in the system.

20) All pipe culverts and upper end of pipe systems will be sized to satisfy inlet or outlet control constraints. See the section on Culvert Design.

21) Precast structures may be allowed subject to City approval.

22) Precast boxes for curb inlets will be ordered with the height 24-inches lower than the finished grade. Once installed, a brick mason will be required to raise the top of the box to the proper height using brick and mortar to fit the curb grade. This is to keep from having to break out the front of the box to accommodate the curb and gutter.

23) Site drainage will not be allowed to flow out driveway entrance into streets.

24) Outlets of City maintained storm sewer systems must be above the normal pool elevation of detention ponds. Invert of drainage structures must be above the standpipe elevation of the detention pond. This is to assure that the pipe systems do not stand full of water for long periods of time and do not back up into the roadway during heavy rainstorms.

25) Private drain lines larger than 4-inches in diameter cannot tie directly into the curb and gutter. The pipe must tie into a junction box behind the curb.

26) Site drainage must be tied into any existing storm drain system.

27) There must be an 18-inch clearance between proposed utility lines and existing storm sewer lines.

28) Permits from the City are required before tying into any City storm sewer structure. The inspection is to insure a proper tie-in to reduce future maintenance problems.

29) Reinforced concrete pipe is the only material allowed for driveway culverts.

30) Extensive energy dissipaters must be used where new commercial site will be draining onto existing residential property. The City reserves the right to require on-site stormwater detention for release at pre-development flows on a case by case basis. The impact on downstream development and the impact on downstream piping systems will be taken into consideration for stormwater detention to be required. In addition, new State Storm Water Quality Rules may impact design.

ADDITIONAL REQUIREMENTS FOR DRAINAGE PLANS
(Subdivisions and Other Developments)

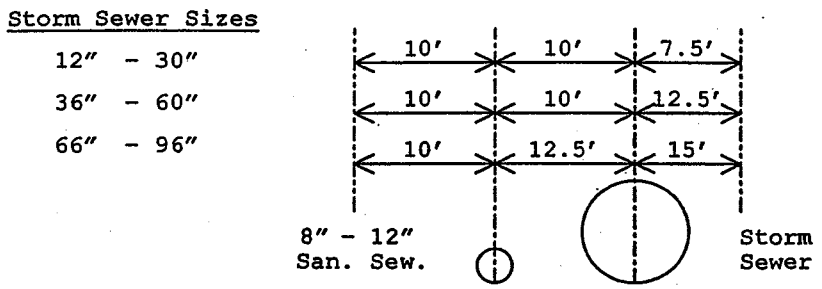
1) All water courses which carry a flow of 5 cubic feet per second (5cfs) or more during a 10-year storm, as calculated in accordance with this manual, and which are not situated within a street right-of-way shall either be piped or have a drainage easement dedicated.

2) Drainaged easements for piped drainageway:
   a) 12" - 30" pipe - 15'
   b) 36" - 60" pipe - 20'
   c) 66" - 96" pipe - 30'

3) Drainage Easements for Unpiped Drainageways:
   a) 5 cfs to 16 cfs - 30' centered on channel
   b) 17 cfs to 70 cfs - 60' centered on channel
   c) 70 cfs and up - 100' + the width of the channel

   Note: The drainageway easement width may be reduced from the above values to the width of the 100-year flood fringe as documented by floodway studies.

4) Drainage and utility easements with storm and sanitary sewer lines.



5) Any proposed storm sewer lines, which will be carrying street water, must be submitted to the City for construction approval. The installation of the storm sewer line must be inspected prior to acceptance of the line.

6) The following must be included on Site Drainage Plans.
   a) Location of inlets, manholes, pipelines.
   b) Clearly defined lines delineating areas drained to each inlet.
   c) Existing and proposed contour lines must be shown to 200-feet beyond the property line.
   d) Ditches swales, pipes, and drainage easements, which are adjacent to the proposed project.
   e) Drainage calculations on form similar to that shown on page 52.

7) The City may approve on a case by case basis a variance from street curb and gutters. In this instance, the street ditches shall be designed in accordance with the N.C.D.E.M. Erosion and Sediment Control Planning Design Manual except that riprap liners are not allowed in street rights of way. Furthermore, driveway pipes shall be no larger than 18" in diameter except when the pipe is a part of a continuous piping system.

STORM DRAINAGE DESIGN DATA SHEET

PROJECT_____ ENGINEER_____ DATE_____

LOCATION_____

STORM FREQUENCY_____ YEAR

LOCATION		AREA		C	INTENSITY			Q = CIA	PIPE			REMARKS
TO	FROM	SUB	TOTAL		L.B.	T.C.	I	CFS	SIZE	SLOPE	VEL.	

ARTICLE IX. FLOOD DAMAGE PREVENTION

Section 10.360 Statutory authorization; findings of fact

The Legislature of the State of North Carolina has in Part 6, Article 21 of Chapter 143; Parts 3, 5, and 8 of Article 19 of Chapter 160A; and Article 8 of Chapter 160A of the North Carolina General Statutes, delegated to local governmental units the responsibility to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry.

Therefore, the City Council of the City of Graham, North Carolina, does ordain as follows:

Section 10.361 Findings of fact

(1) The flood prone areas within the jurisdiction of the City of Graham are subject to periodic inundation which results in loss of life, property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures of flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.

(2) These flood losses are caused by the cumulative effect of obstructions in floodplains causing increases in flood heights and velocities and by the occupancy in flood prone areas of uses vulnerable to floods or other hazards.

Section 10.362 Statement of purpose

It is the purpose of this ordinance to promote public health, safety, and general welfare and to minimize public and private losses due to flood conditions within flood prone areas by provisions designed to:

(1) restrict or prohibit uses that are dangerous to health, safety, and property due to water or erosion hazards or that result in damaging increases in erosion, flood heights or velocities;

(2) require that uses vulnerable to floods, including facilities that serve such uses, be protected against flood damage at the time of initial construction;

(3) control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters;

(4) control filling, grading, dredging, and all other development that may increase erosion or flood damage; and

(5) prevent or regulate the construction of flood barriers that will unnaturally divert flood waters or which may increase flood hazards to other lands.

Section 10.363 Objectives

The objectives of this ordinance are:

(1) to protect human life and health;

(2) to minimize expenditure of public money for costly flood control projects;

(3) to minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;

(4) to minimize prolonged business losses and interruptions;

(5) to minimize damage to public facilities and utilities (i.e. water and gas mains, electric, telephone, cable and sewer lines, streets, and bridges) that are located in flood prone areas;

(6) to help maintain a stable tax base by providing for the sound use and development of flood prone areas; and

(7) to ensure that potential buyers are aware that property is in a Special Flood Hazard Area.

Section 10.364 Definitions

Unless specifically defined below, words or phrases used in this ordinance shall be interpreted so as to give them the meaning they have in common usage and to give this ordinance its most reasonable application.

"Accessory Structure (Appurtenant Structure)" means a structure located on the same parcel of property as the principal structure and the use of which is incidental to the use of the principal structure. Garages, carports and storage sheds are common urban accessory structures. Pole barns, hay sheds and the like qualify as accessory structures on farms, and may or may not be located on the same parcel as the farm dwelling or shop building.

"Addition (to an existing building)" means an extension or increase in the floor area or height of a building or structure.

"Appeal" means a request for a review of the floodplain administrator's interpretation of any provision of this ordinance.

"Area of Shallow Flooding" means a designated Zone AO on a community's Flood Insurance Rate Map (FIRM) with base flood depths determined to be from one (1) to three (3) feet. These areas are located where a clearly defined channel does not exist, where the path of flooding is unpredictable and indeterminate, and where velocity flow may be evident.

"Area of Special Flood Hazard" see "Special Flood Hazard Area (SFHA)"

"Basement" means any area of the building having its floor subgrade (below ground level) on all sides.

"Base Flood" means the flood having a one (1) percent chance of being equaled or exceeded in any given year.

"Base Flood Elevation (BFE)" means a determination of the water surface elevations of the base flood as published in the Flood Insurance Study. When the BFE has not been provided in a "Special Flood Hazard Area", it may be obtained from engineering studies available from a Federal or State or other source

using FEMA approved engineering methodologies. This elevation, when combined with the "Freeboard", establishes the "Regulatory Flood Protection Elevation".

"Building" see "Structure"

"Chemical Storage Facility" means a building, portion of a building, or exterior area adjacent to a building used for the storage of any chemical or chemically reactive products.

"Development" means any man-made change to improved or unimproved real estate, including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials.

"Disposal" means, as defined in NCGS 130A-290(a)(6), the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste into or on any land or water so that the solid waste or any constituent part of the solid waste may enter the environment or be emitted into the air or discharged into any waters, including groundwaters.

"Elevated Building" means a non-basement building which has its lowest elevated floor raised above ground level by foundation walls, shear walls, posts, piers, pilings, or columns.

"Encroachment" means the advance or infringement of uses, fill, excavation, buildings, permanent structures or development into a floodplain, which may impede or alter the flow capacity of a floodplain.

"Existing Manufactured Home Park or Manufactured Home Subdivision" means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) was completed before the original effective date of the floodplain management regulations adopted by the community.

"Expansion to an existing manufactured home park or subdivision" means the preparation of the additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete slabs.)

"Flood" or "Flooding" means a general and temporary condition of partial or complete inundation of normally dry land areas from:

(1) the overflow of inland or tidal waters; and/or

(2) the unusual and rapid accumulation of runoff of surface waters from any source.

"Flood Boundary and Floodway Map (FBFM)" means an official map of a community, issued by the Federal Emergency Management Agency, on which the Special Flood Hazard Areas and the floodways are delineated. This official map is a supplement to and shall be used in conjunction with the Flood Insurance Rate Map (FIRM).

"Flood Hazard Boundary Map (FHBM)" means an official map of a community, issued by the Federal Emergency Management Agency, where the boundaries of the Special Flood Hazard Areas have been defined as Zone A.

"Flood Insurance" means the insurance coverage provided under the National Flood Insurance Program.

"Flood Insurance Rate Map (FIRM)" means an official map of a community, issued by the Federal Emergency Management Agency, on which both the Special Flood Hazard Areas and the risk premium zones applicable to the community are delineated.

"Flood Insurance Study (FIS)" means an examination, evaluation, and determination of flood hazards, corresponding water surface elevations (if appropriate), flood hazard risk zones, and other flood data in a community issued by the Federal Emergency Management Agency. The Flood Insurance Study report includes Flood Insurance Rate Maps (FIRMs) and Flood Boundary and Floodway Maps (FBFMs), if published.

"Flood Prone Area" see "Floodplain"

"Floodplain" means any land area susceptible to being inundated by water from any source.

"Floodplain Administrator" is the individual appointed to administer and enforce the floodplain management regulations.

"Floodplain Development Permit" means any type of permit that is required in conformance with the provisions of this ordinance, prior to the commencement of any development activity.

"Floodplain Management" means the operation of an overall program of corrective and preventive measures for reducing flood damage and preserving and enhancing, where possible, natural resources in the floodplain, including, but not limited to, emergency preparedness plans, flood control works, floodplain management regulations, and open space plans.

"Floodplain Management Regulations" means this ordinance and other zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances, and other applications of police power which control development in flood-prone areas. This term describes federal, state or local regulations, in any combination thereof, which provide standards for preventing and reducing flood loss and damage.

"Floodproofing" means any combination of structural and nonstructural additions, changes, or adjustments to structures, which reduce or eliminate flood damage to real estate or improved real property, water and sanitation facilities, structures, and their contents.

"Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one (1) foot.

"Flood Zone" means a geographical area shown on a Flood Hazard Boundary Map or Flood Insurance Rate Map that reflects the severity or type of flooding in the area.

"Floor" means the top surface of an enclosed area in a building (including basement), i.e., top of slab in concrete slab construction or top of wood flooring in wood frame construction. The term does not include the floor of a garage used solely for parking vehicles.

"Freeboard" means the height added to the Base Flood Elevation (BFE) to account for the many unknown factors that could contribute to flood heights greater that the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization on the watershed. The Base Flood Elevation plus the freeboard establishes the "Regulatory Flood Protection Elevation".

"Functionally Dependent Facility" means a facility which cannot be used for its intended purpose unless it is located in close proximity to water, such as a docking or port facility necessary for the loading and unloading of cargo or passengers, shipbuilding, or ship repair. The term does not include long-term storage, manufacture, sales, or service facilities.

"Hazardous Waste Facility" means, as defined in NCGS 130A, Article 9, a facility for the collection, storage, processing, treatment, recycling, recovery, or disposal of hazardous waste.

"Highest Adjacent Grade (HAG)" means the highest natural elevation of the ground surface, prior to construction, immediately next to the proposed walls of the structure.

"Historic Structure" means any structure that is:

(a) listed individually in the National Register of Historic Places (a listing maintained by the US Department of Interior) or preliminarily determined by the Secretary of Interior as meeting the requirements for individual listing on the National Register;

(b) certified or preliminarily determined by the Secretary of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;

(c) individually listed on a local inventory of historic landmarks in communities with a "Certified Local Government (CLG) Program"; or

(d) certified as contributing to the historical significance of a historic district designated by a community with a "Certified Local Government (CLG) Program"

Certified Local Government (CLG) Programs are approved by the US Department of the Interior in cooperation with the North Carolina Department of Cultural Resources through the State Historic Preservation Officer as having met the requirements of the National Historic Preservation Act of 1966 as amended in 1980.

"Levee" means a manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

"Levee system" means a flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices.

"Lowest Adjacent Grade (LAG)" means the elevation of the ground, sidewalk or patio slab immediately next to the building, or deck support, after completion of the building.

"Lowest Floor" means lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access, or limited storage in an area other than a basement area is not considered a building's lowest floor, provided that such an enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of this ordinance.

"Manufactured Home" means a structure, transportable in one or more sections, which is built on a permanent chassis and designed to be used with or without a permanent foundation when connected to the required utilities. The term "manufactured home" does not include a "recreational vehicle".

"Manufactured Home Park or Subdivision" means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

"Market Value" means the building value, not including the land value and that of any accessory structures or other improvements on the lot. Market value may be established by independent certified appraisal; replacement cost depreciated for age of building and quality of construction (Actual Cash Value); or adjusted tax assessed values.

"Mean Sea Level" means, for purposes of this ordinance, the National Geodetic Vertical Datum (NGVD) as corrected in 1929, the North American Vertical Datum (NAVD) as corrected in 1988, or other vertical control datum used as a reference for establishing varying elevations within the floodplain, to which Base Flood Elevations (BFEs) shown on a FIRM are referenced. Refer to each FIRM panel to determine datum used.

"National Geodetic Vertical Datum (NGVD)" as corrected in 1929 is a vertical control used as a reference for establishing elevations within the floodplain.

"New Construction" means structures for which the "start of construction" commenced on or after the effective date of the original version of the community's Flood Damage Prevention Ordinance and includes any subsequent improvements to such structures.

"New manufactured home park or subdivision means a manufactured" home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction. of streets, and either final site grading or the pouring of concrete slabs) is completed on or after August 5, 1980.

"Non-Encroachment Area" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one (1) foot as designated in the Flood Insurance Study report.

"Post-FIRM" means construction or other development for which the "start of construction" occurred on or after the effective date of the initial Flood Insurance Rate Map for the area.

"Pre-FIRM" means construction or other development for which the "start of construction" occurred before the effective date of the initial Flood Insurance Rate Map for the area.

"Principally Above Ground" means that at least 51% of the actual cash value of the structure is above ground.

"Public Safety" and/or "Nuisance" means anything which is injurious to the safety or health of an entire community or neighborhood, or any considerable number of persons, or unlawfully obstructs the free passage or use, in the customary manner, of any navigable lake, or river, bay, stream, canal, or basin.

"Recreational Vehicle (RV)" means a vehicle, which is:

(a) built on a single chassis;

(b) 400 square feet or less when measured at the largest horizontal projection;

(c) designed to be self-propelled or permanently towable by a light duty truck; and

(d) designed primarily not for use as a permanent dwelling, but as temporary living quarters for recreational, camping, travel, or seasonal use.

"Reference feature" is the receding edge of a bluff or eroding frontal dune or, if such a feature is not present, the normal high water line or the seaward line of permanent vegetation if high water line cannot be identified.

"Reference Level" is the top of the lowest floor for structures within Special Flood Hazard Areas designated as Zone A1-A30, AE, A, A99 or AO. It can also be the bottom of the lowest horizontal structural member of the lowest floor, excluding the foundation system, for structures within all Special Flood Hazard Areas.

"Regulatory Flood Protection Elevation" means the "Base Flood Elevation" plus the "Freeboard". In "Special Flood Hazard Areas" where Base Flood Elevations (BFEs) have been determined, this elevation shall be the BFE plus two (2) feet of freeboard. In "Special Flood Hazard Areas" where no BFE has been established, this elevation shall be at least two (2) feet above the highest adjacent grade.

"Remedy a Violation" means to bring the structure or other development into compliance with State and community floodplain management regulations, or, if this is not possible, to reduce the impacts of its noncompliance. Ways that impacts may be reduced include protecting the structure or other affected development from flood damages, implementing the enforcement provisions of the ordinance or otherwise deterring future similar violations, or reducing Federal financial exposure with regard to the structure or other development.

"Riverine" means relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.

"Salvage Yard" means any non-residential property used for the storage, collection, and/or recycling of any type of equipment, and including but not limited to vehicles, appliances and related machinery.

"Solid Waste Disposal Facility" means, as defined in NCGS 130A-290(a)(35), any facility involved in the disposal of solid waste.

"Solid Waste Disposal Site" means, as defined in NCGS 130A-290(a)(36), any place at which solid wastes are disposed of by incineration, sanitary landfill, or any other method.

"Special Flood Hazard Area (SFHA)" means the land in the floodplain subject to a one (1%) percent or greater chance of being flooded in any given year, as determined in Section 10.365 (b) of the *City of Graham Development Ordinances*.

"Start of Construction" includes substantial improvement, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading, and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of the building, whether or not that alteration affects the external dimensions of the building.

"Structure" means a walled and roofed building, a manufactured home, or a gas, liquid, or liquefied gas storage tank that is principally above ground.

"Substantial Damage" means damage of any origin sustained by a structure during any one-year period whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. See definition of "substantial improvement". Substantial damage also means flood-related damage sustained by a structure on two separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25 percent of the market value of the structure before the damage occurred.

"Substantial Improvement" means any combination of repairs, reconstruction, rehabilitation, addition, or other improvement of a structure, taking place during any one-year period for which the cost equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed. The term does not, however, include either:

(a) any correction of existing violations of State or community health, sanitary, or safety code specifications which have been identified by the community code enforcement official and which are the minimum necessary to assure safe living conditions; or,

(b) any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure.

"Substantially improved existing manufactured home park" means where the repair, reconstruction, rehabilitation or improvement of the streets, utilities and pads equals or exceeds 50 percent of the value of the streets, utilities and pads before the repair, reconstruction or improvement commenced.

"Variance" is a grant of relief from the requirements of this ordinance.

"Violation" means the failure of a structure or other development to be fully compliant with the community's floodplain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in Sections 10.366, 10.367, 10.368, 10.369, 10.370, 10.371, 10.372, 10.373, 10.374, 10.375, 10.376, 10.377, and 10.378 of the *City of Graham Development Ordinances* is presumed to be in violation until such time as that documentation is provided.

"Water Surface Elevation (WSE)" means the height, in relation to mean sea level, of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.

"Watercourse" means a lake, river, creek, stream, wash, channel or other topographic feature on or over which waters flow at least periodically. Watercourse includes specifically designated areas in which substantial flood damage may occur.

Section 10.365 General provisions

(a) *LANDS TO WHICH THIS SECTION APPLIES.* This ordinance shall apply to all Special Flood Hazard Areas within the jurisdiction, including Extra-Territorial Jurisdictions (ETJs) if applicable, of the City of Graham and within the jurisdiction of any other community whose governing body agrees, by resolution, to such applicability.

(b) *BASIS FOR ESTABLISHING THE SPECIAL FLOOD HAZARD AREAS*. The Special Flood Hazard Areas are those identified under the Cooperating Technical State (CTS) agreement between the State of North Carolina and FEMA in its Flood Insurance Study (FIS) and its accompanying Flood Insurance Rate Maps (FIRM), for Alamance County September 6, 2006 which are adopted by reference and declared to be a part of this ordinance.

(c) *ESTABLISHMENT OF FLOODPLAIN DEVELOPMENT PERMIT*. A Floodplain Development Permit shall be required in conformance with the provisions of this ordinance prior to the commencement of any development activities within Special Flood Hazard Areas determined in accordance with Section 10.365 (b) of the *City of Graham Development Ordinance*.

(d) *COMPLIANCE*. No structure or land shall hereafter be located, extended, converted, altered, or developed in any way without full compliance with the terms of this ordinance and other applicable regulations.

(e) *ABROGATION AND GREATER RESTRICTIONS*. This ordinance is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this ordinance and another conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

(f) *INTERPRETATION*. In the interpretation and application of this ordinance, all provisions shall be:

(1) considered as minimum requirements;

(2) liberally construed in favor of the governing body; and

(3) deemed neither to limit nor repeal any other powers granted under State statutes.

(g) *WARNING AND DISCLAIMER OF LIABILITY*. The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering consideration. Larger floods can and will occur. Actual flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the Special Flood Hazard Areas or uses permitted within such areas will be free from flooding or flood damages. This ordinance shall not create liability on the part of the City of Graham or by any officer or employee thereof for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made hereunder.

(h) *PENALTIES FOR VIOLATION*. Violation of the provisions of this ordinance or failure to comply with any of its requirements, including violation of conditions and safeguards established in connection with grants of variance or special exceptions, shall constitute a misdemeanor. Any person who violates this ordinance or fails to comply with any of its requirements shall, upon conviction thereof, be fined not more than $50.00 or imprisoned for not more than thirty (30) days, or both. Each day such violation continues shall be considered a separate offense. Nothing herein contained shall prevent the City of Graham from taking such other lawful action as is necessary to prevent or remedy any violation.

Section 10.366 ADMINISTRATION; Designation of Local Floodplain Administrator

The City Planner, hereinafter referred to as the "Floodplain Administrator", is hereby appointed to administer and implement the provisions of ARTICLE IX. FLOOD DAMAGE PREVENTION in the *City of Graham Development Ordinances*.

Section 10.367 Floodplain Development Application, Permit and Certification Requirements

(1) Application Requirements. Application for a Floodplain Development Permit shall be made to the floodplain administrator prior to any development activities located within Special Flood Hazard Areas. The following items shall be presented to the floodplain administrator to apply for a floodplain development permit:

(a) A plot plan drawn to scale which shall include, but shall not be limited to, the following specific details of the proposed floodplain development:

i) the nature, location, dimensions, and elevations of the area of development/disturbance; existing and proposed structures, utility systems, grading/pavement areas, fill materials, storage areas, drainage facilities, and other development;

ii) the boundary of the Special Flood Hazard Area as delineated on the FIRM or other flood map as determined in Section 10.365 (b) of the *City of Graham Development Ordinances*, or a statement that the entire lot is within the Special Flood Hazard Area;

iii) flood zone(s) designation of the proposed development area as determined on the FIRM or other flood map as determined in Section 10.365 (b) of the *City of Graham Development Ordinances*;

iv) the boundary of the floodway(s) or non-encroachment area(s) as determined in Section 10.365 (b) of the *City of Graham Development Ordinances*;

v) the Base Flood Elevation (BFE) where provided as set forth in Section 10.365 (b) of the *City of Graham Development Ordinances*; Section 10.368 (11 & 12) of the *City of Graham Development Ordinances*; or Section 10.373 of the *City of Graham Development Ordinances*;

vi) the old and new location of any watercourse that will be altered or relocated as a result of proposed development;

vii) certification of the plot plan by a registered land surveyor or professional engineer.

(b) Proposed elevation, and method thereof, of all development within a Special Flood Hazard Area including but not limited to:

i) Elevation in relation to mean sea level of the proposed reference level (including basement) of all structures;

ii) Elevation in relation to mean sea level to which any non-residential structure in Zone AE, A or AO will be flood-proofed; and

iii) Elevation in relation to mean sea level to which any proposed utility systems will be elevated or floodproofed;

(c) If floodproofing, a Floodproofing Certificate *(FEMA Form 81-65)* with supporting data and an operational plan that includes, but is not limited to, installation, exercise, and maintenance of floodproofing measures.

(d) A Foundation Plan, drawn to scale,, which shall include details of the proposed foundation system to ensure all provisions of this ordinance are met. These details include but are not limited to:

i) The proposed method of elevation, if applicable (i.e., fill, solid foundation perimeter wall, solid backfilled foundation, open foundation on columns/posts/piers/piles/shear walls);

ii) Openings to facilitate equalization of hydrostatic flood forces on walls in accordance with Section 10.372 (4)(d) of the *City of Graham Development Ordinances*, when solid foundation perimeter walls are used in Zones A, AO, AE, and A1-30;

(e) Usage details of any enclosed areas below the regulatory flood protection elevation.

(f) Plans and/or details for the protection of public utilities and facilities such as sewer, gas, electrical, and water systems to be located and constructed to minimize flood damage;

(g) Copies of all other Local, State and Federal permits required prior to floodplain development permit issuance (Wetlands, Endangered Species, Erosion and Sedimentation Control, Riparian Buffers, Mining, etc.)

(h) Documentation for placement of Recreational Vehicles and/or Temporary Structures, when applicable, to ensure Section 10.372 (6 & 7) of the *City of Graham Development Ordinances* are met.

(i) A description of proposed watercourse alteration or relocation, when applicable, including an engineering report on the effects of the proposed project on the flood-carrying capacity of the watercourse and the effects to properties located both upstream and downstream; and a map (if not shown on plot plan) showing the location of the proposed watercourse alteration or relocation.

(2) Permit Requirements. The Floodplain Development Permit shall include, but not be limited to:

(a) description of the development to be permitted under the floodplain development permit.

(b) The Special Flood Hazard Area determination for the proposed development per available data specified in Section 10.365 (b) of the *City of Graham Development Ordinances*.

(c) The regulatory flood protection elevation required for the reference level and all attendant utilities.

(d) The regulatory flood protection elevation required for the protection of all public utilities.

(e) All certification submittal requirements with timelines.

(f) A statement that no fill material or other development shall encroach into the floodway or non-encroachment area of any watercourse, as applicable.

(g) The flood openings requirements, if in Zones A, AO, AE or A1-30.

(h) Limitations of below BFE enclosure uses (if applicable). (i.e., Parking, Building Access and Limited Storage only).

(3) Certification Requirements.

(a) Elevation Certificates

i) An Elevation Certificate (FEMA Form 81-31) is required prior to the actual start of any new construction. It shall be the duty of the permit holder to submit to the floodplain administrator a certification of the elevation of the reference level, in relation to mean sea level. The floodplain administrator shall review the certificate data submitted. Deficiencies detected by such review shall be corrected by the permit holder prior to the beginning of construction. Failure to submit the certification or failure to make required corrections shall be cause to deny a floodplain development permit.

ii) A final as-built Elevation Certificate (FEMA Form 81-31) is required after construction is completed and prior to Certificate of Compliance/Occupancy issuance. It shall be the duty of the permit holder to submit to the floodplain administrator a certification of final as-built construction of the elevation of the reference level and all attendant utilities. The floodplain administrator shall review the certificate data submitted. Deficiencies detected by such review shall be corrected by the permit holder immediately and prior to Certificate of Compliance/Occupancy issuance. In some instances, another certification may be required to certify corrected as-built construction. Failure to submit the certification or failure to

make required corrections shall be cause to withhold the issuance of a Certificate of Compliance/Occupancy.

(b) Floodproofing Certificate

If non-residential floodproofing is used to meet the regulatory flood protection elevation requirements, a Floodproofing Certificate (FEMA Form 81-65), with supporting data and an operational plan, is required prior to the actual start of any new construction. It shall be the duty of the permit holder to submit to the floodplain administrator a certification of the floodproofed design elevation of the reference level and all attendant utilities, in relation to mean sea level. Floodproofing certification shall be prepared by or under the direct supervision of a professional engineer or architect and certified by same. The floodplain administrator shall review the certificate data and plan. Deficiencies detected by such review shall be corrected by the applicant prior to permit approval. Failure to submit the certification or failure to make required corrections shall be cause to deny a floodplain development permit. Failure to construct in accordance with the certified design shall be cause to withhold the issuance of a Certificate of Compliance/Occupancy.

(c) If a manufactured home is placed within Zone A, AO, AE, or A1-30 and the elevation of the chassis is more than 36 inches in height above grade, an engineered foundation certification is required per Section 10.372 (3) of the *City of Graham Development Ordinances*.

(d) If a watercourse is to be altered or relocated, a description of the extent of watercourse alteration or relocation; a professional engineer's certified report on the effects of the proposed project on the flood-carrying capacity of the watercourse and the effects to properties located both upstream and downstream; and a map showing the location of the proposed watercourse alteration or relocation shall all be submitted by the permit applicant prior to issuance of a floodplain development permit.

(e) Certification Exemptions. The following structures, if located within Zone A, AO, AE or A1-30, are exempt from the elevation/floodproofing certification requirements specified in items (a) and (b) of this subsection:

i) Recreational Vehicles meeting requirements of Section 10.372 (6) of the City of Graham Development Ordinance**s**;

ii) Temporary Structures meeting requirements of Section 10.372 (7) of the City of Graham Development Ordinances; and

iii) Accessory Structures less than 150 square feet meeting requirements of 10.372 (8) of the City of Graham Development Ordinances.

Section 10.368 Duties and Responsibilities of the Floodplain Administrator

The Floodplain Administrator shall perform, but not be limited to, the following duties:

(1) Review all floodplain development applications and issue permits for all proposed development within Special Flood Hazard Areas to assure that the requirements of this ordinance have been satisfied.

(2) Advise permittee that additional Federal or State permits (Wetlands, Endangered Species, Erosion and Sedimentation Control, Riparian Buffers, Mining, etc.) may be required, and require that copies of such permits be provided and maintained on file with the floodplain development permit.

(3) Notify adjacent communities and the North Carolina Department of Crime Control and Public Safety, Division of Emergency Management, State Coordinator for the National Flood Insurance Program prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Emergency Management Agency (FEMA).

(4) Assure that maintenance is provided within the altered or relocated portion of said watercourse so that the flood-carrying capacity is not diminished.

(5) Prevent encroachments into floodways and non-encroachment areas unless the certification and flood hazard reduction provisions of Section 10.374 of the *City of Graham Development Ordinances* are met.

(6) Obtain actual elevation (in relation to mean sea level) of the reference level (including basement) and all attendant utilities of all new or substantially improved structures, in accordance with Section 10.367 (3) of the *City of Graham Development Ordinances*.

(7) Obtain actual elevation (in relation to mean sea level) to which all new and substantially improved structures and utilities have been floodproofed, in accordance with Section 10.367 (3) of the *City of Graham Development Ordinances*.

(8) Obtain actual elevation (in relation to mean sea level) of all public utilities in accordance with Section 10.367 (3) of the *City of Graham Development Ordinances*.

(9) When floodproofing is utilized for a particular structure, obtain certifications from a registered professional engineer or architect in accordance with Section 10.367 (3) and Section 10.372 (2) of the *City of Graham Development Ordinances*.

(10) Where interpretation is needed as to the exact location of boundaries of the Special Flood Hazard Areas (for example, where there appears to be a conflict between a mapped boundary and actual field conditions), make the necessary interpretation. The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in Sections 10.366, 10.367, 10.368, 10.369, and 10.370 of the *City of Graham Development Ordinances*.

(11) When Base Flood Elevation (BFE) data has not been provided in accordance with Section 10.365 (b) of the *City of Graham Development Ordinances*, obtain, review, and reasonably utilize any Base Flood Elevation (BFE) data, along with floodway data or non-encroachment area data available from a Federal, State, or other source, including data developed pursuant to Section 10.373 (2)(b) of the *City of Graham Development Ordinances*, in order to administer the provisions of this ordinance.

(12) When Base Flood Elevation (BFE) data is provided but no floodway nor non-encroachment area data has been provided in accordance with Section 10.365 (b) of the *City of Graham Development Ordinances*, obtain, review, and reasonably utilize any floodway data or non-encroachment area data available from a Federal, State, or other source in order to administer the provisions of this ordinance.

(13)When the lowest ground elevation of a parcel or structure in a Special Flood Hazard Area is above the Base Flood Elevation, advise the property owner of the option to apply for a Letter of Map Amendment (LOMA) from FEMA. Maintain a copy of the Letter of Map Amendment (LOMA) issued by FEMA in the floodplain development permit file.

(14)Permanently maintain all records that pertain to the administration of this ordinance and make these records available for public inspection.

(15)Make on-site inspections of work in progress. As the work pursuant to a floodplain development permit progresses, the floodplain administrator shall make as many inspections of the work as may be necessary to ensure that the work is being done according to the provisions of the local ordinance and the terms of the permit. In exercising this power, the floodplain administrator has a right, upon presentation of proper credentials, to enter on any premises within the jurisdiction of the community at any reasonable hour for the purposes of inspection or other enforcement action.

(16)Issue stop-work orders as required. Whenever a building or part thereof is being constructed, reconstructed, altered, or repaired in violation of this ordinance, the floodplain administrator may order the work to be immediately stopped. The stop-work order shall be in writing and directed to the person doing the work. The stop-work order shall state the specific work to be stopped, the specific reason(s) for the stoppage, and the condition(s) under which the work may be resumed. Violation of a stop-work order constitutes a misdemeanor.

(17)Revoke floodplain development permits as required. The floodplain administrator may revoke and require the return of the floodplain development permit by notifying the permit holder in writing stating the reason(s) for the revocation. Permits shall be revoked for any substantial departure from the approved application, plans, or specifications; for refusal or failure to comply with the requirements of State or local laws; or for false statements or misrepresentations made in securing the permit. Any floodplain development permit mistakenly issued in violation of an applicable State or local law may also be revoked.

(18)Make periodic inspections throughout all special flood hazard areas within the jurisdiction of the community. The floodplain administrator and each member of his or her inspections department shall have a right, upon presentation of proper credentials, to enter on any premises within the territorial jurisdiction of the department at any reasonable hour for the purposes of inspection or other enforcement action.

(19)Follow through with corrective procedures of Section 10.369 of the *City of Graham Development Ordinances*.

(20)Review, provide input, and make recommendations for variance requests.

(21)Maintain a current map repository to include, but not limited to, the FIS Report, FIRM and other official flood maps and studies adopted in accordance with Section 10.365 of the *City of Graham Development Ordinances*, including any revisions thereto including Letters of Map Change, issued by FEMA. Notify State and FEMA of mapping needs.

(22)Coordinate revisions to FIS reports and FIRMs, including Letters of Map Revision Based on Fill (LOMR-F) and Letters of Map Revision (LOMR).

Section 10.369 Corrective Procedures

(1) Violations to be Corrected: When the floodplain administrator finds violations of applicable State and local laws, it shall be his or her duty to notify the owner or occupant of the building of the violation. The owner or occupant shall immediately remedy each of the violations of law cited in such notification.

(2) Actions in Event of Failure to Take Corrective Action: If the owner of a building or property shall fail to take prompt corrective action, the floodplain administrator shall give the owner written notice, by certified or registered mail to the owner's last known address or by personal service, stating:

(a) that the building or property is in violation of the Flood Damage Prevention Ordinance;

(b) that a hearing will be held before the floodplain administrator at a designated place and time, not later than ten (10) days after the date of the notice, at which time the owner shall be entitled to be heard in person or by counsel and to present arguments and evidence pertaining to the matter; and,

(c) that following the hearing, the floodplain administrator may issue an order to alter, vacate, or demolish the building; or to remove fill as appears appropriate.

(3) Order to Take Corrective Action: If, upon a hearing held pursuant to the notice prescribed above, the floodplain administrator shall find that the building or development is in violation of the Flood Damage Prevention Ordinance, they shall issue an order in writing to the owner, requiring the owner to remedy the violation within a specified time period, not less than sixty (60) calendar days. Where the floodplain administrator finds that there is imminent danger to life or other property, they may order that corrective action be taken in such lesser period as may be feasible.

(4) Appeal: Any owner who has received an order to take corrective action may appeal the order to the local elected governing body by giving notice of appeal in writing to the floodplain administrator and the clerk within ten (10) days following issuance of the final order. In the absence of an appeal, the order of the floodplain administrator shall be final. The local governing body shall hear an appeal within a reasonable time and may affirm, modify and affirm, or revoke the order.

(5) Failure to Comply with Order: If the owner of a building or property fails to comply with an order to take corrective action for which no appeal has been made or fails to comply with an order of the governing body following an appeal, the owner shall be guilty of a misdemeanor and shall be punished at the discretion of the court.

Section 10.370 Variance Procedures

(1) The Board of Adjustment as established by the City of Graham*)*, hereinafter referred to as the "appeal board", shall hear and decide requests for variances from the requirements of this ordinance.

(2) Any person aggrieved by the decision of the appeal board may appeal such decision to the Court, as provided in Chapter 7A of the North Carolina General Statutes.

(3) Variances may be issued for:

(a) the repair or rehabilitation of historic structures upon the determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and that the variance is the minimum necessary to preserve the historic character and design of the structure.

(b) functionally dependent facilities if determined to meet the definition as stated in Section 10.364 of the *City of Graham Development Ordinances*, provided provisions of Section 10.370 (9) (b, c, and e) of the *City of Graham Development Ordinances* have been satisfied, and such facilities are protected by methods that minimize flood damages.

(c) any other type of development, provided it meets the requirements stated in this section.

(4) In passing upon variances, the appeal board shall consider all technical evaluations, all relevant factors, all standards specified in other sections of this ordinance, and:

(a) the danger that materials may be swept onto other lands to the injury of others;

(b) the danger to life and property due to flooding or erosion damage;

(c) the susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;

(d) the importance of the services provided by the proposed facility to the community;

(e) the necessity to the facility of a waterfront location as defined under Section 10.364 of the *City of Graham Development Ordinances* as a functionally dependent facility, where applicable;

(f) the availability of alternative locations, not subject to flooding or erosion damage, for the proposed use;

(g) the compatibility of the proposed use with existing and anticipated development;

(h) relationship of the proposed use to the comprehensive plan and floodplain management program for that area;

(i) safety of access to the property in times of flood for ordinary and emergency vehicles;

(j) the expected heights, velocity, duration, rate of rise, and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site; and

(k) the costs of providing governmental services during and after flood conditions including maintenance and repair of public utilities and facilities such as sewer, gas, electrical and water systems, and streets and bridges.

(5) A written report addressing each of the above factors shall be submitted with the application for a variance.

(6) Upon consideration of the factors listed above and the purposes of this ordinance, the appeal board may attach such conditions to the granting of variances as it deems necessary to further the purposes of this ordinance.

(7) Any applicant to whom a variance is granted shall be given written notice specifying the difference between the Base Flood Elevation (BFE) and the elevation to which the structure is to be built and that such construction below the Base Flood Elevation increases risks to life and property, and that the issuance of a variance to construct a structure below the Base Flood Elevation will result in increased premium rates for flood insurance up to $25 per $100 of insurance coverage. Such notification shall be maintained with a record of all variance actions, including justification for their issuance.

(8) The floodplain administrator shall maintain the records of all appeal actions and report any variances to the Federal Emergency Management Agency and the State of North Carolina upon request.

(9) Conditions for Variances:

(a) Variances shall not be issued when the variance will make the structure in violation of other Federal, State, or local laws, regulations, or ordinances.

(b) Variances shall not be issued within any designated floodway or non-encroachment area if the variance would result in any increase in flood levels during the base flood discharge.

(c) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.

(d) Variances shall only be issued prior to development permit approval.

(e) Variances shall only be issued upon:

i) a showing of good and sufficient cause;

ii) a determination that failure to grant the variance would result in exceptional hardship; and

iii) a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, or extraordinary public expense, create nuisance, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances.

(10) A variance may be issued for solid waste disposal facilities, hazardous waste management facilities, salvage yards, and chemical storage facilities that are located in Special Flood Hazard Areas provided that all of the following conditions are met.

(a) The use serves a critical need in the community.

(b) No feasible location exists for the use outside the Special Flood Hazard Area.

(c) The reference level of any structure is elevated or floodproofed to at least the regulatory flood protection elevation.

(d) The use complies with all other applicable Federal, State and local laws.

(e) The City of Graham has notified the Secretary of the North Carolina Department of Crime Control and Public Safety of its intention to grant a variance at least thirty (30) calendar days prior to granting the variance.

Section 10.371 Provisions for Flood Hazard Reduction

GENERAL STANDARDS. In all Special Flood Hazard Areas the following provisions are required:

(1) All new construction and substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse, and lateral movement of the structure.

(2) All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

(3) All new construction and substantial improvements shall be constructed by methods and practices that minimize flood damages.

(4) Electrical, heating, ventilation, plumbing, air conditioning equipment, and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding. These include, but are not limited to, HVAC equipment, water softener units, bath/kitchen fixtures, ductwork, electric/gas meter panels/boxes, utility/cable boxes, appliances (washers, dryers, refrigerators, freezers, etc.), hot water heaters, and electric outlets/switches.

(5) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the system.

(6) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the systems into flood waters.

(7) On-site waste disposal systems shall be located and constructed to avoid impairment to them or contamination from them during flooding.

(8) Any alteration, repair, reconstruction, or improvements to a structure, which is in compliance with the provisions of this ordinance, shall meet the requirements of “new construction” as contained in this ordinance.

(9) Nothing in this ordinance shall prevent the repair, reconstruction, or replacement of a building or structure existing on the effective date of this ordinance and located totally or partially within the floodway, non-encroachment area, or stream setback, provided there is no additional encroachment below the regulatory flood protection elevation in the floodway, non-encroachment area, or stream setback, and provided that such repair, reconstruction, or replacement meets all of the other requirements of this ordinance.

(10) New solid waste disposal facilities and sites, hazardous waste management facilities, salvage yards, and chemical storage facilities shall not be permitted, except by variance as specified in Section 10.370 (10) of the *City of Graham Development Ordinances*. A structure or tank for chemical or fuel

storage incidental to an allowed use or to the operation of a water treatment plant or wastewater treatment facility may be located in a Special Flood Hazard Area only if the structure or tank is either elevated or floodproofed to at least the regulatory flood protection elevation and certified according to Section 10.367 (3) of the *City of Graham Development Ordinances*.

(11) All subdivision proposals and other development proposals shall be consistent with the need to minimize flood damage.

(12) All subdivision proposals and other development proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage.

(13) All subdivision proposals and other development proposals shall have adequate drainage provided to reduce exposure to flood hazards.

(14) All subdivision proposals and other development proposals shall have received all necessary permits from those governmental agencies for which approval is required by Federal or State law, including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334.

Section 10.372 Specific Standards

In all Special Flood Hazard Areas where Base Flood Elevation (BFE) data has been provided, as set forth in Section 10.365 or Section 10.368 (11 & 12) of the *City of Graham Development Ordinances*, the following provisions, in addition to Section 10.371 of the *City of Graham Development Ordinances*, are required:

(1) Residential Construction. New construction and substantial improvement of any residential structure (including manufactured homes) shall have the reference level, including basement, elevated no lower than the regulatory flood protection elevation, as defined in Section 10.364 of the *City of Graham Development Ordinances*.

(2) Non-Residential Construction. New construction and substantial improvement of any commercial, industrial, or other non-residential structure shall have the reference level, including basement, elevated no lower than the regulatory flood protection elevation, as defined in Section 10.364 of the *City of Graham Development Ordinances*. Structures located in A, AE and A1-30 Zones may be floodproofed to the regulatory flood protection elevation in lieu of elevation provided that all areas of the structure, together with attendant utility and sanitary facilities, below the regulatory flood protection elevation are watertight with walls substantially impermeable to the passage of water, using structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. For AO Zones, the floodproofing elevation shall be in accordance with Section 10.376 of the *City of Graham Development Ordinances*. A registered professional engineer or architect shall certify that the standards of this subsection are satisfied. Such certification shall be provided to the Floodplain Administrator as set forth in Section 10.367 (3) of the *City of Graham Development Ordinances* , along with the operational and maintenance plans.

(3) Manufactured Homes.

(a) New or replacement manufactured homes shall be elevated so that the reference level of the manufactured home is no lower than the regulatory flood protection elevation, as defined in Section 10.364 of the *City of Graham Development Ordinances*.

(b) Manufactured homes shall be securely anchored to an adequately anchored foundation to resist flotation, collapse, and lateral movement, either by engineer certification, or in accordance with the most current edition of the State of North Carolina Regulations for Manufactured Homes adopted by the Commissioner of Insurance pursuant to NCGS 143-143.15. Additionally, when the elevation would be met by an elevation of the chassis thirty-six (36) inches or less above the grade at the site, the chassis shall be supported by reinforced piers or engineered foundation. When the elevation of the chassis is above thirty-six (36) inches in height, an engineering certification is required.

(c) All enclosures or skirting below the lowest floor shall meet the requirements of Section 10.372 (4) (a, b, & c) of the *City of Graham Development Ordinances*..

(d) An evacuation plan must be developed for evacuation of all residents of all new, substantially improved or substantially damaged manufactured home parks or subdivisions located within flood prone areas. This plan shall be filed with and approved by the floodplain administrator and the local Emergency Management coordinator.

(4) Elevated Buildings. Fully enclosed area, of new construction and substantially improved structures, which is below the lowest floor:

(a) shall not be designed or used for human habitation, but shall only be used for parking of vehicles, building access, or limited storage of maintenance equipment used in connection with the premises. Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage of maintenance equipment (standard exterior door), or entry to the living area (stairway or elevator). The interior portion of such enclosed area shall not be finished or partitioned into separate rooms, except to enclose storage areas;

(b) shall be constructed entirely of flood resistant materials below the regulatory flood protection elevation;

(c) shall include, in Zones A, AO, AE, and A1-30, flood openings to automatically equalize hydrostatic flood forces on walls by allowing for the entry and exit of floodwaters. To meet this requirement, the openings must either be certified by a professional engineer or architect or meet or exceed the following minimum design criteria;

i) A minimum of two flood openings on different sides of each enclosed area subject to flooding;

ii) The total net area of all flood openings must be at least one (1) square inch for each square foot of enclosed area subject to flooding;

iii) If a building has more than one enclosed area, each enclosed area must have flood openings to allow floodwaters to automatically enter and exit;

iv) The bottom of all required flood openings shall be no higher than one (1) foot above the adjacent grade;

v) Flood openings may be equipped with screens, louvers, or other coverings or devices, provided they permit the automatic flow of floodwaters in both directions; and

vi) Enclosures made of flexible skirting are not considered enclosures for regulatory purposes, and, therefore, do not require flood openings. Masonry or wood underpinning, regardless of structural status, is considered an enclosure and requires flood openings as outlined above.

(5) Additions/Improvements.

(a) Additions and/or improvements to pre-FIRM structures when the addition and/or improvements in combination with any interior modifications to the existing structure are:

i) not a substantial improvement, the addition and/or improvements must be designed to minimize flood damages and must not be any more non-conforming than the existing structure.

ii) a substantial improvement, both the existing structure and the addition and/or improvements must comply with the standards for new construction.

(b) Additions to post-FIRM structures with no modifications to the existing structure other than a standard door in the common wall shall require only the addition to comply with the standards for new construction.

(c) Additions and/or improvements to post-FIRM structures when the addition and/or improvements in combination with any interior modifications to the existing structure are:

i) not a substantial improvement, the addition and/or improvements only must comply with the standards for new construction.

ii) a substantial improvement, both the existing structure and the addition and/or improvements must comply with the standards for new construction.

(6) Recreational Vehicles. Recreational vehicles shall either:

(a) be on site for fewer than 180 consecutive days and be fully licensed and ready for highway use (a recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities, and has no permanently attached additions); or

(b) meet all the requirements for new construction.

(7) Temporary Non-Residential Structures. Prior to the issuance of a floodplain development permit for a temporary structure, the applicant must submit to the floodplain administrator a plan for the removal of such structure(s) in the event of a hurricane, flash flood or other type of flood warning notification. The following information shall be submitted in writing to the floodplain administrator for review and written approval;

(a) a specified time period for which the temporary use will be permitted. Time specified may not exceed three months, renewable up to one year;

(b) the name, address, and phone number of the individual responsible for the removal of the temporary structure;

(c) the time frame prior to the event at which a structure will be removed (i.e., minimum of 72 hours before landfall of a hurricane or immediately upon flood warning notification);

(d) a copy of the contract or other suitable instrument with the entity responsible for physical removal of the structure; and

(e) designation, accompanied by documentation, of a location outside the Special Flood Hazard Area, to which the temporary structure will be moved.

(8) Accessory Structures. When accessory structures (sheds, detached garages, etc.) are to be placed within a Special Flood Hazard Area, the following criteria shall be met:

(a) Accessory structures shall not be used for human habitation (including working, sleeping, living, cooking or restroom areas);

(b) Accessory structures shall not be temperature-controlled;

(c) Accessory structures shall be designed to have low flood damage potential;

(d) Accessory structures shall be constructed and placed on the building site so as to offer the minimum resistance to the flow of floodwaters;

(e) Accessory structures shall be firmly anchored in accordance with Section 10.371 (1) of the *City of Graham Development Ordinances*;

(f) All service facilities such as electrical shall be installed in accordance with Section 10.371 (4) of the *City of Graham Development Ordinances*; and

(g) Flood openings to facilitate automatic equalization of hydrostatic flood forces shall be provided below regulatory flood protection elevation in conformance with Section 10.372 (4) (c) of the *City of Graham Development Ordinances*.

An accessory structure with a footprint less than 150 square feet that satisfies the criteria outlined above does not require an elevation or floodproofing certificate. Elevation or floodproofing certifications are required for all other accessory structures in accordance with Section 10.367 (3) of the *City of Graham Development Ordinances*.

(Section 10.372 amended by City Council 11/7/2006)

Section 10.373 Standards for Floodplains Without Established Base Flood Elevations

Within the Special Flood Hazard Areas designated as Approximate Zone A and established in Section 10.365 (b) of the *City of Graham Development Ordinances*, where no Base Flood Elevation (BFE) data has been provided by FEMA, the following provisions, in addition to Section 10.371 and Section 10.372 of the *City of Graham Development Ordinances*, shall apply:

(1) No encroachments, including fill, new construction, substantial improvements or new development shall be permitted within a distance of twenty (20) feet each side from top of bank or five times the width of the stream, whichever is greater, unless certification with supporting technical data by a registered professional engineer is provided demonstrating that such encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.

(2) The BFE used in determining the regulatory flood protection elevation shall be determined based on one of the following criteria set in priority order:

(a) If Base Flood Elevation (BFE) data is available from other sources, all new construction and substantial improvements within such areas shall also comply with all applicable provisions of this ordinance and shall be elevated or floodproofed in accordance with standards in Section 10.368 (11 & 12) of the *City of Graham Development Ordinances*.

(b) All subdivision, manufactured home park and other development proposals shall provide Base Flood Elevation (BFE) data if development is greater than five (5) acres or has more than fifty (50) lots/manufactured home sites. Such Base Flood Elevation (BFE) data shall be adopted by reference per Section 10.365 (b) of the *City of Graham Development Ordinances* to be utilized in implementing this ordinance.

(c) When Base Flood Elevation (BFE) data is not available from a Federal, State, or other source as outlined above, the reference level shall be elevated to or above the regulatory flood protection elevation, as defined in Section 10.364 of the *City of Graham Development Ordinances*.

Section 10.374 Standards for Riverine Floodplains with BFE but Without Established Floodways or Non-Encroachment Areas

Along rivers and streams where BFE data is provided but neither floodway nor non-encroachment areas are identified for a Special Flood Hazard Area on the FIRM or in the FIS report, the following requirements shall apply to all development within such areas:

(1) Standards outlined in Section 10.371 and Section 10.372 of the *City of Graham Development Ordinances*; and

(2) Until a regulatory floodway or non-encroachment area is designated, no encroachments, including fill, new construction, substantial improvements, or other development, shall be permitted unless certification with supporting technical data by a registered professional engineer is provided demonstrating that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.

Section 10.375 Floodways and Non-Encroachment Areas

Areas designated as floodways or non-encroachment areas are located within the Special Flood Hazard Areas established in Section 10.365 (b) of the *City of Graham Development Ordinances.* The floodways and non-encroachment areas are extremely hazardous areas due to the velocity of floodwaters that have erosion potential and carry debris and potential projectiles. The following provisions, in addition to standards outlined in Section 10.371 and Section 10.372 of the *City of Graham Development Ordinances*, shall apply to all development within such areas:

(1) No encroachments, including fill, new construction, substantial improvements and other developments shall be permitted unless it has been demonstrated that:

(a) the proposed encroachment would not result in any increase in the flood levels during the occurrence of the base flood, based on hydrologic and hydraulic analyses performed in accordance with standard engineering practice and presented to the floodplain administrator prior to issuance of floodplain development permit, or

(b) a Conditional Letter of Map Revision (CLOMR) has been approved by FEMA. A Letter of Map Revision (LOMR) must also be obtained upon completion of the proposed encroachment.

(2) If Section 10.375 (1) of the *City of Graham Development Ordinances* is satisfied, all development shall comply with all applicable flood hazard reduction provisions of this ordinance.

(3) No manufactured homes shall be permitted, except replacement manufactured homes in an existing manufactured home park or subdivision, provided the following provisions are met:

(a) the anchoring and the elevation standards of Section 10.372 (3) of the *City of Graham Development Ordinances*; and

(b) the no encroachment standard of Section 10.375 (1) of the *City of Graham Development Ordinances*.

(Section 10.375 amended by City Council 11/7/2006)

Section 10.376 Standards for Areas of Shallow Flooding (Zone AO)

Located within the Special Flood Hazard Areas established in Section 10.365 (b) of the *City of Graham Development Ordinances*, are areas designated as shallow flooding areas. These areas have special flood hazards associated with base flood depths of one (1) to three (3) feet where a clearly defined channel does not exist and where the path of flooding is unpredictable and indeterminate. In addition to Section 10.371 of the *City of Graham Development Ordinances*, all new construction and substantial improvements shall meet the following requirements:

(1) The reference level shall be elevated at least as high as the depth number specified on the Flood Insurance Rate Map (FIRM), in feet, plus a freeboard of two (2) feet, above the highest adjacent grade; or at least two feet above the highest adjacent grade plus a freeboard of two (2) feet if no depth number is specified.

(2) Non-residential structures may, in lieu of elevation, be floodproofed to the same level as required in Section 10.376 (1) of the *City of Graham Development Ordinances* so that the structure, together with attendant utility and sanitary facilities, below that level shall be watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. Certification is required as per Section 10.367 (3) and Section 10.372 (2) of the *City of Graham Development Ordinances*.

(3) Adequate drainage paths shall be provided around structures on slopes, to guide floodwaters around and away from proposed structures.

Section 10.377 Legal Status Provisions, Effect on Rights and Liabilities Under the Existing Flood Damage Prevention Ordinance

This ordinance in part comes forward by re-enactment of some of the provisions of the flood damage prevention ordinance enacted August 5, 1980 as amended, and it is not the intention to repeal but rather to re-enact and continue to enforce without interruption of such existing provisions, so that all rights and liabilities that have accrued thereunder are reserved and may be enforced. The enactment of this ordinance shall not affect any action, suit or proceeding instituted or pending. All provisions of the flood damage prevention ordinance of the City of Graham enacted on August 5, 1980, as amended, which are not reenacted herein are repealed.

Section 10.378 Effect Upon Outstanding Building Permits

Nothing herein contained shall require any change in the plans, construction, size, or designated use of any development or any part thereof for which a building permit has been granted by the Chief Building Inspector before the time of passage of this ordinance; provided, however, that when construction is not begun under such outstanding permit within a period of six (6) months subsequent to the date of issuance of the outstanding permit, construction or use shall be in conformity with the provisions of this ordinance.

Sections 10.379 – 10.389 Reserved

Riparian Buffer Protection Ordinance

City of Graham, North Carolina

Adopted December 7, 2010

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TABLE OF CONTENTS

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Section 1. Authority
This Ordinance is adopted pursuant to the authority vested in the City of Graham by the Session Laws and the General Statutes of North Carolina, particularly Session Law 2009-216 (House Bill 239), Session Law 2009-484 (Senate Bill 838), N.C Gen. Stat §153A-121, 153A-140, Chapter 153A, Article 18, N.C. Gen. Stat §160A-174, 160A-193, Chapter 160A, Article 19, and any special legislation enacted by the General Assembly for the City of Graham.

Section 2. Purpose and Intent
The purposes of the City of Graham in adopting the following Ordinance is to protect and preserve existing riparian buffers throughout the Jordan Watershed as generally described in Rule 15A NCAC 02B .0262 (Jordan Water Supply Nutrient Strategy: Purpose and Scope), in order to maintain their nutrient removal and stream protection functions. Additionally this Ordinance will help protect the water supply uses of Jordan Reservoir and of designated water supplies throughout the Jordan watershed.

Buffers adjacent to streams provide multiple environmental protection and resource management benefits. Forested buffers enhance and protect the natural ecology of stream systems, as well as water quality through bank stabilization, shading, and nutrient removal. They also help to minimize flood damage in flood prone areas. Well-vegetated streamside riparian areas help to remove nitrogen and prevent sediment and sediment-bound pollutants such as phosphorous from reaching the streams.

Section 3. Title
This Ordinance shall be known as the *City of Graham Riparian Buffer Protection Ordinance*.

Section 4. Jurisdiction
This Ordinance shall be applied to all land in the planning jurisdiction of the City of Graham.

Section 5. Applicability
This Ordinance applies to all landowners and other persons conducting activities in the area described in Section 4, with the exception of activities conducted under the authority of the State, the United States, multiple jurisdictions, or local units of government, and forest harvesting and agricultural activities. The NC Division of Water Quality shall administer the requirements of Rule 15A NCAC 02B .0267 and .0268 (Jordan Water Supply Nutrient Strategy: Protection of Existing Riparian Buffers and Mitigation of Existing Riparian Buffers, respectively) for these activities.

Section 6. Relation to Other Ordinances
The requirements of this Ordinance shall supersede all locally implemented buffer requirements stated in Rules 15A NCAC 02B .0214 through .0216 as applied to WS-II, WS-III, and WS-IV waters in the Jordan watershed. If the provisions of this ordinance otherwise conflict with the provisions of any other validly enforceable ordinance(s) or

laws, the most stringent provisions shall control. This Ordinance is not intended to interfere with, abrogate, or annul any other ordinance, rule, regulation, or other provision of law.

Section 7. Riparian Area Protection within the Jordan Reservoir Watershed

A. Buffers Protected

The following minimum criteria shall be used for identifying regulated buffers:

1. This Ordinance shall apply to activities conducted within, or outside of with hydrologic impacts in violation of the diffuse flow requirements set out in Section 7.(E) upon, 50-foot wide riparian buffers directly adjacent to surface waters in the Jordan watershed (intermittent streams, perennial streams, lakes, reservoirs and ponds), excluding wetlands.
2. Wetlands adjacent to surface waters or within 50 feet of surface waters shall be considered as part of the riparian buffer but are regulated pursuant to Rules 15A NCAC 2B .0230 and .0231, Rules 15A NCAC 2H .0500, 15A NCAC 2H .1300, and Sections 401 and 404 of the Federal Water Pollution Control Act.
3. For the purpose of this Ordinance: a surface water is defined as being present if the feature is approximately shown on any of the following:
   a. The most recent version of the soil survey map prepared by the Natural Resources Conservation Service of the United States Department of Agriculture.
   b. The most recent version of the 1:24,000 scale (7.5 minute) quadrangle topographic maps prepared by the United States Geologic Survey (USGS).
   c. A map approved by the Geographic Information Coordinating Council and by the NC Environmental Management Commission. Prior to approving a map under this Item, the Commission shall provide a 30-day public notice and opportunity for comment. Alternative maps approved by the Commission shall not be used for buffer delineation on projects that are existing and ongoing within the meaning of Section 7.(C) of this Ordinance.
4. Where the specific origination point of a stream regulated under this Item is in question, upon request of the NC Division of Water Quality or another party, the City of Graham shall make an on-site determination. A City of Graham representative who has successfully completed the Division's *Surface Water Identification Training Certification* course, its successor, or other equivalent training curriculum approved by the Division, shall establish that point using the latest version of the Division publication, *Identification Methods for the Origins of Intermittent and Perennial Streams*, available at http://h2o.enr.state.nc.us/ncwetlands/documents/NC_Stream_ID_Manual.pdf or from the NC Division of Water Quality - 401 Oversight Express Permitting Unit, or its successor. The City of Graham may accept the results of a site assessment made by another party who meets these criteria. Any disputes over on-site

determinations made according to this Item shall be referred to the Director of the Division of Water Quality c/o the 401 Oversight Express Permitting Unit, or its successor, in writing. The Director's determination is subject to review as provided in Articles 3 and 4 of G.S. 150B.

5. Riparian buffers protected by this Ordinance shall be measured pursuant to Section 7.(D) of this Ordinance.
6. Parties subject to this Ordinance shall abide by all State rules and laws regarding waters of the state including but not limited to Rules 15A NCAC 2B .0230 and .0231, Rules 15A NCAC 2H .0500, 15A NCAC 2H .1300, and Sections 401 and 404 of the Federal Water Pollution Control Act.
7. No new clearing, grading, or development shall take place nor shall any new building permits be issued in violation of this Ordinance.

B. Exemption Based on On–site Determination

When a landowner or other affected party including the Division believes that the maps have inaccurately depicted surface waters, he or she shall consult the City of Graham. Upon request, a City of Graham representative who has successfully completed the Division of Water Quality's *Surface Water Identification Training Certification* course, its successor, or other equivalent training curriculum approved by the Division, shall make an on-site determination. The City of Graham may also accept the results of site assessments made by other parties who have successfully completed such training. Any disputes over on-site determinations shall be referred to the Director of the Division of Water Quality c/o the 401 Oversight Express Permitting Unit, or its successor, in writing. A determination of the Director as to the accuracy or application of the maps is subject to review as provided in Articles 3 and 4 of G.S. 150B. Surface waters that appear on the maps shall not be subject to these buffer requirements if a site evaluation reveals any of the following cases:

1. Man-made ponds and lakes that are not part of a natural drainage way that is classified in accordance with 15A NCAC 2B .0100, including ponds and lakes created for animal watering, irrigation, or other agricultural uses. (A pond or lake is part of a natural drainage way when it is fed by an intermittent or perennial stream or when it has a direct discharge point to an intermittent or perennial stream.)
2. Ephemeral streams.
3. The absence on the ground of a corresponding intermittent or perennial stream, lake, reservoir, or pond.
4. Ditches or other man-made water conveyances, other than modified natural streams.

C. Exemption when Existing Uses are Present and Ongoing

This Ordinance shall not apply to uses that are existing and ongoing; however, this Ordinance shall apply at the time an existing, ongoing use is changed to another use. Change of use shall involve the initiation of any activity that does not meet either of the following criteria for existing, ongoing activity:

1. It was present within the riparian buffer as of the effective date of this Ordinance and has continued to exist since that time. Existing uses

shall include agriculture, buildings, industrial facilities, commercial areas, transportation facilities, maintained lawns, utility lines and on-site sanitary sewage systems, any of which involve either specific, periodic management of vegetation or displacement of vegetation by structures or regular activity. Only the portion of the riparian buffer occupied by the footprint of the existing use is exempt from this Ordinance. Change of ownership through purchase or inheritance is not a change of use. Activities necessary to maintain uses are allowed provided that the site remains similarly vegetated, no impervious surface is added within 50 feet of the surface water where it did not previously exist as of the effective date of this Ordinance, and existing diffuse flow is maintained. Grading and revegetating Zone Two is allowed provided that the health of the vegetation in Zone One is not compromised, the ground is stabilized and existing diffuse flow is maintained.

2. Projects or proposed development that are determined by the City of Graham to meet at least one of the following criteria:
   a. Project requires a 401 Certification/404 Permit and these were issued prior to the effective date this Ordinance, and prior to the effective date of this Ordinance.
   b. Projects that require a state permit, such as landfills, NPDES wastewater discharges, land application of residuals and road construction activities, have begun construction or are under contract to begin construction and had received all required state permits and certifications prior to the effective date of this Ordinance;
   c. Projects that are being reviewed through the Clean Water Act Section 404/National Environmental Policy Act Merger 01 Process (published by the US Army Corps of Engineers and Federal Highway Administration, 2003) or its immediate successor and that have reached agreement with DENR on avoidance and minimization by the effective date of this Ordinance; or
   d. Projects that are not required to be reviewed by the Clean Water Act Section 404/National Environmental Policy Act Merger 01 Process (published by the US Army Corps of Engineers and Federal Highway Administration, 2003) or its immediate successor if a Finding of No Significant Impact has been issued for the project and the project has the written approval of the City of Graham prior to the effective date of this Ordinance.
   e. Projects that have a vested right per North Carolina General Statutes § 160A-385.1.

D. Zones of the Riparian Buffer

The protected riparian buffer shall have two zones as follows:

1. Zone One shall consist of a vegetated area that is undisturbed except for uses provided for in the Table of Uses, Section 8.(B) of this Ordinance. The location of Zone One shall be as follows:
    a. For intermittent and perennial streams, Zone One shall begin at the top of the bank and extend landward a distance of 30 feet on all sides of the surface water, measured horizontally on a line perpendicular to a vertical line marking the top of the bank.
    b. For ponds, lakes and reservoirs located within a natural drainage way, Zone One shall begin at the normal water level and extend landward a distance of 30 feet, measured horizontally on a line perpendicular to a vertical line marking the normal water level.
2. Zone Two shall consist of a stable, vegetated area that is undisturbed except for uses provided for in the Table of Uses, Section 8.(B) of this Ordinance. Grading and revegetating in Zone Two is allowed provided that the health of the vegetation in Zone One is not compromised. Zone Two shall begin at the outer edge of Zone One and extend landward 20 feet as measured horizontally on a line perpendicular to the surface water. The combined width of Zones One and Two shall be 50 feet on all sides of the surface water.

E. Diffuse Flow Requirements

Diffuse flow of runoff shall be maintained in the riparian buffer by dispersing concentrated flow prior to its entry into the buffer and reestablishing vegetation as follows:

1. Concentrated runoff from new ditches or man-made conveyances shall be converted to diffuse flow at non-erosive velocities before the runoff enters Zone Two of the riparian buffer;
2. Periodic corrective action to restore diffuse flow shall be taken as necessary and shall be designed to impede the formation of erosion gullies; and
3. As set out in Sections 7.(D) and 8.(B) of this Ordinance, The Zones of the Riparian Buffer and Table of Uses respectively, no new stormwater conveyances are allowed through the buffers except for those specified in the Table of Uses, Section 8.(B) of this Ordinance, addressing stormwater management ponds, drainage ditches, roadside ditches, and stormwater conveyances.

Section 8. Potential Uses and Associated Requirements

A. Approval for New Development

City of Graham shall issue an approval for new development only if the development application proposes to avoid impacts to riparian buffers defined in Section 7.(A) of this Ordinance, or where the application proposes to impact such buffers, it demonstrates that the applicant has done the following, as applicable:

1. Determined the activity is exempt from requirements of this Ordinance;

2. Received an Authorization Certificate from the City of Graham pursuant to Section 9.A of this Ordinance;
3. For uses designated as Allowable with Mitigation in the Table of Uses in Section 8.(B), received approval of mitigation plan pursuant to Section 9.(C) of this Ordinance; and
4. Received a variance pursuant to Section 9.(B).

B. Table of Uses

The following chart sets out potential new uses within the buffer, or outside the buffer with impacts on the buffer, and categorizes them as exempt, allowable, or allowable with mitigation. All uses not categorized as exempt, allowable, or allowable with mitigation are considered prohibited and may not proceed within the riparian buffer or outside the buffer if the use would impact the buffer, unless a variance is granted pursuant to Section 9.(C) of this Ordinance, Variances. The requirements for each category are given in Section 8.(C) of this Section following the Table of Uses.

Use	Exempt *	Allowable *	Allowable with Mitigation*
Access trails: Pedestrian access trails leading to the surface water, docks, fishing piers, boat ramps and other water dependent activities: • Pedestrian access trails that are restricted to the minimum width practicable and do not exceed 4 feet in width of buffer disturbance, and provided that installation and use does not result in removal of trees as defined in this Ordinance and no impervious surface is added to the riparian buffer • Pedestrian access trails that exceed 4 feet in width of buffer disturbance, the installation or use results in removal of trees as defined in this Ordinance or impervious surface is added to the riparian buffer	X	X	
Airport facilities: • Airport facilities that impact equal to or less than 150 linear feet or one-third of an acre of riparian buffer • Airport facilities that impact greater than 150 linear feet or one-third of an acre of riparian buffer • Activities necessary to comply with FAA requirements (e.g. radar uses or landing strips)[1]		X X	X
Archaeological activities	X		
Bridges		X	
Canoe Access provided that installation and use does not result in removal of trees as defined in this Ordinance and no impervious surface is added to the buffer.	X		

* To qualify for the designation indicated in the column header, an activity must adhere to the limitations defined for it in a given listing as well as the requirements established in Section 8.(C) of this Ordinance.

Use	Exempt *	Allowable *	Allowable with Mitigation*
Dam maintenance activities: • Dam maintenance activities that do not cause additional buffer disturbance beyond the footprint of the existing dam or those covered under the U.S. Army Corps of Engineers Nationwide Permit No. 3 • Dam maintenance activities that do cause additional buffer disturbance beyond the footprint of the existing dam or those not covered under the U.S. Army Corps of Engineers Nationwide Permit No.3	X	X	

* To qualify for the designation indicated in the column header, an activity must adhere to the limitations defined for it in a given listing as well as the requirements established in Section 8.(C) of this Ordinance.

Use	Exempt *	Allowable *	Allowable with Mitigation*
Drainage ditches, roadside ditches and stormwater conveyances through riparian buffers: • New stormwater flows to existing drainage ditches, roadside ditches, and stormwater conveyances provided flows do not alter or result in the need to alter the conveyance and are managed to minimize the sediment, nutrients and other pollution that convey to waterbodies. • Realignment of existing roadside drainage ditches retaining the design dimensions, provided that no additional travel lanes are added and the minimum required roadway typical section is used based on traffic and safety considerations. • New or altered drainage ditches, roadside ditches and stormwater outfalls provided that a stormwater management facility is installed to control nutrients and attenuate flow before the conveyance discharges through the riparian buffer • New drainage ditches, roadside ditches and stormwater conveyances applicable to linear projects that do not provide a stormwater management facility due to topography constraints provided that other practicable BMPs are employed.	X	X X	X

* To qualify for the designation indicated in the column header, an activity must adhere to the limitations defined for it in a given listing as well as the requirements established in Section 8.(C) of this Ordinance.

Use	Exempt *	Allowable *	Allowable with Mitigation*
Driveway crossings of streams and other surface waters subject to this Ordinance:			
• Driveway crossings on single family residential lots that disturb equal to or less than 25 linear feet or 2,500 square feet of riparian buffer	X		
• Driveway crossings on single family residential lots that disturb greater than 25 linear feet or 2,500 square feet of riparian buffer		X	
• In a subdivision that cumulatively disturb equal to or less than 150 linear feet or one-third of an acre of riparian buffer		X	
• In a subdivision that cumulatively disturb greater than 150 linear feet or one-third of an acre of riparian buffer			X
Driveway impacts other than crossing of a stream or other surface waters subject to this Ordinance			X
Fences:			
• Fences provided that disturbance is minimized and installation does not result in removal of trees as defined in this Ordinance	X		
• Fences provided that disturbance is minimized and installation results in removal of trees as defined in this Ordinance		X	
Fertilizer application: one-time application to establish vegetation	X		
Grading and revegetation in Zone Two provided that diffuse flow and the health of existing vegetation in Zone One is not compromised and disturbed areas are stabilized until they are revegetated.	X		

* To qualify for the designation indicated in the column header, an activity must adhere to the limitations defined for it in a given listing as well as the requirements established in Section 8.(C) of this Ordinance.

Use	Exempt *	Allowable *	Allowable with Mitigation*
Greenway / hiking trails designed, constructed and maintained to maximize nutrient removal and erosion protection, minimize adverse effects on aquatic life and habitat, and protect water quality to the maximum extent practical.		X	
Historic preservation	X		
Maintenance access on modified natural streams: a grassed travel way on one side of the water body when less impacting alternatives are not practical. The width and specifications of the travel way shall be only that needed for equipment access and operation. The travel way shall be located to maximize stream shading.		X	
Mining activities: • Mining activities that are covered by the Mining Act provided that new riparian buffers that meet the requirements of Sections 7.(D) and 7.(E) of this Ordinance are established adjacent to the relocated channels • Mining activities that are not covered by the Mining Act OR where new riparian buffers that meet the requirements of Sections 7.(D) and 7.(E) of this Ordinance are not established adjacent to the relocated channels • Wastewater or mining dewatering wells with approved NPDES permit	X	X	X
Playground equipment: • Playground equipment on single family lots provided that installation and use does not result in removal of vegetation • Playground equipment installed on lands other than single-family lots or that requires removal of vegetation	X	X	

* To qualify for the designation indicated in the column header, an activity must adhere to the limitations defined for it in a given listing as well as the requirements established in Section 8.(C) of this Ordinance.

Use	Exempt *	Allowable *	Allowable with Mitigation*
Ponds created by impounding streams and not used as stormwater BMPs: • New ponds provided that a riparian buffer that meets the requirements of Sections 7.(D) and 7.(E) of this Ordinance is established adjacent to the pond • New ponds where a riparian buffer that meets the requirements of Sections 7.(D) and 7.(E) of this Ordinance is NOT established adjacent to the pond		X	X
Protection of existing structures, facilities and stream banks when this requires additional disturbance of the riparian buffer or the stream channel		X	
Railroad impacts other than crossings of streams and other surface waters subject to this Ordinance.			X
Railroad crossings of streams and other surface waters subject to this Ordinance: • Railroad crossings that impact equal to or less than 40 linear feet of riparian buffer • Railroad crossings that impact greater than 40 linear feet but equal to or less than 150 linear feet or one-third of an acre of riparian buffer • Railroad crossings that impact greater than 150 linear feet or one-third of an acre of riparian buffer	X	X	X

* To qualify for the designation indicated in the column header, an activity must adhere to the limitations defined for it in a given listing as well as the requirements established in Section 8.(C) of this Ordinance.

Use	Exempt *	Allowable *	Allowable with Mitigation*
Recreational and accessory structures in Zone Two: • Sheds and gazebos in Zone Two, provided they are not prohibited under local water supply ordinance: o Total footprint less than or equal to 150 square feet per lot. o Total footprint greater than 150 square feet per lot. • Wooden slatted decks and associated steps, provided the use meets the requirements of Sections 7.(D) and 7.(E) of this Ordinance: o Deck at least eight feet in height and no vegetation removed from Zone One. o Deck less than eight feet in height or vegetation removed from Zone One.		X X	 X X
Removal of previous fill or debris provided that diffuse flow is maintained and vegetation is restored	X		
Road impacts other than crossings of streams and other surface waters subject to this Ordinance			X
Road crossings of streams and other surface waters subject to this Ordinance: • Road crossings that impact equal to or less than 40 linear feet of riparian buffer • Road crossings that impact greater than 40 linear feet but equal to or less than 150 linear feet or one-third of an acre of riparian buffer • Road crossings that impact greater than 150 linear feet or one-third of an acre of riparian buffer	X	X	 X

- To qualify for the designation indicated in the column header, an activity must adhere to the limitations defined for it in a given listing as well as the requirements established in Section 8.(C) of this Ordinance

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Use	Exempt *	Allowable *	Allowable with Mitigation*
Road relocation: Relocation of existing private access roads associated with public road projects where necessary for public safety: • Less than or equal to 2,500 square feet of buffer impact • Greater than 2,500 square feet of buffer impact		X	X
Stormwater BMPs: • Wet detention, bioretention, and constructed wetlands in Zone Two if diffuse flow of discharge is provided into Zone One • Wet detention, bioretention, and constructed wetlands in Zone One		X	X
Scientific studies and stream gauging	X		
Streambank or shoreline stabilization		X	
Temporary roads, provided that the disturbed area is restored to pre-construction topographic and hydrologic conditions immediately after construction is complete and replanted immediately with comparable vegetation, except that tree planting may occur during the dormant season. A one-time application of fertilizer may be used to establish vegetation: At the end of five years the restored buffer shall comply with the restoration criteria in Section 9.(C)(7) of this Ordinance: • Less than or equal to 2,500 square feet of buffer disturbance • Greater than 2,500 square feet of buffer disturbance • Associated with culvert installation or bridge construction or replacement.	X	X X	

* To qualify for the designation indicated in the column header, an activity must adhere to the limitations defined for it in a given listing as well as the requirements established in Section 8.(C) of this Ordinance.

Use	Exempt *	Allowable *	Allowable with Mitigation*
Temporary sediment and erosion control devices, provided that the disturbed area is restored to pre-construction topographic and hydrologic conditions immediately after construction is complete and replanted immediately with comparable vegetation, except that tree planting may occur during the dormant season. A one-time application of fertilizer may be used to establish vegetation. At the end of five years the restored buffer shall comply with the restoration criteria in Section 9.(C)(7) of this Ordinance:			
• In Zone Two provided ground cover is established within timeframes required by the Sedimentation and Erosion Control Act, vegetation in Zone One is not compromised, and runoff is released as diffuse flow in accordance with Section 7.(E) of this Ordinance.	X		
• In Zones one and two to control impacts associated with uses approved by the City of Graham or that have received a variance, provided that sediment and erosion control for upland areas is addressed, to the maximum extent practical, outside the buffer.		X	
• In-stream temporary erosion and sediment control measures for work within a stream channel that is authorized under Sections 401 and 404 of the Federal Water Pollution Control Act.	X		
• In-stream temporary erosion and sediment control measures for work within a stream channel.		X	
Utility, electric, aerial, perpendicular crossings of streams and other surface waters subject to this Ordinance[2,3,5]:			
• Disturb equal to or less than 150 linear feet of riparian buffer	X		
• Disturb greater than 150 linear feet of riparian buffer		X	

* To qualify for the designation indicated in the column header, an activity must adhere to the limitations defined for it in a given listing as well as the requirements established in Section 8.(C) of this Ordinance.

Use	Exempt *	Allowable *	Allowable with Mitigation*
Utility, electric, aerial, other than perpendicular crossings[5]:			
• Impacts in Zone Two		X	
• Impacts in Zone One[2,3]			X
Utility, electric, underground, perpendicular crossings[3,4,5]:			
• Disturb less than or equal to 40 linear feet of riparian buffer	X		
• Disturb greater than 40 linear feet of riparian buffer		X	
Utility, electric, underground, other than perpendicular crossings[4]:			
• Impacts in Zone Two	X		
• Impacts in Zone One[1]	X		
Utility, non-electric, perpendicular crossings of streams and other surface waters subject to this Ordinance[3,5]:			
• Disturb equal to or less than 40 linear feet of riparian buffer with a maintenance corridor equal to or less than 10 feet in width	X		
• Disturb equal to or less than 40 linear feet of riparian buffer with a maintenance corridor greater than 10 feet in width		X	
• Disturb greater than 40 linear feet but equal to or less than 150 linear feet of riparian buffer with a maintenance corridor equal to or less than 10 feet in width		X	
• Disturb greater than 40 linear feet but equal to or less than 150 linear feet of riparian buffer with a maintenance corridor greater than 10 feet in width			X
• Disturb greater than 150 linear feet of riparian buffer			X

* To qualify for the designation indicated in the column header, an activity must adhere to the limitations defined for it in a given listing as well as the requirements established in Section 8.(C) of this Ordinance.

Use	Exempt *	Allowable *	Allowable with Mitigation*
Utility, non-electric, other than perpendicular crossings[4.5]:			
• Impacts in Zone Two		X	
• Impacts in Zone One[1]			X
Vegetation management:			
• Emergency fire control measures provided that topography is restored	X		
• Mowing or harvesting of plant products in Zone Two	X		
• Planting vegetation to enhance the riparian buffer	X		
• Pruning forest vegetation provided that the health and function of the forest vegetation is not compromised	X		
• Removal of individual trees that are in danger of causing damage to dwellings, other structures or human life, or are imminently endangering stability of the streambank.	X		
• Removal of individual trees which are dead, diseased or damaged.	X		
• Removal of poison ivy	X		
• Removal of invasive exotic vegetation as defined in: *Smith, Cherri L. 1998. Exotic Plant Guidelines. Dept. of Environment and Natural Resources. Division of Parks and Recreation. Raleigh, NC. Guideline #30*	X		
• Vehicular access roads leading to water-dependent structures as defined in 15A NCAC 02B .0202, provided they do not cross the surface water and have minimum practicable width not exceeding ten feet.		X	
• Water dependent structures as defined in 15A NCAC 02B .0202 where installation and use result in disturbance to riparian buffers.		X	

* To qualify for the designation indicated in the column header, an activity must adhere to the limitations defined for it in a given listing as well as the requirements established in Section 8.(C) of this Ordinance.

Use	Exempt *	Allowable *	Allowable with Mitigation*
Water supply reservoirs: • New reservoirs where a riparian buffer that meets the requirements of Sections 7.(D) and 7.(E) of this Ordinance is established adjacent to the reservoir • New reservoirs where a riparian buffer that meets the requirements of Sections 7.(D) and 7.(E) of this Ordinance is not established adjacent to the reservoir		X	X
Water wells • Single family residential water wells • All other water wells	X	X	
Wetland, stream and buffer restoration that results in impacts to the riparian buffers: • Wetland, stream and buffer restoration that requires NC Division of Water Quality approval for the use of a 401 Water Quality Certification • Wetland, stream and buffer restoration that does not require Division of Water Quality approval for the use of a 401 Water Quality Certification	X	X	
Wildlife passage structures		X	

[1]Provided that:

- No heavy equipment is used in Zone One.
- Vegetation in undisturbed portions of the buffer is not compromised.
- Felled trees are removed by chain.
- No permanent felling of trees occurs in protected buffers or streams.
- Stumps are removed only by grinding.
- At the completion of the project the disturbed area is stabilized with native vegetation.
- Zones one and two meet the requirements of Sections 7.(D) and 7.(E)

[2]Provided that, in Zone One, all of the following BMPs for overhead utility lines are used. If all of these BMPs are not used, then the overhead utility lines shall require a no practical alternative evaluation by the City of Graham, as defined in Section 9.(A).

- A minimum zone of 10 feet wide immediately adjacent to the water body shall be managed such that only vegetation that poses a hazard or has the potential to grow tall enough to interfere with the line is removed.
- Woody vegetation shall be cleared by hand. No land grubbing or grading is allowed.
- Vegetative root systems shall be left intact to maintain the integrity of the soil. Stumps shall remain where trees are cut.
- Riprap shall not be used unless it is necessary to stabilize a tower.
- No fertilizer shall be used other than a one-time application to re-establish vegetation.

- Construction activities shall minimize the removal of woody vegetation, the extent of the disturbed area, and the time in which areas remain in a disturbed state.
- Active measures shall be taken after construction and during routine maintenance to ensure diffuse flow of stormwater through the buffer.
- In wetlands, mats shall be utilized to minimize soil disturbance.

[3]Provided that poles or aerial infrastructure shall not be installed within 10 feet of a water body unless the City of Graham completes a no practical alternative evaluation as defined in Section 9.(A).

[4]Provided that, in Zone One, all of the following BMPs for underground utility lines are used. If all of these BMPs are not used, then the underground utility line shall require a no practical alternative evaluation by the City of Graham, as defined in Section 9.(A).

- Woody vegetation shall be cleared by hand. No land grubbing or grading is allowed.
- Vegetative root systems shall be left intact to maintain the integrity of the soil. Stumps shall remain, except in the trench where trees are cut.
- Underground cables shall be installed by vibratory plow or trenching.
- The trench shall be backfilled with the excavated soil material immediately following cable installation.
- No fertilizer shall be used other than a one-time application to re-establish vegetation.
- Construction activities shall minimize the removal of woody vegetation, the extent of the disturbed area, and the time in which areas remain in a disturbed state.
- Measures shall be taken upon completion of construction and during routine maintenance to ensure diffuse flow of stormwater through the buffer.
- In wetlands, mats shall be utilized to minimize soil disturbance.

[5]Perpendicular crossings are those that intersect the surface water at an angle between 75 degrees and 105 degrees.

C. Requirements for Categories of Uses

Uses designated in Section 8.(B) of this Section as exempt, allowable, and allowable with mitigation within a riparian buffer shall have the following requirements:

1. Exempt.
   Uses designated as exempt are permissible without authorization by the City of Graham provided that they adhere to the limitations of the activity as defined in Section 8.(B) of this Section, the Table of Uses. In addition, exempt uses shall be designed, constructed and maintained to minimize soil disturbance and to provide the maximum water quality protection practicable, including construction, monitoring, and maintenance activities.
2. Allowable.
   Uses designated as allowable may proceed provided that there are no practical alternatives to the requested use pursuant to Section 9.(A) of this Section. This includes construction, monitoring, and maintenance activities. These uses require written authorization from the City of Graham.
3. Allowable with Mitigation.
   Uses designated as allowable with mitigation may proceed provided that there are no practical alternatives to the requested use pursuant to Section 9.(A) of this Section and an appropriate mitigation strategy has

been approved pursuant to Section 9.(C). These uses require written authorization from the City of Graham.

Section 9. Permits Procedures, Requirements, and Approvals

A. Determination of No Practical Alternatives / Request for Authorization Certificate

1. Persons who wish to undertake uses designated as allowable or allowable with mitigation shall submit a request for a "no practical alternatives" determination to the City of Graham. The applicant shall certify that the project meets all the following criteria for finding "no practical alternatives":
   a. The basic project purpose cannot be practically accomplished in a manner that would better minimize disturbance, preserve aquatic life and habitat, and protect water quality;
   b. The use cannot practically be reduced in size or density, reconfigured or redesigned to better minimize disturbance, preserve aquatic life and habitat, and protect water quality; and
   c. Best management practices shall be used if necessary to minimize disturbance, preserve aquatic life and habitat, and protect water quality.
2. The applicant shall also submit at least the following information in support of their assertion of "no practical alternatives":
   a. The name, address and phone number of the applicant;
   b. The nature of the activity to be conducted by the applicant;
   c. The location of the activity, including the jurisdiction;
   d. A map of sufficient detail to accurately delineate the boundaries of the land to be utilized in carrying out the activity, the location and dimensions of any disturbance in riparian buffers associated with the activity, and the extent of riparian buffers on the land;
   e. An explanation of why this plan for the activity cannot be practically accomplished, reduced or reconfigured to better minimize disturbance to the riparian buffer, preserve aquatic life and habitat and protect water quality; and
   f. Plans for any best management practices proposed to be used to control the impacts associated with the activity.
3. Within 60 days of a submission that addresses Section 9.(A)(2) , the City of Graham shall review the entire project and make a finding of fact as to whether the criteria in Section 9.(A)(1) of this Section have been met. A finding of "no practical alternatives" shall result in issuance of an Authorization Certificate. Failure to act within 60 days shall be construed as a finding of "no practical alternatives" and an Authorization Certificate shall be issued to the applicant unless one of the following occurs:
   a. The applicant agrees, in writing, to a longer period;
   b. The City of Graham determines that the applicant has failed to furnish requested information necessary to the City of Graham decision;
   c. The final decision is to be made pursuant to a public hearing; or

d. The applicant refuses access to its records or premises for the purpose of gathering information necessary to the City of Graham's decision.

4. The City of Graham may attach conditions to the Authorization Certificate that support the purpose, spirit and intent of this Ordinance.
5. Any appeals of determinations regarding Authorization Certificates shall be referred to the Director of the Division of Water Quality, c/o the 401 Oversight Express Permitting Unit, or its successor. The Director's decision is subject to review as provided in G.S. 150B Articles 3 and 4.

B. Variances

1. Requirements for Variances.
Persons who wish to undertake prohibited uses may pursue a variance. The City of Graham Board of Adjustments may grant minor variances. For major variances, the City of Graham shall prepare preliminary findings and submit them to the Division of Water Quality, 401 Oversight Express Permitting Unit, or its successor for approval by the Environmental Management Commission. The variance request procedure shall be as follows:
   a. For any variance request, the City of Graham Board of Adjustments shall make a finding of fact as to whether there are practical difficulties or unnecessary hardships that prevent compliance with the riparian buffer protection requirements. A finding of practical difficulties or unnecessary hardships shall require that the following conditions are met:
      i. If the applicant complies with the provisions of this Ordinance, he/she can secure no reasonable return from, nor make reasonable use of, his/her property. Merely proving that the variance would permit a greater profit from the property shall not be considered adequate justification for a variance. Moreover, the City of Graham Board of Adjustments shall consider whether the variance is the minimum possible deviation from the terms of this Ordinance that shall make reasonable use of the property possible;
      ii. The hardship results from application of this Ordinance to the property rather than from other factors such as deed restrictions or other hardship;
      iii. The hardship is due to the physical nature of the applicant's property, such as its size, shape, or topography, such that compliance with provisions of this ordinance would not allow reasonable use of the property;
      iv. The applicant did not cause the hardship by knowingly or unknowingly violating this Ordinance;
      v. The applicant did not purchase the property after the effective date of this Ordinance, and then request a variance; and
      vi. The hardship is rare or unique to the applicant's property.

b. The variance is in harmony with the general purpose and intent of the State's riparian buffer protection requirements and this Ordinance and preserves its spirit; and
c. In granting the variance, the public safety and welfare have been assured, water quality has been protected, and substantial justice has been done.

2. Minor Variances
A minor variance request pertains to activities that will impact only Zone Two of the riparian buffer. Minor variance requests shall be reviewed and approved based on the criteria in Section 9.(A)(1) through Section 9.(A)(3) by the City of Graham pursuant to G.S. 153A-Article 18, or G.S. 160A-Article 19. The City of Graham may attach conditions to the variance approval that support the purpose, spirit and intent of the riparian buffer protection program. Request for appeals to decisions made by the City of Graham shall be made in writing to the Director of the Division of Water Quality c/o the 401 Oversight Express Permitting Unit, or its successor. The Director's decision is subject to review as provided in G.S. 150B Articles 3 and 4.

3. Major Variances
A major variance request pertains to activities that will impact any portion of Zone One or any portion of both Zones One and Two of the riparian buffer. If the City of Graham has determined that a major variance request meets the requirements in Section 9.(B)(1)) through 8.(C)(3), then it shall prepare a preliminary finding and submit it to the NC Environmental Management Commission c/o the Division of Water Quality, 401 Oversight Express Permitting Unit, or its successor, for approval. Within 90 days after receipt by the City of Graham, the Commission shall review preliminary findings on major variance requests and take one of the following actions: approve, approve with conditions and stipulations, or deny the request. Appeals from a Commission decision on a major variance request are made on judicial review to Superior Court.

C. Mitigation

1. This item shall apply to persons who wish to impact a riparian buffer in the Jordan watershed when one of the following applies:
d. A person has received an Authorization Certificate pursuant to Section 9.(A) of this Ordinance for a proposed use that is designated as "allowable with mitigation;" or
e. A person has received a variance pursuant to Section 9.(B) of this Ordinance and is required to perform mitigation as a condition of a variance approval.

2. Issuance of the Mitigation Approval
The City of Graham shall issue a mitigation approval upon determining that a proposal meets the requirements set out in this Ordinance. The approval shall identify at a minimum the option chosen, the required and proposed areas, and either the mitigation location or the offset payment amount as applicable.

3. Options for Meeting the Mitigation Requirement

The mitigation requirement may be met through one of the following options:

a. Payment of a compensatory mitigation fee to the Riparian Buffer Restoration Fund pursuant to 15A NCAC 02B .0269 (Jordan Water Supply Nutrient Strategy: Riparian Buffer Mitigation Fees to the NC Ecosystem Enhancement Program) contingent upon acceptance of payments by the NC Ecosystem Enhancement Program, or to a private mitigation bank that complies with banking requirements of the US Army Corps of Engineers, currently set out at http://www.saw.usace.army.mil/WETLANDS/Mitigation/mitbanks.html or from the US Army Corps of Engineers, P.O. Box 1890, Wilmington, NC, 28402-1890, and the applicable trading criteria in Rule 15A NCAC 02B .0273;
b. Donation of real property or of an interest in real property pursuant to Section 9.(C)(6) of this Ordinance; or
c. Restoration or enhancement of a non-forested riparian buffer pursuant to the requirements of Section 9.(C)(7) of this Ordinance.

4. The Area of Mitigation

The City of Graham shall determine the required area of mitigation, which shall apply to all mitigation options identified in Section 9.(C)(3) of this Ordinance and as further specified in the requirements for each option set out in this Section, according to the following:

a. The impacts in square feet to each zone of the riparian buffer shall be determined by the City of Graham by adding the following:
    i. The area of the footprint of the use causing the impact to the riparian buffer;
    ii. The area of the boundary of any clearing and grading activities within the riparian buffer necessary to accommodate the use; and
    iii. The area of any ongoing maintenance corridors within the riparian buffer associated with the use.
b. The required area of mitigation shall be determined by applying the following multipliers to the impacts determined in Section 9.(4)(a) of this Ordinance to each zone of the riparian buffer:
    i. Impacts to Zone One of the riparian buffer shall be multiplied by three;
    ii. Impacts to Zone Two of the riparian buffer shall be multiplied by one and one-half; and
    iii. Impacts to wetlands within Zones One and Two of the riparian buffer that are subject to mitigation under 15A NCAC 2H .0506 shall comply with the mitigation ratios in 15A NCAC 2H .0506.

5. The Location of Mitigation

For any option chosen, the mitigation effort shall be located within the same subwatershed of the Jordan watershed, as defined in 15A NCAC 02B.0262, and the same distance from the Jordan Reservoir as the proposed impact, or closer to the Reservoir than the impact, and as

close to the location of the impact as feasible. Alternatively, the applicant may propose mitigation anywhere within the same subwatershed of the Jordan watershed, as defined in 15A NCAC 02B.0262, provided that the mitigation proposal accounts for differences in delivery of nutrients to the affected arm of Jordan Reservoir resulting from differences between the locations of the buffer impact and mitigation. Additional location requirements for the property donation option are enumerated in Section 9.(C)(6)(c)(i) of this Ordinance.

6. Donation of Property
   Persons who choose to satisfy their mitigation determination by donating real property or an interest in real property shall meet the following requirements:
   a. The donation of real property interests may be used to either partially or fully satisfy the payment of a compensatory mitigation fee to the Riparian Buffer Restoration Fund pursuant to 15A NCAC 02B .0269. The value of the property interest shall be determined by an appraisal performed in accordance with Section 9.(C)(6)(d)(iv) of this Ordinance. The donation shall satisfy the mitigation determination if the appraised value of the donated property interest is equal to or greater than the required fee. If the appraised value of the donated property interest is less than the required fee calculated pursuant to 15A NCAC 02B .0269, the applicant shall pay the remaining balance due.
   b. The donation of conservation easements to satisfy compensatory mitigation requirements shall be accepted only if the conservation easement is granted in perpetuity.
   c. Donation of real property interests to satisfy the mitigation determination shall be accepted only if such property meets all of the following requirements:
      i. In addition to the location requirements of Section 9.(C)(5) of this Ordinance, the property shall be located within an area that is identified as a priority for restoration in, or is otherwise consistent with the goals of, the *Basinwide Wetlands and Riparian Restoration Plan for the Cape Fear River Basin* developed by NC Division of Water Quality pursuant to G.S. 143-214.10;
      ii. The property shall contain riparian buffers not currently protected by the State's riparian buffer protection program that are in need of restoration as defined in Section 9.(7)(d) of this Ordinance;
      iii. The restorable riparian buffer on the property shall have a minimum length of 1000 linear feet along a surface water and a minimum width of 50 feet as measured horizontally on a line perpendicular to the surface water;
      iv. The size of the restorable riparian buffer on the property to be donated shall equal or exceed the area of mitigation

responsibility determined pursuant to Section 9.(C)(4) of this Ordinance;

v. Restoration shall not require removal of man-made structures or infrastructure;

vi. The property shall be suitable to be successfully restored, based on existing hydrology, soils, and vegetation;

vii. The estimated cost of restoring and maintaining the property shall not exceed the value of the property minus site identification and transaction costs;

viii. The property shall not contain any building, structure, object, site, or district that is listed in the National Register of Historic Places established pursuant to Public Law 89-665, 16 U.S.C. 470 as amended;

ix. The property shall not contain any hazardous substance or solid waste;

x. The property shall not contain structures or materials that present health or safety problems to the general public. If wells, septic, water or sewer connections exist, they shall be filled, remediated or closed at owner's expense in accordance with state and local health and safety regulations;

xi. The property and adjacent properties shall not have prior, current, and known future land use that would inhibit the function of the restoration effort; and

xii. The property shall not have any encumbrances or conditions on the transfer of the property interests.

d. At the expense of the applicant or donor, the following information shall be submitted to the City of Graham with any proposal for donations or dedications of interest in real property:

i. Documentation that the property meets the requirements laid out in Section 9.(C)(6)(c) of this Ordinance;

ii. US Geological Survey 1:24,000 (7.5 minute) scale topographic map, county tax map, USDA Natural Resource Conservation Service County Soil Survey Map, and county road map showing the location of the property to be donated along with information on existing site conditions, vegetation types, presence of existing structures and easements;

iii. A current property survey performed in accordance with the procedures of the North Carolina Department of Administration, State Property Office as identified by the State Board of Registration for Professional Engineers and Land Surveyors in "Standards of Practice for Land Surveying in North Carolina." Copies may be obtained from the North Carolina State Board of Registration for Professional Engineers and Land Surveyors, 3620 Six Forks Road, Suite 300, Raleigh, North Carolina 27609;

iv. A current appraisal of the value of the property performed in accordance with the procedures of the North Carolina Department of Administration, State Property Office as

identified by the Appraisal Board in the "Uniform Standards of Professional North Carolina Appraisal Practice." Copies may be obtained from the Appraisal Foundation, Publications Department, P.O. Box 96734, Washington, D.C. 20090-6734; and

v. A title certificate.

7. Riparian Buffer Restoration or Enhancement

Persons who choose to meet their mitigation requirement through riparian buffer restoration or enhancement shall meet the following requirements:

a. The applicant may restore or enhance a non-forested riparian buffer if either of the following applies:
   i. The area of riparian buffer restoration is equal to the required area of mitigation determined pursuant to Section 9.(C)(4) of this Ordinance; or
   ii. The area of riparian buffer enhancement is three times larger than the required area of mitigation determined pursuant to Section 9.(C)(4) of this Ordinance;
b. The location of the riparian buffer restoration or enhancement shall comply with the requirements in Section 9.(C)(5) of this Ordinance;
c. The riparian buffer restoration or enhancement site shall have a minimum width of 50 feet as measured horizontally on a line perpendicular to the surface water;
d. Enhancement and restoration shall both have the objective of establishing a forested riparian buffer according to the requirements of this Item. Enhancement shall be distinguished from restoration based on existing buffer conditions. Where existing trees are sparse, that is greater than or equal to 100 trees per acre but less than 200 trees per acre, a buffer may be enhanced. Where existing woody vegetation is absent, that is less than 100 trees per acre, a buffer may be restored;
e. The applicant shall first receive an Authorization Certificate for the proposed use according to the requirements of Section 9.(A) of this Ordinance. After receiving this determination, the applicant shall submit a restoration or enhancement plan for approval by the City of Graham. The restoration or enhancement plan shall contain the following:
   i. A map of the proposed restoration or enhancement site;
   ii. A vegetation plan. The vegetation plan shall include a minimum of at least two native hardwood tree species planted at a density sufficient to provide 320 trees per acre at maturity;
   iii. A grading plan. The site shall be graded in a manner to ensure diffuse flow through the riparian buffer;
   iv. A fertilization plan; and
   v. A schedule for implementation;
f. Within one year after the City of Graham has approved the restoration or enhancement plan, the applicant shall present proof

to the City of Graham that the riparian buffer has been restored or enhanced. If proof is not presented within this timeframe, then the person shall be in violation of both the State's and the City of Graham riparian buffer protection program;

g. The mitigation area shall be placed under a perpetual conservation easement that will provide for protection of the property's nutrient removal functions; and

h. The applicant shall submit annual reports for a period of five years after the restoration or enhancement showing that the trees planted have survived and that diffuse flow through the riparian buffer has been maintained. The applicant shall replace trees that do not survive and restore diffuse flow if needed during that five-year period.

Section 10. Compliance and Enforcement

A. Site Inspections

1. Agents, officials, or other qualified persons authorized by the City of Graham may periodically inspect riparian buffers to ensure compliance with this ordinance.
2. Notice of the right to inspect shall be included in the letter of approval of each variance and buffer authorization.
3. Authority to Enter Property and Conduct Investigations and Inspections
   Authorized agents, officials or other qualified persons shall have the authority, upon presentation of proper credentials, to enter and inspect at reasonable times any property, public or private, for the purpose of investigating and inspecting the site of any riparian buffer. No person shall willfully resist, delay, or obstruct an authorized representative, employee, or agent of the City of Graham, while that person is inspecting or attempting to inspect a riparian buffer nor shall any person obstruct, hamper or interfere with any such representative while in the process of carrying out their official duties. The City of Graham shall have the power to conduct such investigations as deemed reasonably necessary to carry out the duties as prescribed in this Ordinance.
4. Notice of Violation
   a. If it is determined that a person has failed to comply with the requirements of this Ordinance, or rules, or orders adopted or issued pursuant to this Ordinance, a notice of violation shall be served upon that person. The notice may be served by any means authorized under G.S. 1A-1, rule 4. In the event service cannot be accomplished by registered or certified mail, it may be accomplished in any manner provided in rule (4)j of the North Carolina Rules of Civil Procedure.
   b. The notice shall specify the violation and inform the person of the actions that need to be taken to comply with this Ordinance, or rules or orders adopted pursuant to this Ordinance. The notice shall direct the person to correct the violation within a specified

reasonable time. The notice shall inform the person that any person who violates or fails to act in accordance with any of the provisions of this Ordinance or rules or orders adopted or issued pursuant to this Ordinance is subject to the civil and criminal penalties and other enforcement actions as provided in this Ordinance.

5. Power to Require Statements
   The City of Graham shall also have the power to require written statements, or the filing of reports under oath, with respect to pertinent questions relating to land-disturbing activities.

B. Civil Penalties

1. Assessment of Penalties
   Any person who violates or fails to act in accordance with any of the provisions of this Ordinance or rules or orders adopted or issued pursuant to this Ordinance shall be subject to a civil penalty. A civil penalty for a violation may be assessed in an amount not to exceed ten thousand dollars ($10,000) per day. If any violation for which a penalty may be assessed is continuous, a civil penalty may be assessed for each day of the violation in an amount not to exceed twenty-five thousand dollars ($25,000) per day for as long as the violation occurs. Each day of a continuing violation shall constitute a separate violation under Section 10.(B)(1).
2. Notice of Civil Penalty Assessment
   The governing body of the City of Graham shall provide written notice of the civil penalty amount and the basis for the assessment to the person assessed. The notice of civil penalty assessment shall be served by any means authorized under G.S. 1A-1, Rule 4, and shall direct the violator to either pay the assessment or contest the assessment, within thirty (30) days after receipt of the notice of assessment by written demand for a hearing.
3. Hearing
   A hearing on the civil penalty shall be conducted by the City of Graham City Council within 30 days after the date the written demand for the hearing is received by the City of Graham City Council. The conducting the hearing shall make its recommendation to the governing body of the City of Graham within 30 days after the date of the hearing.
4. Final Decision.
   The governing body shall issue a final decision on the civil penalty within 30 days of the recommended decision. A copy of the final decision shall be served on the violator by any means authorized under G.S. 1A-1, Rule 4.
5. Appeal of Final Decision.
   Appeal form the final decision of the governing body shall be to the Superior Court of the county in which the violation occurred. Any appeal must be filed with thirty days of receipt of the final decision. A

copy of the appeal must be served on the (City manager/other appropriate person) by any means authorized under G.S. 1A-1, Rule 4.

6. Demand for Payment of Penalty
   An assessment that is not contested is due when the violator is served with a notice of assessment. The civil penalty must be paid within 30 days or the assessment, if not appealed, or within 30 days after the conclusion of the administrative or judicial review of the assessment. If payment is not received within 30 days after demand for payment is made, the City of Graham may institute a civil action to recover the amount of the assessment. The civil action may be brought in the Superior Court where the violation occurred, or the violator's residence or principal place of business is located. Such civil actions must be filed within three (3) years of the date the assessment was due.
7. Use of Penalties
   [Civil penalties collected pursuant to this Ordinance shall be credited to the general fund of the City of Graham as nontax revenue.]

C. Criminal Penalties
   1. A violation of the provisions of this Ordinance or a rule or order adopted pursuant to this ordinance shall be punished as provided for in the North Carolina General Statutes for the violation of local ordinances. See. E.g., Section 14-4 of the North Carolina General Statutes. Violation may also be punishable under the provisions of Section 143-215.6B of the North Carolina General Statutes.

D. Injunctive Relief
   1. Civil Action in Superior Court
      Whenever the governing body of the City of Graham has reasonable cause to believe that any person is violating or threatening to violate this Ordinance or any rule or order adopted or issued pursuant to this Ordinance, it may, either before or after the institution of any other action or proceeding authorized by this Ordinance, institute a civil action in the name of the City of Graham for injunctive relief to restrain the violation or threatened violation. The action shall be brought in the Superior Court of Alamance County.
   2. Order to Cease Violation
      Upon determination by a court that an alleged violation is occurring or is threatened, the court shall enter any order or judgment that is necessary to abate the violation, to ensure that restoration is performed, or to prevent the threatened violation. The institution of an action for injunctive relief under this section shall not relieve any party to the proceedings from any civil or criminal penalty prescribed for violations of this Ordinance.

E. Compliance with Requirements
   Any person engaged in new activities as defined by this Ordinance who fails to meet the requirements of this Ordinance shall be deemed in violation of this Ordinance.

Section 11. Severability

If any one or more sections or portions thereof of this Ordinance are held to be invalid or unenforceable, all other sections and portions thereof shall nevertheless continue in full force and effect.

Section 12. Effective Date
This Ordinance will become effective upon approval by the NC Environmental Management Commission and adoption by the City of Graham City Council.

Section 13. Revisions to this Ordinance
The City of Graham shall review any revisions to the Riparian Buffer Protection Ordinance made by the Environmental Management Commission and, within 60 days of receipt of the recommended revisions, submit draft amendments to the Commission for its consideration and comments. Within 90 days after receipt of the Commissions' comments, the City of Graham will incorporate amendments into this ordinance.

Section 14. Definitions
For the purpose of this Ordinance, these terms shall be defined as follows:

A. 'Access Trails' means pedestrian trails constructed of pervious or impervious surfaces and related structures to access a surface water, including boardwalks, steps, rails, and signage.
B. 'Airport Facilities' means all properties, facilities, buildings, structures, and activities that satisfy or otherwise fall within the scope of one or more of the definitions or uses of the words or phrases 'air navigation facility', 'airport', or 'airport protection privileges' under G.S. 63-1; the definition of 'aeronautical facilities' in G.S. 63-79(1); the phrase 'airport facilities' as used in G.S. 159-48(b)(1); the phrase 'aeronautical facilities' as defined in G.S. 159-81 and G.S. 159-97; and the phrase 'airport facilities and improvements' as used in Article V, Section 13, of the North Carolina Constitution, which shall include, without limitation, any and all of the following: airports, airport maintenance facilities, clear zones, drainage ditches, fields, hangars, landing lighting, airport and airport-related offices, parking facilities, related navigational and signal systems, runways, stormwater outfalls, terminals, terminal shops, and all appurtenant areas used or suitable for airport buildings or other airport facilities, and all appurtenant rights-of-way; restricted landing areas; any structures, mechanisms, lights, beacons, marks, communicating systems, or other instrumentalities or devices used or useful as an aid, or constituting an advantage or convenience to the safe taking off, navigation, and landing of aircraft, or the safe and efficient operation or maintenance of an airport or restricted landing area; easements through, or interests in, air space over land or water, interests in airport hazards outside the boundaries of airports or restricted landing areas, and other protection privileges, the acquisition or control of which is necessary to ensure safe approaches to the landing areas of airports and restricted landing areas, and the safe and efficient operation thereof and any combination of any or all of such facilities. Notwithstanding the foregoing, the following shall not be included in the definition of 'airport facilities':

1. Satellite parking facilities;
2. Retail and commercial development outside of the terminal area, such as rental car facilities; and
3. Other secondary development, such as hotels, industrial facilities, free-standing offices and other similar buildings, so long as these facilities are not directly associated with the operation of the airport, and are not operated by a unit of government or special governmental entity such as an airport authority, in which case they are included in the definition of 'airport facilities'.

C. 'Channel' means a natural water-carrying trough cut vertically into low areas of the land surface by erosive action of concentrated flowing water or a ditch or canal excavated for the flow of water.

D. 'DBH' means diameter at breast height of a tree measured at 4.5 feet above ground surface level.

E. 'Development' means the same as defined in Rule 15A NCAC 2B .0202(23).

F. 'Ditch or canal' means a man-made channel other than a modified natural stream constructed for drainage purposes that is typically dug through inter-stream divide areas. A ditch or canal may have flows that are perennial, intermittent, or ephemeral and may exhibit hydrological and biological characteristics similar to perennial or intermittent streams.

G. 'Ephemeral stream' means a feature that carries only stormwater in direct response to precipitation with water flowing only during and shortly after large precipitation events. An ephemeral stream may or may not have a well-defined channel, the aquatic bed is always above the water table, and stormwater runoff is the primary source of water. An ephemeral stream typically lacks the biological, hydrological, and physical characteristics commonly associated with the continuous or intermittent conveyance of water.

H. 'Existing development' means development, other than that associated with agricultural or forest management activities, that meets one of the following criteria:
1. It either is built or has established a vested right based on statutory or common law as interpreted by the courts, for projects that do not require a state permit, as of the effective date of either local new development stormwater programs implemented under Rule 15A NCAC 2B .0265 (Jordan Water Supply Nutrient Strategy: Stormwater Management for New Development) or, for projects requiring a state permit, as of the applicable compliance date established in Rule 15A NCAC 2B .0271 (Jordan Water Supply Nutrient Strategy: Stormwater Management for New Development), Items (5) and (6); or
2. It occurs after the compliance date set out in Sub-Item (4)(d) of Rule .0265 (Jordan Water Supply Nutrient Strategy: Stormwater Management for New Development) but does not result in a net increase in built-upon area.

I. 'Greenway / Hiking Trails' means pedestrian trails constructed of pervious or impervious surfaces and related structures including but not limited to boardwalks, steps, rails, and signage, and that generally run parallel to the shoreline.

J. ‘High Value Tree’ means a tree that meets or exceeds the following standards: for pine species, 14-inch DBH or greater or 18-inch or greater stump diameter; or for hardwoods and wetland species, 16-inch DBH or greater or 24-inch or greater stump diameter.
K. ‘Intermittent stream’ means a well-defined channel that contains water for only part of the year, typically during winter and spring when the aquatic bed is below the water table. The flow may be heavily supplemented by stormwater runoff. An intermittent stream often lacks the biological and hydrological characteristics commonly associated with the continuous conveyance of water.
L. ‘Jordan nutrient strategy’ or ‘Jordan water supply nutrient strategy’ means the set of Rules 15A NCAC 2B .0262 through .0273 and .0311(p).
M. ‘Jordan Reservoir’ means the surface water impoundment operated by the US Army Corps of Engineers and named B. Everett Jordan Reservoir, as further delineated for purposes of the Jordan nutrient strategy in Rule 15A NCAC 2B .0262(4).
N. ‘Jordan watershed’ means all lands and waters draining to B. Everett Jordan Reservoir.
O. New Development’ means any development project that does not meet the definition of existing development set out in this Ordinance.
P. ‘Perennial stream’ means a well-defined channel that contains water year round during a year of normal rainfall with the aquatic bed located below the water table for most of the year. Groundwater is the primary source of water for a perennial stream, but it also carries stormwater runoff. A perennial stream exhibits the typical biological, hydrological, and physical characteristics commonly associated with the continuous conveyance of water.
Q. “Perennial waterbody” means a natural or man-made basin, including lakes, ponds, and reservoirs, that stores surface water permanently at depths sufficient to preclude growth of rooted plants. For the purpose of the State’s riparian buffer protection program, the waterbody must be part of a natural drainage way (i.e., connected by surface flow to a stream).
R. ‘Shoreline stabilization’ is the in-place stabilization of an eroding shoreline. Stabilization techniques which include “soft” methods or natural materials (such as root wads, or rock vanes) may be considered as part of a restoration design. However, stabilization techniques that consist primarily of “hard” engineering, such as concrete lined channels, riprap, or gabions, while providing bank stabilization, shall not be considered stream restoration.
S. ‘Stream restoration’ is defined as the process of converting an unstable, altered or degraded stream corridor, including adjacent riparian zone and flood-prone areas to its natural or referenced, stable conditions considering recent and future watershed conditions. This process also includes restoring the geomorphic dimension, pattern, and profile as well as biological and chemical integrity, including transport of water and sediment produced by the stream’s watershed in order to achieve dynamic equilibrium. ‘Referenced’ or ‘referenced reach’ means a stable stream that is in dynamic equilibrium with its valley and contributing watershed. A reference reach can be used to develop natural channel design criteria for stream restoration projects.

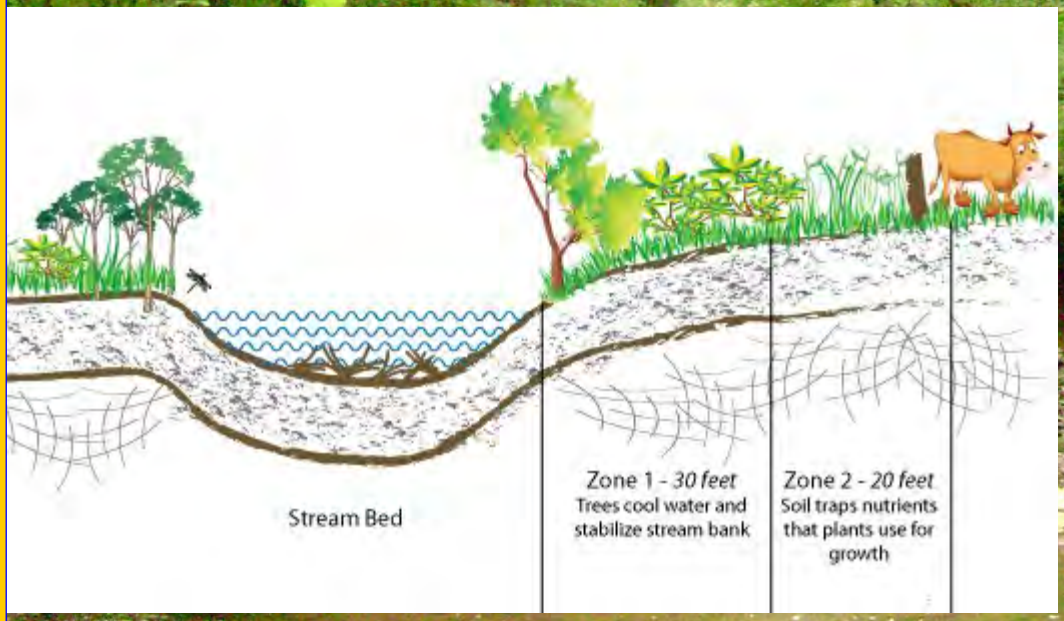
T. Stream” means a body of concentrated flowing water in a natural low area or natural channel on the land surface.
U. ‘Stump diameter’ means the diameter of a tree measured at six inches above the ground surface level.
V. “Surface waters” means all waters of the state as defined in G.S. 143-212 except underground waters
W. “Tree” means a woody plant with a DBH equal to or exceeding five inches or a stump diameter exceeding six inches.
X. ‘Temporary road’ means a road constructed temporarily for equipment access to build or replace hydraulic conveyance structures such as bridges, culverts, pipes or water dependent structures, or to maintain public traffic during construction.

Riparian Stream Buffers

What? A riparian buffer is an area along a stream that remains wooded and vegetated.

Why? Riparian buffers are essential in limiting stormwater pollution and nutrients that enter streams and go downstream. Streams without riparian buffers are more likely to experience erosion and degraded water quality.

When? The City passed a riparian buffer protection ordinance in fall of 2010 that established riparian buffers on streams that are shown on the USGS Quadmap and NRCS soil survey maps. A map of the affected streams and the ordinance can both be viewed at the City Planning Department.



Exemptions

A grandfather clause exists in the riparian buffer protection ordinance that allows existing uses to continue as long as the use is present and ongoing within the riparian buffer as of the implementation date of the ordinance.

However if these uses change then the buffer ordinance applies. If you have a question about existing or new uses of the buffer, please contact the City Planning Department.

Two Different Buffer Zones

- Zone 1 – An undisturbed or natural area that is 30' wide and runs parallel to the stream. Trees and vegetation located in this zone are not allowed to be cut or removed without approval from the City. In addition, buildings, parking lots, driveways, or other impervious surfaces (surfaces that water cannot penetrate) are prohibited in Zone 1.
- Zone 2 – A 20' wide strip that is adjacent to Zone 1 but with a few more maintenance allowances. For example, Zone 2 allows lawns to be maintained and trees to be removed. However, similar to Zone 1, buildings, parking lots, driveways, or other impervious surfaces are prohibited in Zone 2.

What do Riparian Buffers Do?

Stream Buffers are an essential part of a healthy ecosystem. They provide many benefits including:

- Improved Water Quality.
- Reducing Stream Bank Erosion.
- Limiting Flooding Impacts.
- Provide Habitat for Animals & Aquatic Insects.
- Controlling Water Temperature for Streams.
- Limiting Nutrient Runoff.

Questions?

Contact City Planning Department at
(336) 570 –6705.

City of Graham
Stormwater Permit Application

FOR OFFICE USE ONLY	
Review Fee:	
Permit No.:	
Date Issued:	
Date Paid:	
Check No.:	
Rec'd By:	

City of Graham Planning Department
Telephone: (336) 570-6705
Fax: (336) 570-6703

201 South Main St
Graham, NC 27253

City web site:
www.cityofgraham.com

Section A. SUMMARY INFORMATION

DEVELOPMENT NAME: _____

LOCATION: _____

PARCEL ID NO.: _____

TOTAL ACRES: _____ TOTAL DWELLING UNITS (if applicable) : _____

TOTAL DU/Acre: _____ % Built Upon Area: _____ TOTAL Built Upon Area: _____

☐ LOW DENSITY (no more than two dwelling units per acre or twenty-four percent built-upon area):

☐ HIGH DENSITY (exceeds the low density thresholds for dwelling units per acre or built-upon area)

Section B. APPLICANT INFORMATION

Owner (Owner or Developer)

Owner: _____ Phone No.: _____

Company: _____ Fax No: _____

Address: _____

_____ Zip: _____

Fax No: _____ Email Address: _____

Consultant (Person to contact regarding questions or revisions to the plan)

Contact Name: _____ Phone No.: _____

Company: _____ Fax No.: _____

Address: _____

_____ Zip: _____

Fax No: _____ Email Address: _____

ALL ITEMS ON THIS APPLICATION MUST BE ADDRESSED PRIOR TO SUBMITTAL.

ALL INCOMPLETE SUBMITTALS WILL BE RETURNED.

Section C. REQUIRED ITEMS CHECKLIST

The following checklists outline submittal requirements. Initial in the space provided to indicate the following submittal requirements have been met and supporting documentation is attached.

General Requirements:

Applicant's initials

_____1. Sheets shall be no larger than 36" x 24" plan and profile paper.

_____2. Minimum text size shall be 1/8".

_____3. Scale on plan view shall be no smaller than 1" = 50'; scale on profile view shall be no smaller than 1" = 50' horizontally and 1" = 5' vertically using a grid showing 1' intervals.

_____4. All drawings to be in North Carolina State Plane coordinate system.

_____5. Cover sheet shall have a vicinity map at a scale no smaller than 1" = 200'.

_____6. Provide a legend indicating existing and proposed lines, features and symbols.

_____7. Cover sheet shall include all general notes, owner's name, telephone number, and mailing address.

_____8. All elevations shall be given in relation to mean sea level; elevations in profile view shall be labeled in 10' intervals on the heavy lines (Ex. 350, 360).

_____9. Benchmark elevations and locations shall be shown on plan view.

_____10. Plan views shall have a north arrow on each drawing.

_____11. Each drawing shall have the following information in the title block: Street or project title, limits, horizontal and vertical scales, original date, revisions date, drawing number, checked by and drawn by. Recommended placement is lower right-hand corner.

_____12. All drawings sealed, signed and dated by a NC Professional Engineer or Landscape Architect.

_____13. A signed and sealed statement on the plans (if a high density project) certifying that the design of all stormwater management facilities and practices will control and treat the runoff from the from the first one inch of rain over the total drainage area, that the designs and plans are sufficient to comply with applicable standards and policies found in the *Stormwater BMP Design Manual*, and that the designs and plans ensure compliance with the City's Phase II Stormwater Ordinance.

_____14. Plan view shall show all actual street names. State road numbers shall be shown if applicable. Plan view should also indicate whether street is asphalt, concrete, gravel or dirt. Proposed street & Right-of-way widths will be dimensioned back-to-back and labeled in plan view.

_____15. Plan view shall show proposed and existing curb and gutter, pavement, storm sewers, drainage structures, driveway pipes, water mains, sanitary sewer mains, etc. All available elevations shall be shown on the profile view. Direction of flow shall be shown on plan view for all sanitary sewers and storm drains. Materials and pipe sizes shall be labeled.

_____16. Existing utility lines shall be shown and labeled on plan view and indicated in the legend.

_____17. Plans shall show final proposed locations and dimensions of all water, storm drain, and sanitary sewer lines, devices to be installed on the system, catch basins, culverts, ditches, including grades, pipes sizes, elevations, assumptions, calculations, invert elevations for all inlets and manholes and profiles of sanitary sewer lines.

_____18. All existing and proposed water, storm drainage and sanitary sewer easements shall be shown on all applicable sheets.

_____19. Number of dwelling units

_____20. Existing and proposed topographic lines (minimum 2-foot intervals).

_____21. City limits, county lines, and other jurisdiction lines, if any.

_____22. Streams, ponds, wetlands, etc. on the project site and within 50 feet of the property lines.

_____23. Location of floodplain and floodway (if applicable).

_____24. Location of drainage ways and easements.

Site Drainage Features:

_____25. Existing and planned drainage patterns (include off-site areas that drain through project) .

_____26. Any existing stormwater control systems.

_____27. Sub-watershed delineation showing drainage areas.

_____28. Show extent and number of disturbed acres.

_____29. Proposed impervious areas.

_____30. Soil information: type, special characteristics.

_____31. Name and classification of receiving water course.

Permanent Stormwater Control Measures (High Density only):

_____32. Type of BMP (wet pond, rain-garden, etc.).

_____33. Designer's certification.

_____34. Narrative description of proposed stormwater system (where runoff originates (e.g. roofs, roads, parking lots etc.), its conveyance within the project, its treatment, and its conveyance from the project to the receiving water body).

_____35. Profile along the centerline of the principal spillway/outfall pipe extending below the protected outfall or to the downstream structure.

_____36. Elevations of the "water quality" surface, temporary storage water surface, and the 10 and 100 year storms.

_____37. Stage-storage table for each BMP.

_____38. If BMP is to be used to treat construction site runoff, provide steps necessary to restore BMP to original design condition.

_____39. All necessary construction specifications.

_____40. Sequence of construction.

_____41. Individual drainage areas for each stormwater BMP.

_____42. Construction drawings and details for permanent measures.

_____43. Size and location of culverts.

_____44. Size and location of subsurface drainage conveyances.

_____45. Disclosure of party ultimately responsible for operation and maintenance of the stormwater system.

Stormwater Calculations:

_____46. Narrative description of calculations (methods, variables, assumptions, etc.) and results.

_____47. Stormwater BMPs designed in accordance with North Carolina Department of the Environment and Natural Resources-Division of Water Quality's *Manual of Stormwater Best Management Practices.*

_____48. Time of concentration for pre/post development conditions.

_____49. Pre-construction and post-construction runoff calculations for each outlet from the site (at peak discharge points).

_____50. Pre-construction and post-construction design calculations and hydrographs.

_____51. Design calculations of culverts and storm sewers.

_____52. Discharge and velocity calculations for open channel and ditch flows (easement & right-of-ways).

_____53. Design calcs of cross sections and method of stabilization of existing and planned channels (include temporary linings).

_____54. Design calcs and construction details of energy dissipators below culvert and storm sewer outlets (diameters & apron dimensions).

_____55. Amount and type of existing and proposed land use.

Operation and Maintenance Manual (for each BMP, High Density only):

_____56. Narrative description of the purpose and operation of the BMP.

_____57. Detailed list, description, and procedure of routine maintenance items.

_____58. Detailed list, description, and procedure of non-routine maintenance items.

_____59. Maintenance schedule.

_____60. Steps needed to restore BMP in the event of a failure.

_____61. Maintenance checklist and inspection form.

_____62. BMP construction drawings. Replace with record drawings when BMP is complete.

_____63. Latitude and longitude of each stormwater BMP.

Section D. ATTACHMENTS

- ☐ 3 sets of plans
- ☐ 1 set of calculations
- ☐ Operation and Maintenance Manual
- ☐ Application Fee

Section E. APPLICANT'S CERTIFICATION

Designer Certification:

I hereby certify that the design-related information submitted with this application for permit coverage was prepared under my direction or supervision and that the information is, in the exercise of my reasonable professional judgment, true, accurate and complete. I also hereby certify that the stormwater collection, treatment and control system design submitted with this application complies with all requirements of the City's Phase II Stormwater Ordinance.

Original Signature of Stormwater Designer	Title
Type or Print Name	

Owner Certification:

I hereby certify that I have read this application and agree to abide by the terms of any Stormwater Permit issued by the City of Graham.

Original Signature of Owner or Authorized Agent	Title
Type or Print Name	

City of Graham
Stormwater As-built Submission Form

FOR OFFICE USE ONLY	
Permit No.:	
Rec'd By:	
Date Rec'd:	

City of Graham Planning Department
Telephone: (336) 570-6705
Fax: (336) 570-6703

201 South Main St
Graham, NC 27253

City web site:
www.cityofgraham.com

Prior to obtaining a Certificate of Occupancy, the following items must be provided to the Graham Stormwater Administrator for approval. These will be compared to the approved stormwater permit application for any irregularities or non-conformance with the approved plans.

☐ As-built Drawings (2 paper copies)

☐ Electronic As-built Drawings (.dwg, .jpg, .tif, or pdf format.)

☐ Designer's Stormwater BMP Certification

The as-built drawings shall reflect the "as-constructed" condition of the development, and shall include sufficient information to demonstrate conformance with the approved stormwater permit application. Significant deviations from the approved plan shall be considered violations of the Graham Phase II Stormwater Ordinance and are grounds for the invocation of the injunctions and penalties defined therein, and/or withholding the release of any bond pending the completion of corrective action(s), and/or requiring a submittal of a revised stormwater permit application.

In the event that the Stormwater Administrator requires submittal of a revised plan, the revision shall include a description of the discrepancies between the site conditions and the prior approved stormwater permit application, along with design calculations that demonstrate that the as-built conditions comply with the Graham Phase II Stormwater Ordinance. Should the as-built conditions be shown to have a negative impact with regards to flooding, maintenance, erosion or water quality, the Stormwater Administrator has the authority to require other mitigation measures and proposed design plans to mitigate any potential impacts from the development.

Submitted By: _____ Date: _____
(Signature Required)

_____
(Print Name)

City of Graham

WET DETENTION POND

Engineer's Statement of Certification

FOR OFFICE USE ONLY
Permit No.: _____
Date Rec'd.: _____
Rec'd By: _____

City of Graham Planning Department
Telephone: (336) 570-6705
Fax: (336) 570-6703

201 South Main St
Graham, NC 27253

City web site:
www.cityofgraham.com

Description	**Design**	**As-built**
Slope of embankments (3:1)		
Elevations on the following:		
Bottom of pond		
Bottom of riser		
Top of riser		
Water quality hole		
Invert of inflow and outflow pipes		
Top of dam: Elevation and width		
Width of maintenance benches		
Anti-seep collars - size		
Size and material of riser/barrel		
Verification of volume:		
Permanent Sediment Storage (CF)		
Permanent Water Quality (SF)		
Temporary Water Quality (CF)		
Baffle location and top elevation		
Emergency Spillway - Width		
Emergency Spillway - Elevation		

I state to the best of my knowledge and belief that the permanent structural stormwater Best Management Practice(s) for _____ will control and treat the runoff from the first one
(name of plat)
inch of rain over the total drainage area, is duly recorded in the Office of the Alamance County Register of Deeds, and has been completed in conformance with the approved plans and specifications dated _____.
(approval date)

SIGNATURE _____ (Seal)

DATE _____

City of Graham

BIO-RETENTION

Engineer's Statement of Certification

FOR OFFICE USE ONLY	
Permit No.:	
Date Rec'd.:	
Rec'd By:	

City of Graham Planning Department
Telephone: (336) 570-6705
Fax: (336) 570-6703

201 South Main St
Graham, NC 27253

City web site:
www.cityofgraham.com

Bio-Retention Cell Identification:

_____

_____

Description	**Design**	**As-built**
Slope of embankments (3:1)		
Elevations on the following:		
Bypass Structure		
Surface		
Top of Dam		
Surface Area (SF)		
Ponding Area (SF)		
Minimum Volume Required (CF)		
Volume Provided (CF)		
Groundcover		
Underdrains		
Internal Water Storage Provided		
Size & Material of Bypass Structure		

I state to the best of my knowledge and belief that the permanent structural stormwater Best Management Practice(s) for _____ will control and treat the runoff from the first one
(name of plat)
inch of rain over the total drainage area, is duly recorded in the Office of the Alamance County Register of Deeds, and has been completed in conformance with the approved plans and specifications dated _____.
(approval date)

SIGNATURE _____ (Seal)

DATE _____

City of Graham

STORMWATER WETLAND

Engineer's Statement of Certification

FOR OFFICE USE ONLY
Permit No.: _____
Date Rec'd.: _____
Rec'd By: _____

City of Graham Planning Department
Telephone: (336) 570-6705
Fax: (336) 570-6703

201 South Main St
Graham, NC 27253

City web site:
www.cityofgraham.com

Bio-Retention Cell Identification:

_____

_____

Description	Required/Designed		As-built
Slope of embankments (3:1)			
Elevations on the following:			
Deep Pool			
Shallow Water			
Shallow Land			
Water quality hole - size			
Bypass Structure			
Emergency Spillway - Elevation			
Top of dam: Elevation and width			
Anti-seep collars/Filter Drainage Diaphragm			
Size and material of riser/barrel			
Volume (CF)			
Surface Area (SF) on following:			
Deep Pool			
Shallow Water			
Shallow Land			

I state to the best of my knowledge and belief that the permanent structural stormwater Best Management Practice(s) for _____ will control and treat the runoff from the first one
(name of plat)
inch of rain over the total drainage area, is duly recorded in the Office of the Alamance County Register of Deeds, and has been completed in conformance with the approved plans and specifications dated _____.
(approval date)

SIGNATURE _____ (Seal)

DATE _____

STORMWATER OPERATION AND MAINTENANCE AGREEMENT

For
Structural Stormwater Management Facilities

City of Graham

Structural Stormwater BMP Maintenance Agreement

THIS AGREEMENT, made this ____ day of _____, 20____, by and between _____, hereinafter referred to as the "OWNER(S)" and the City of Graham, North Carolina, hereinafter referred to as the "CITY",

WITNESSETH, that

WHEREAS, the OWNER is the owner of certain real property described as _____ as recorded by deed in the land records of Alamance County, (Alamance County tax Map/Parcel Identification Number) Deed Book _____ Page _____, Parcel Identification Number _____ hereinafter called the "Property".

WHEREAS, the OWNER is proceeding to build on and develop the property; and

WHEREAS, the Site Plan/Subdivision Plan known as _____,
(Name of Plan/Development)
hereinafter called the "Plan", which is expressly made a part hereof, as approved or to be approved by the CITY, provides for treatment of stormwater within the confines of the property; and

WHEREAS, the CITY and the OWNER, its successors and assigns, including any homeowners association, agree that the health, safety, and welfare of the residents of Graham, North Carolina, require that on-site structural stormwater BMP facilities be constructed and maintained on the Property; and

WHEREAS, the CITY requires that on-site structural stormwater Management facilities as shown on the Plan be constructed and adequately maintained by the OWNER, its successors and assigns, including any homeowners association.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The on-site structural stormwater Management facilities shall be constructed by the OWNER, its successors and assigns, in accordance with the plans and specifications identified in the Plan.

2. The OWNER, its successors and assigns, including any homeowners association, shall adequately maintain the structural stormwater BMP facilities in accordance with the approved Operation and Maintenance Manual(s). This includes all pipes and channels built to convey stormwater to the facility, as well as all structures, improvements, and vegetation provided to control the quantity and quality of the stormwater. Adequate maintenance is herein defined as good working condition so that these facilities are performing their design functions.

3. The OWNER, its successors and assigns, shall ensure the structural stormwater BMP facility is inspected by a qualified professional and shall submit an inspection report. The inspection report shall be due annually 30 days from the date of the final structural stormwater Management facilities construction inspection. The purpose of the inspection is to assure safe and proper functioning of the facilities. The inspection shall cover the entire facilities, berms, outlet structure, pond areas, access roads, etc. Deficiencies shall be noted in the inspection report.

4. The OWNER, its successors and assigns, hereby grant permission to the CITY, its authorized agents and employees, to enter upon the Property and to inspect the structural stormwater Management facilities whenever the CITY deems necessary. The purpose of inspection is to follow-up on reported deficiencies and/or to respond to citizen complaints. The CITY shall provide the OWNER, its successors and assigns, copies of the inspection findings and a directive to commence with the repairs if necessary.

5. In the event the OWNER, its successors and assigns, fails to maintain the structural stormwater Management facilities in good working condition acceptable to the CITY, the CITY may enter upon the Property and take <u>whatever steps necessary</u> to correct deficiencies identified in the inspection report and to charge the costs of such repairs to the OWNER, its successors and assigns. This provision shall not be construed to allow the CITY to erect any structure of permanent nature on the land of the OWNER outside of the easement for the structural stormwater Management facilities. It is expressly understood and agreed that the CITY is under no obligation to routinely maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the CITY.

6. For all structural stormwater Management facilities which are to be or are owned and maintained by a property owner's association or similar entity, the OWNER and the association shall enter into an escrow agreement with CITY. The agreement shall contain all of the following provisions:

    a. Acknowledgment that the association shall continuously operate and maintain the structural stormwater Management facilities.

    b. Establishment of an escrow account which can be spent solely for sediment removal, structural, biological or vegetative replacement, major repair, or reconstruction of the stormwater control measures and devices of the particular site plan or subdivision. If structural stormwater Management facilities are not performing adequately or as intended or are not properly maintained, the CITY, in its sole discretion, may remedy the situation, and in such instances the CITY shall be fully reimbursed from the escrow account. Escrowed funds may be spent by the association for sediment removal, structural, biological or vegetative replacement, major repair, and reconstruction of the structural stormwater Management facilities; provided that, the CITY shall first consent to the expenditure.

    c. Both OWNER contribution and annual sinking funds shall fund the escrow account. Prior to plat recordation or issuance of stormwater permits, whichever shall first occur, the OWNER shall pay into the escrow account an amount equal to fifteen (15) per cent of the initial construction cost of the structural stormwater Management facilities. Two-thirds (2/3) of the total amount of sinking fund budget shall be

deposited into the escrow account within the first five (5) years and the full amount shall be deposited within ten (10) years following initial construction of the stormwater control measure or device. Funds shall be deposited each year into the escrow account. A portion of the annual assessments of the property owners association shall include an allocation into the escrow account. Any funds drawn down from the escrow account shall be replaced in accordance with the schedule of anticipated work used to create the sinking fund budget.

d. Granting to the CITY a right of entry to inspect, monitor, maintain, repair, and reconstruct structural stormwater Management facilities.

e. Allowing the CITY to recover from the association and its members any and all costs the CITY expends to maintain or repair the stormwater control and management facility or to correct any operational deficiencies. Failure to pay to the CITY all of its expended costs, after thirty (30) days written notice, shall constitute a breach of the agreement. The CITY shall thereafter be entitled to bring an action against the association and its members to pay, or foreclose upon the lien herein authorized by the agreement against the property, or both in the case of a deficiency. Interest, collection costs, and attorney fees shall be added to the recovery.

f. A statement that this agreement shall not obligate the CITY to maintain or repair any stormwater control measure or device, and that the CITY shall not be liable to any person for the condition or operation of structural stormwater Management facilities.

g. A statement that this agreement shall not in any way diminish, limit, or restrict the right of the CITY to enforce any of its ordinances as authorized by law.

7. The OWNER, its successors and assigns, will perform the work necessary to keep these facilities in good working order as appropriate. In the event a maintenance schedule for the structural stormwater Management facilities (including sediment removal) is outlined on the approved plans, the schedule will be followed.

8. In the event the CITY, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the OWNER, its successors and assigns, shall reimburse the CITY upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the CITY hereunder.

9. This Agreement imposes no liability of any kind whatsoever on the CITY and the OWNER agrees to hold the CITY harmless from any liability in the event the structural stormwater Management facilities fail to operate properly.

10. This Agreement shall be recorded among the land records of Alamance County, North Carolina, and shall constitute a covenant running with the land, and shall be binding on the OWNER, its administrators, executors, assigns, heirs and any other successors in interests, including any homeowners association.

IN WITNESS WHEREOF, the parties have executed this agreement on the day and year first above written:

_____
Name of Company/Corporation/Partnership/Individuals (Seal if corporation)

By: _____

_____
(Type Name)

_____
(Type Title)

STATE OF NORTH CAROLINA

CITY OF _____

The foregoing Agreement was acknowledged before me this _____ day of _____ _____, 20___, by

_____

_____
NOTARY PUBLIC

My Commission Expires: _____

CITY OF GRAHAM, NORTH CAROLINA

_____
City of Graham (Seal)

By: _____

_____
(Type Name)

_____
(Type Title)

STATE OF NORTH CAROLINA

CITY OF _____

The foregoing Agreement was acknowledged before me this _____ day of _____ _____, 20___, by _____.

_____
NOTARY PUBLIC

My Commission Expires: _____

Approved as to Form:

_____ _____
City Attorney Date